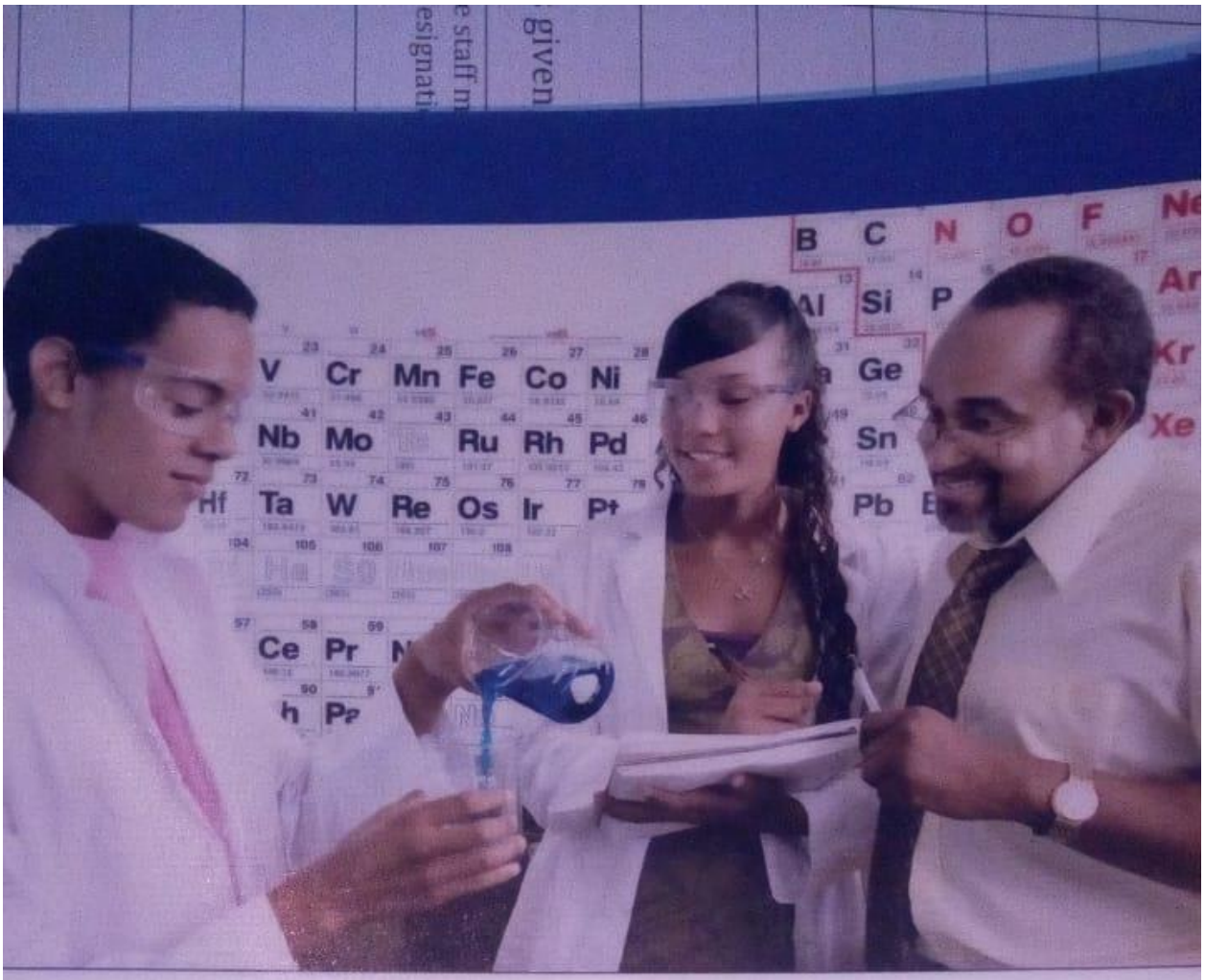

Manthapudi Sri Kameswara Rao

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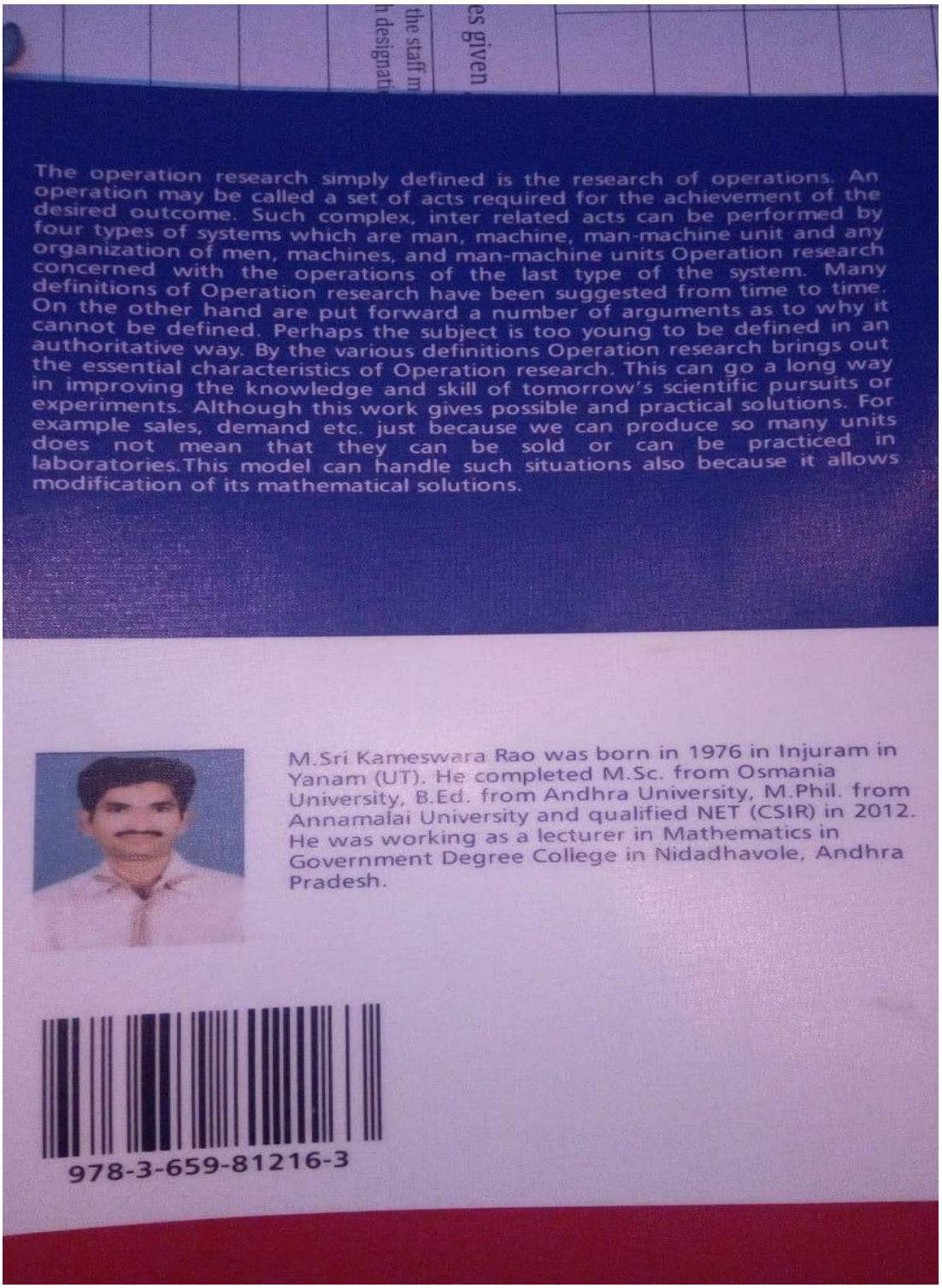

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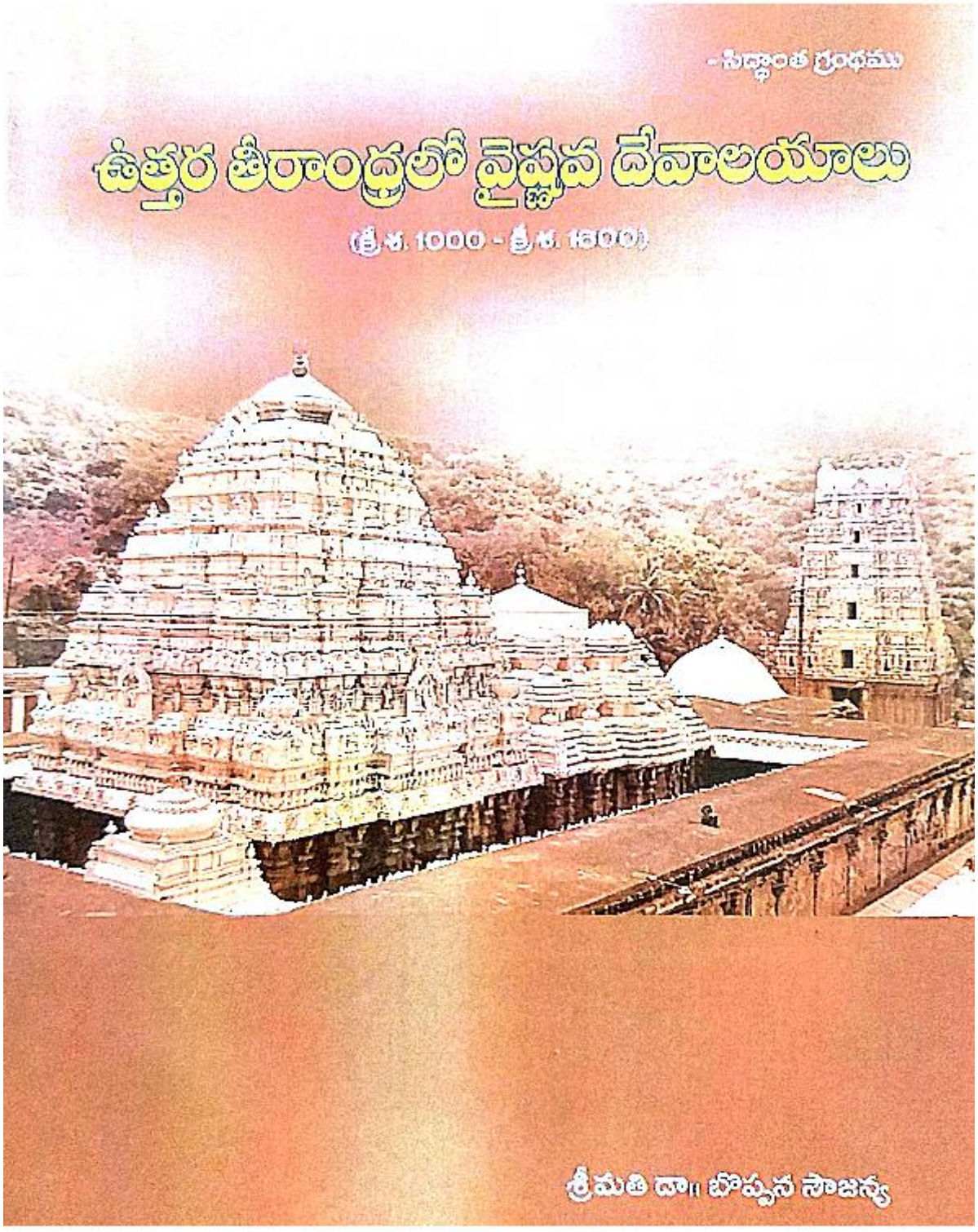
CHAPTER 18

Impact of Aquaculture on Environment and Need of Sustainable Practices

B. Chakravarthi and M. Vasantha Lakshmi

Aquaculture provides food security to the people and plays vital role in the economy of the country. Over recent years Aquaculture has led to substantial socio-economic benefits. But on the other side of the coin certain environmental issues have been arising which need attention of farmers, researchers and governments as well. In order to achieve the immediate objective of economic growth, culture practices were aimed at gaining maximum profit over the shortest period of time. Production systems have moved from managing the environment to intensive commercial practices characterized by high stocking densities and feed inputs and excessive mechanization pushing harvests beyond carrying capacities. The discharge of effluents released from Aquaculture is another problem. The coastal zone bears most of the ecological consequences of aquaculture development. These include habitat loss, excessive harvest of wild seed, damage to by catch, introduction of exotic species, escape of cultured species and spread of diseases etc. Coastal aquaculture causes salination of drinking water wells and farm fields and resistance exists against the conversion of farmland for aquaculture. The negative impact of shrimp culture on Mangroves is highly considerable, more than a third of mangrove forests have disappeared in the last two decades globally due to shrimp culture.

In India there is a lack of awareness about long-term sustainability with regard to fisheries and aquaculture. Unsustainable aquaculture will only generate short and medium term profits at the expense of long-term ecological balance and social stability. There are a number of alternatives for sustainable development of aquaculture which include ecological aquaculture, organic aquaculture, composite fish culture, integrated aquaculture and closed recirculatory systems. There is every need to integrate the objectives of economy, society and nature for sustainable development.



http://www.svrkgdc.ac.in/uploads/ssr/Vaishna%20Temples%20in%20Northern%20Coastal%20Andhra%20AD1000%20to%20AD1600%20(In%20Telugu)%20SVR%20GDC%20DPT%20of%20History%20.pdf

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Modern

Endowment of Different Social Classes to the Vaishnava Temples in Northern Coastal Andhra : An Inscriptional Study

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Generally in the middle of the 14th Century A.D., the Western World transformed into modern age and even in India, the state, society and economy were transformed from its medieval past towards its modern and colonial future[1]. It is well known fact that medieval period in India was an evidence of religions envious contention mainly in between the Hinduism and Islam. At that juncture reformation was started in Hinduism in the name of Bhakti Concept.

Ramanujacharya, the former one among the Bhakti Saints. He was the cause and responsible for the development and propagation of Vaishnavism in South India. Particularly based on the Epigraphical evidences it is came to known since A.D., 1000 onwards due to preaches and activities of Ramanuja, Anandathreertha[2], Naraharitheertha[3] and Krishna Chaitanya. A number of Vaishnava Temples were came into light and Vaishnavism, which gave importance of social equality. It was propagated maximum in Northern Coastal Andhra Region and it is propitious to Hinduism.

The present study is carried out to determine the Endowments of Different Social Classes to the Vaishnava Temples in Northern Coastal Region (the land in between Eleru to Bahuda River) during the Medieval period i.e. from 1000 A.D. to 1600 A.D. of Andhra Desa is called Northern Coastal Andhra. In this period the present study area was experienced with the rule of several dynasties viz., Eastern Gangas, Eastern Chalukyas, Kakatiyas, Reddy Kings, Gajapathis of Orissa, Vijayanagara Rulers and with the rule of petty local dynasties of Velanadu Chiefs, Chalukyas of Pithapuram Chalukyas of Yelamanchili, Matsya kings of Vaddadi, Pallavas of Veeraghattam etc., At that juncture besides the rulers of various dynasties, the subordinates Chiefs also built several temples and these temples were enriched by their magnificent grants like lands, villages, tanks, cash, perpetual lamps and etc., for its maintenance. By this process not only temples but also temple towns were raised. Temple played a vital role like banks in financial transactions of villages. Each temple had a treasury of its own and it sanctioned money in the form of loan to the villages. For the sake of cultivation and also utilized for the purposes of improving the tanks, canals and other irrigation works.

Thus the temples witnessed a new glory in medieval period and this shows inevitable role of the temples in the progress of economic life of people. The temple constructions by the rulers in the medieval period are still surviving in the

Northern Coastal Andhra. All these were also endowed with gifts of lands[4], villages[5], perpetual lamps[6] and etc., by different social groups. Regarding this we came to know by a Plethora of Inscriptional material and some of them are presenting as follows.....

An Inscription from Bhavanarayana Swamy Temple at Sarpavaram, East Godavari District dated A.D. 1073, states that a women named Meenavana Mahadevi donated 50 cows. According the Inscriptional evidence actually she gave 50 cows to Golla Meena Boina and he used to supply 1 Manika of ghee daily for the perpetual lamp in the temple[7].

In A.D. 1097 a Boya caste person named Mana Boya donated 50 cows to the Bavanarayana Swamy Temple at Sarpavaram for the perpetual lamp for the commemoration and merit of his father. And the same year he also once again donated 50 cows to the same God for the wick of perpetual lamp[8].

Two Tamil Inscriptions dated A.D. 1123 and A.D. 1201 from Sarpavaram, states that a Vysya person called Brahmamudi setty donated 50 cows to the Bavanarayana Swamy Temple of the same for the perpetual lamp[9].

An Inscription from Chalukya Bhimavaram, East Godavari District dated A.D. 1115, states that a certain person from Merchant Community named Mandavya a Vaisya of Chalukya Bhimavaram, East Godavari District. He was responsible for the construction of Narayana Swamy Temple and he donated 20 buffaloes for the perpetual lamp. This temple is called Mandvya Narayana Swamy Temple in the name of Mandavya[10].

In A.D. 1177, records the gift of land, made by Mallapa Deva for the maintenance of Mandavya Narayana Temple viz., Daily worship etc[11].

According to one Inscription (undated) from Namagiri, East Godavari District, It is came to known that one a common man Sambhu was the responsible for the Installation of Idols of Lakshmi and Dwarapalakas in the Venugopala Swamy Temple and Sambhu constructed temple whereas some of devotees constructed steps to Ardhamandapa of this temple[12].

One interesting note that a foreigner named Gayaki Bagala Devi from Srilanka visited Sri Kurmanadha Swamy Temple at Srikurmam, Srikakulam District and gifted valuable tributes in the year 1256 A.D.[13].

An Inscription from Mandavya Narayana Swamy Temple at Samarlakota, East Godavari District in the year A.D. 1272 states that Malli Reddy constructed a piller in Thiruchuttu Maliga[14].

An inscription dated A.D. 1353, states a women named Lakshmi Dasi got permission and some money from local ruler Mummadi Nayaka and meanwhile she also used to Pawn her daughters and gathered economical resources. Finally donated 2 villages to the temple at the time of installation of idol of Lakshmi Narasimha Swamy at Korukonda, East Godavari District[15].

Another Inscription dated A.D. 1294 states Narahariteerdha installed "Sita Rama Lakshmana idol at Srikurmam Temple[16] in Srikakulam District.

An Inscription from Srikurmam temple dated A.D. 1598 states a man he belongs to Thelaka caste. He donated one Ganugu for the maintenance of perpetual lamp[17].

An Inscription (undated) from Chodavaram 'Kesava Swamy Temple (Vizag Dist.) registers the two putties of land grant by the Yadavas of Juthada village to the God Kesava Swamy for perpetual lamp[18].

Another Inscription dated A.D. 1163 states Puravari Nurupootu he donated 10 Puttis of land to Suryanarayana Swamy Temple at Arasavalli, Srikakulam District[19].

The rulers of Northern Coastal Andhra forms a glorious period in the cultural history of medieval Andhra desa. They patronized Hinduism and as most of them they were the followers of Vaishnavism, they encouraged the participation of common people in the propagation of same by giving endowments in the form of cows, buffaloes, lands, and villages. In this connection, people from Yadav, Boya, Thelike, Sani and Setty castes used to donate gifts to the Vaishnava temples in Northern Coastal Andhra. Among the donors the unique one was a women named Lakshmi Dasi who used to mortgage her daughters even for the God Lakshmi Narasimha Swamy at Korukonda. So such type of contribution is unseen in the religious history of Northern Coastal Andhra particularly in Medieval period and came to known by the above evidences there were Vaishnavates even in abroad like Srilanka. This shows the propagation Vaishnavism in Srilanka also and religions contacts in between the present study area and Srilanka.

Thus the inscriptions of Vaishnava Temples in Northern Coastal Andhra states the Endowments of different social class.

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19. *SII Vol. – VI ; No. 731*

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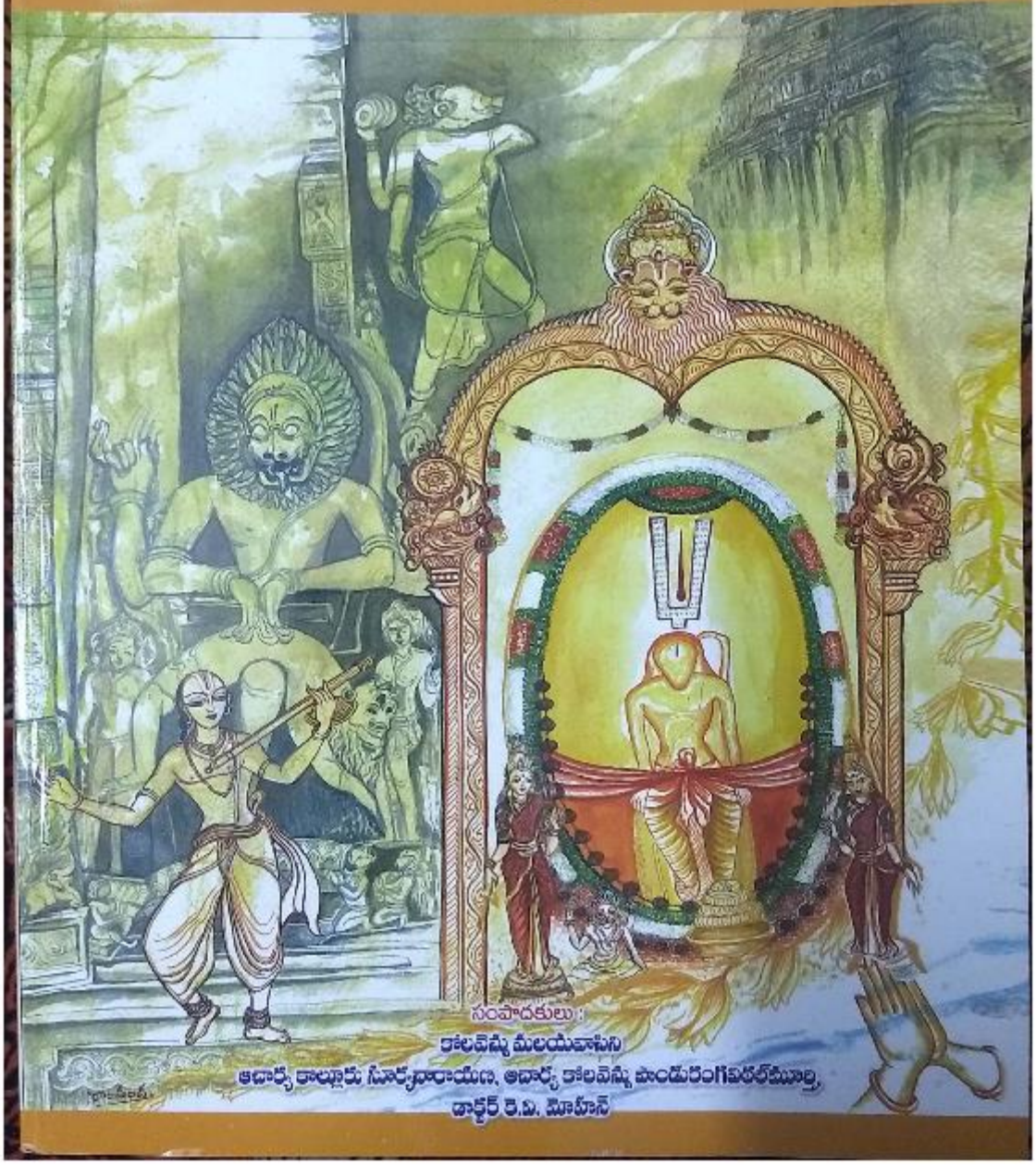
సింహాచల వైభవము



సంపాదకులు :

రాలవెల్మే మలయవాసిని

ఆచార్య కాట్లూరు సూర్యనారాయణ, ఆచార్య కోలవెన్ను పాండురంగవరలక్ష్మీదేవి,

డాక్టర్ కె.ఎ. మోహన్

సింహాచల క్షేత్రం - ద్వైతమతాధిపతులు

- శ్రీమతి దా॥ బొప్పన సౌజన్య
చరిత్ర శాఖ- గవర్నమెంటు కాలేజీ, రాజమహేంద్రవరం.
ఫోన్ : 8096632256

ఆంధ్రదేశములో సుప్రసిద్ధ నరసింహా క్షేత్రాలలో ఒకటి సింహాచలం. ఈ క్షేత్రంలో శ్రీ మహావిష్ణువు దశావతారాలలో తృతీయ చతుర్థ అవతారాల కలయికతో వరాహ నరసింహాదేవరగా దర్శనమివ్వడం విశేషం.

శ్రీ వరాహలక్ష్మీనరసింహాస్వామి దేవాలయం క్రీ॥శ॥ 9వ శతాబ్దానికి చెందినదని[1], ఇది ఒక శైవక్షేత్రమని, క్రీ॥శ॥ 11వ శతాబ్దములో శ్రీమద్ రామానుజులు ఈ క్షేత్రాన్ని వైష్ణవ క్షేత్రంగా మార్చినట్లు ప్రతీతి[2]. సుమారుగా ఐదు వందలకు పైగా శాసనాలు ఉన్న ఈ దేవాలయంలో ప్రస్తుతం మనకు లభ్యమైన మొదటి శాసనము క్రీ॥శ॥ 1087 సంవత్సరానికి చెందినది. ఈ శాసనములో స్వామి వారికి తిరునందనవనం కల్పించినట్లు, అప్పటికే ద్రావిడ వైష్ణవ సాంప్రదాయం అమలులో ఉన్నట్లు తెలుస్తోంది[3]. శక సంవత్సరం 1190 నాటి మరొక శాసనములో తూర్పు గాంగుల సేనాపతిచే ఆలయం పునరుద్ధరించ బడినట్లు తెలియుచున్నది[4]. ఈ క్షేత్రము పౌరాణికంగా కొన్ని యుగాల చరిత్రను సాక్ష్యాధారాలతో కలిగివుండగా, శాసన పరంగాను వేయి సంవత్సరాల చరిత్రను కలిగివుండి ఉత్తర తీరాంధ్రాను పాలించిన అనేక రాజవంశాల వారి పాలనలో సంరక్షించబడినది. చాళుక్య చోళులు, తూర్పుగాంగులు, వడ్డాది మత్స్యరాజులు, ఎలమంచిలి చాళుక్యులు, వీరఘట్టం పల్లవులు, కోరుకొండ ప్రభువులు, సూర్యవంశ గజపతులు, విజయనగర ప్రభువులు మొదలగు వారు వైష్ణవ మతాన్ని ఆదరించారు అనుసరించి పోషించారు. ముఖ్యంగా వారు వేయించిన అనేక దానశాసనాలే ఉత్తర తీరాంధ్రాప్రాంత చరిత్ర నిర్మాణానికి[5], మరియు ఈ ప్రాంతంలో వైష్ణవం ఎంతగా వ్యాపించినది అనే అంశాలు తెలుసుకోవడానికి ఉపయుక్త మగుచున్నవి.

కళింగాంధ్ర నేటి ఉత్తరతీరాంధ్రా ప్రాంతము భారతదేశములో ప్రసిద్ధి చెందిన అతి ప్రాచీన భూభాగాలలో ఒకటిగా పురాణ, ఇతిహాసాలలో జైన, బౌద్ధ వాఙ్మయాలలో పేర్కొనబడెను. ఈ ప్రాంతము విలక్షణమైన నైసర్గికతను కలిగి వివిధ రాజవంశాల పాలనలలో ఆంధ్రా కళింగ ప్రాంతాల సంస్కృతుల కలయికతో చారిత్రక స్వరూప స్వభావాలలో ప్రత్యేకతను సంతరించుకొన్నది. వంశధార నదీ ప్రాంతము నుండి గోదావరి నదీ పరివాహక ప్రాంతం వరకు క్రీ॥పూ॥ 7వ శతాబ్దంలో జైన, బౌద్ధ మతాలు బాగా వ్యాపించినాయి. క్రీ॥శ॥ 7వ శతాబ్దం నాటికి వీటి స్థానాన్ని వైదిక మత శాఖలైన శైవ, వైష్ణవాలు ఆక్రమించాయి. కాని శైవ వైష్ణవాల మధ్య పోటీ పెరిగి వైష్ణవానిదే పై చేయి అయినది. దీనికి గల కారణము ఉత్తర తీరాంధ్రాలో రాజకీయ కేంద్రాల వ్యవస్థాపన ఆధారంగా వైష్ణవ మత వ్యాప్తికి అనుకూల పరిస్థితులు ఏర్పడటమే.

మధ్యయుగ భారతదేశంలో ముస్లిం పాలకులు పశ్చిమాసియా దేశాలతో సంబంధాలు పెంపొందించుకొనడంతో భారతీయ సమాజంలో సంస్కృతిలో అనేక పరిణామాలు సంభవించాయి. పాలకులకు, పాలితులకు మధ్య సఖ్యత లోపించింది. భారతీయ సమాజాన్ని సంస్కృతిని కాపాడి ప్రజలలో మతం పై వున్న విశ్వాసాన్ని బలపరచుటకు భక్తి ఉద్యమము ప్రారంభమైనది. పరస్పర సంఘర్షణలకు, స్పర్ధలకు అతీతంగా భాగవతత్వాన్ని భక్తి ద్వారా అవగతం చేసిన సమన్వయం చేసిన బృహత్తర ఉద్యమం భక్తి ఉద్యమం. ఆళ్వార్లు భక్తి మార్గాన్ని భక్తి తత్వాన్ని ప్రాచుర్యం చేసారు. వీరు ఆలపించిన భక్తి గేయాలకు తాత్వికతను జతపరిచి తమ ఆధ్యాత్మిక అనుభూతులను మేళవించి వైష్ణవ మతాన్ని మరింత ప్రచారం చేసినవారు దక్షిణ భారతదేశంలో ఆచారత్రయంగా ప్రసిద్ధి పొందిన ఆదిశంకరులు, శ్రీమద్ రామానుజులు మరియు మధ్వాచార్యులవారు. శంకరులు బ్రహ్మ నిర్గుణుడని జీవునికి దేవునికి భేదం లేదని జగత్తు సత్యం కాదని ప్రభోదించగా రామానుజులు బ్రహ్మని నారాయణుడు, విష్ణువు అనే పేర్లతో పిలిచి తత్వమసి అనే సిద్ధాంతం ప్రకారం అద్వైతాన్ని, కొంత విశిష్టంగా చెప్పి విశిష్టాద్వైత సిద్ధాంతాన్ని ప్రతిపాదించారు. ఇక మధ్వాచార్యుల వారు భాగవతాన్ని ఆధారంగా చేసుకొని అద్వైతానికి విరుద్ధంగా జీవాత్మ వేరు పరమాత్మ వేరు జగత్ సత్యం అనే ద్వైత సిద్ధాంతాన్ని ప్రతిపాదించిరి. ఇలా వైదికమైన విష్ణువు, యోగ సంప్రదాయానికి చెందిన నారాయణుడు, చారిత్రక సంప్రదాయానికి చెందిన వాసుదేవ కృష్ణుడు అనే ముగ్గురుని సమన్వయం చేయడం వల్ల ఏర్పడిన ఈ వైష్ణవ మతం[7] దక్షిణ భారతదేశం నుండి మహారాష్ట్ర

గుడి గోడమీద సింహాచల దేవాలయోద్ధరణ చేసిన నరసింహ-1 యోగ ముద్రలో పద్మపీఠంపైన. పద్మపీఠం క్రింద చిన్న పద్మపీఠాలు రెండు. ఎడమ పక్క ఏనుగు, కుడి పక్క గుఱ్ఱం ఉన్నాయి. ఇరువైపుల సేవకులు ఉన్నారు.

బెంగాల్, ఆంధ్ర దేశములకు వ్యాపించినది. ముఖ్యంగా ద్వైత మతాధిపతులైన ఆనందతీర్థులు, నరహరి తీర్థులు మొదలగువారు విష్ణుదేవుని మతాన్ని ఉత్తరతీరాంధ్రాలో ప్రత్యేకంగా ప్రచారం చేయడాన్ని చూడవచ్చును.

మధ్వాచార్యుల అసలు పేరు వాసుదేవులు. పూర్ణప్రజ్ఞులుగా, ఆనంద తీర్థులుగా మధ్వాచార్యులుగా[8] పిలుపబడ్డారు. వీరు దక్షిణ కన్నడ జిల్లా ఉడిపి పట్టణ సమీపాన పాజక గ్రామములో క్రీ॥శ॥ 1238వ సంవత్సరంలో వేదవతి, మధ్యగేహ భట్టులకు జన్మించిరి. మధ్యగేయభట్ట అనగా నడిమిల్ల అని అర్థం. ఇప్పటికీ మునిఖండవాడలో నడిమింటి పేరు గల అనేక కుటుంబాల వారు గలరు. తూర్పు గోదావరి జిల్లా కోనసీమలో అంబాజీపేటసమీపాన గల మునిఖండవాడయే మధ్వాచార్యుల పూర్వీకుల స్వస్థలమని చెప్పుచున్నారు[9]. మధ్వాచార్యులను వాయుదేవుని మూడవ అంశ అని చెబుతారు[10]. నారాయణ పండితుని మధ్వవిజయం ప్రకారం ఆనందతీర్థుల వారి ఆధ్యాత్మిక గురువు పురుషోత్తమ తీర్థ బిరుదాంకితులైన అచ్యుత ప్రేక్షాచార్యులు అని తెలియుచున్నది. ఈ పురుషోత్తమ తీర్థనే శాసనాలు గుర్తిస్తున్నాయి.

ఆనందతీర్థుల వారు తురీయ దీక్ష స్వీకరించిన పిదప ద్వైత సిద్ధాంతమును ప్రతిపాదించుటయే గాక ఆసేతు హిమాచలం పర్యటన లను జరిపి అనేకమంది పండితులను జయించడం జరిగినది. బదరికా శ్రమంలో వుంటూ తిరుగు ప్రయాణములో ద్వైత సిద్ధాంత ప్రచారంలో భాగంగా ఆంధ్ర దేశమును పర్యటించారు. క్రీ॥శ॥ 1262 ప్రాంతంలో[11] ఉత్తరతీరాంధ్రాలో గోదావరి తీరప్రాంత మందు తెలుగువారైన శోభనభట్టు, శ్యామశాస్త్రి అనే అద్వైత పండితులతో చర్చలు జరిపి, మాయావాదంలో వారిని ఓడించారు. తదుపరి శోభనభట్టు పద్మనాభ తీర్థులని, శ్యామశాస్త్రి నరహరి తీర్థులు అనే పేర్లతో ద్వైతాన్ని స్వీకరించిరి. ఈ సంఘటనే ఆంధ్ర దేశములో ద్వైతమతము వ్యాప్తి చెందుటకు మార్గాన్ని ఏర్పరచినది. మధ్వాచార్యులు తంత్రసారం అనే గ్రంథము ద్వారా తన శిష్యులకు శ్రీకృష్ణ పూజా విధానమును ఉపదేశించి ద్వైత మత ప్రచారం చేసారు. (సింహాచల క్షేత్రంలో అనేక శాసనాలు ద్వైత మఠాధిపతుల సేవలను తెలియజేస్తున్నాయి.)

ద్వైత పీఠాధిపతుల పరంపరలో నరహరి తీర్థులు మూడవవారు. క్రీ॥శ॥ 1214 నాటి శాసనములో నరహరి తీర్థులను ఆనంద తీర్థుల అంతే వాసి అని గుర్తించడం జరిగినది. నరహరి యతి స్తోత్రం నరహరి తీర్థుల వారి పూర్తి జీవిత విశేషాలను అందిస్తున్నది. వీరి అసలు పేరు శ్యామశాస్త్రి గోదావరి తీర ప్రాంతానికి చెందినవారు[12]. వీరి పూర్వులు అనువంశికంగా తూర్పు గంగా ప్రభువుల కొలువులో అమాత్యులు. శ్యామశాస్త్రి వారి తండ్రి కూడా తూర్పు గాంగుల మంత్రులే. ఒకటవ భాను దేవుడు (క్రీ॥శ॥ 1264 - 1278), 2వ నరసింహదేవుల (క్రీ॥శ॥ 1278 - 1305) కాలాల్లో సింహాచలం మొదలగు వైష్ణవ క్షేత్రాల్లో ఉన్న అనేక శాసనాల్లో నరహరితీర్థులను బహుధా గుర్తించడం జరిగెను. వీరు ఆ శాసనాల్లో నరహరితీర్థ శ్రీపాదులు, నరహరి శ్రీ చరణులు, నృసింహముని అనే పేర్లతో పిలవబడడంతో బాటుగా కళింగాంధ్ర దేశంలో ఆధ్యాత్మిక, మతపరమైన విషయాల్లో నరహరి తీర్థుల ఉనికిని, ప్రాబల్యాన్ని వివరిస్తున్నాయి. క్రీ॥శ॥ 1203 నాటి శాసనములో వారి ఆశ్రమ జీవితానికి చెందిన కొన్ని వివరాలు తెలియుచున్నవి[13]. తానే స్వయంగా ఆరూఢాధికారి అయి, రాజపోషణ ఖచ్చితంగా గలిగిన వ్యక్తిగా తన మతసిద్ధాంతాల వైపు అనేక మందిని మళ్ళించడానికి తగిన అనుకూలత పొందిరి. కళింగ ప్రభువు తన వారసునిగా ఒక బాలుని నిలిపి మరణించగా ఆ బాలునికి యుక్త వయస్సు వచ్చే వరకు నరహరి తీర్థులను సంరక్షకునిగా వ్యవహరించమని ఆనందతీర్థులు ఆదేశించారు[14].

క్రీ॥శ॥ 1215 సంవత్సరంలో ఆయురారోగ్యైశ్వర్యాభివృద్ధికి గాను నరహరితీర్థులు సింహాచలంలో అఖండదీప వత్తికి ఏర్పాట్లు చేసారు. నరహరి తీర్థులు నిర్వహించిన ఇట్టి కార్యములు అనేక మందిని దైవభక్తి లోనికి పాదుకొల్పెను. దాని పలన సమ్మాన్యులైన ప్రభువర్గంలో కొందరు దానాలు చేశారని తెలియు చున్నది. మరణించిన తన సోదరుడు అన్నమరాజు సంస్మరణార్థం ఒడ్డాదికి చెందిన మత్స్య వంశ ప్రభువైన అర్జునుడు నరసింహ దేవునికి మనఃపూర్వకంగా శ.క. సంవత్సరం 1214లో సింహాచలంలో ఒక అఖండదీప వత్తికి దానమిచ్చాడు[15]. ఒడ్డాది ప్రభువైన అర్జునుని కుమారుడైన జయంతుడు నరహరి తీర్థులు చేసిన ఏర్పాట్లను బట్టి నరసింహదేవుని నిత్యపూజకు అవసరమయ్యే పుష్పాలకై ఒక బృందావనాన్ని ఏర్పరచాడు. ఈ రెండు శాసనాల వల్ల కళింగలో నరహరితీర్థులు ఎంత ప్రాబల్యం వహించారో అంతే ప్రాబల్యాన్ని ఒడ్డాదిలో కూడా వహించినట్లు తెలుసుకోవచ్చును17. దీనిని బట్టి మతపరమైన విషయాలలో నరహరి తీర్థులు చూపిన ప్రాబల్యం వల్ల మత ఆధ్యాత్మిక విషయాల్లో అనేకులు వారిని గురువులుగా స్వీకరించారని తెలియుచున్నది. వారిలో సామాన్యులు సమ్మాన్యులు కూడా ఉండటం గమనించదగినది.

శ.క. సంవత్సరం 1213 నాటి సింహాచల శాసనములో నరహరి మఠానికి చెందిన ఒక జగన్నాథ శ్రీపాదులను చెప్పడం వలన నరహరి తీర్థులు సింహాచలంలో ఒక మఠాన్ని నిర్మించి ఉంటారని అర్థమగుచున్నది. తన కార్యక్రమాల ద్వారా భక్తిని ప్రోత్సహించినట్లు తెలియుచున్నది[17]. ఆధారాలను బట్టి నరహరితీర్థులు గీతాభాష్యం, కర్మనిర్ణయ[18], భారత వ్యాఖ్యానము, దేశోప నిషత్తులకు టీకా, సూత్ర భాష్యములకు టీకా, విరల స్వామిపై భక్తిగేయాలైన నరసింహ ప్రవచనాలు మొదలగునవి సుమారు పదిహేను గ్రంథాలు వ్రాసిరి[19]. దశకూట విధానాన్ని ప్రవేశపెట్టారు[20]. వైష్ణవ దేవాలయాలలో మత సంబంధిత పాలనలో పర్యవేక్షకునిగా భోగపరీక్షగా నియమింపబడ్డారు[21]. శత్రువుల దాడుల నుండి వైష్ణవాలయాలను రక్షించి[22] ఉత్తరతీరాంధ్రా ప్రాంతంలో ద్వైతమత ప్రచారం చేస్తూ పండితునిగా, పాలకునిగా ద్వైత మఠాధిపతిగా ప్రముఖ పాత్రను పోషించారు. ద్వైత మతాచార్యులలో శ్రీ విద్యానిధి తీర్థులు ఒకరు. వీరి పూర్వాశ్రమ నామము కృష్ణాచార్యులు. శ.క. సంవత్సరం 1478లో ఆశ్రమ స్వీకారం తీసుకొనిరి. అరగోళ క్షేత్ర పీఠాధిపత్యం వహిస్తూనే మధ్వ మత సిద్ధాంతాలను నలుదిశలా వ్యాపించుటకు చేసిన ప్రయత్నములో భాగంగా సింహాచలం క్షేత్ర నరసింహదేవుని ఆరాధించినట్లు సాహిత్యాధారాల ద్వారా తెలియుచున్నది[23].

ద్వైత మతాచార్యులలో వ్యాసతీర్థులు ఒకరు. వీరి పూర్వాశ్రమ నానము వ్యాసరాయలు. నరహరి తీర్థుల వలె ద్వైత సిద్ధాంత వ్యాప్తితో పాటు కృష్ణదేవరాయల వారి సింహాసనాధిపత్యాన్ని బహు స్వల్పకాలం స్వీకరించి ఎన్నో వైష్ణవ దేవాలయాలకు మాన్యాలను ఇప్పించి వైష్ణవ మతవ్యాప్తికి కృషి చేసిరి. కృష్ణదేవరాయల వారికి ఒకసారి 'కుహయోగం' అనే అరిష్టం ప్రాప్తించగా ఆ సమయములో క్రీ.శ. 30-01-1521వ సంవత్సరంలో దోషనివారణకు వ్యాసతీర్థులే సింహాసనాధిపత్యం స్వీకరించి తదుపరి శ్రీకృష్ణ దేవరాయలను కుహయోగ ప్రమాదం నుండి తప్పించి సింహాసనం పై కూర్చోబెట్టిరి[24].

ఉత్తర తీరాంధ్రాలో మధ్వమత శాఖలలో మరొక ముఖ్యాంశము హనుమాన్ దేవాలయాల నిర్మాణము. మధ్వాచార్యులను వాయుదేవుని మూడవ అంశంగా పేర్కొంటారు. ఈ ప్రాంతాలలో ఉన్న వైష్ణవాలయాలలో ఆంజనేయస్వామి క్షేత్రపాలకునిగా వుండటం[26] గమనించదగినది. మధ్వమతాధిపతులు నేటికీ ఉత్తరతీరాంధ్రా ప్రాంతంలో వైష్ణవ మత సంరక్షకులుగా కొనసాగుచున్నారు. రాజమహేంద్రవరం (ఉత్తరాదిమఠం), పిఠాపురం, పెద్దాపురం పరిసర ప్రాంతాలలో మధ్వ కుటుంబస్థుల ఉనికి కనబడుతూనే ఉంది. ఈ విధంగా ఆంధ్ర కళింగ ప్రాంతాల మత సంస్కృతికి వారధిగా నిలిచిన సింహాచల క్షేత్రంలో ద్వైత మఠాధిపతులు చేసిన సేవలు సమాజంతో విస్తృతమైన సంబంధాలను పెంపొందించేలా చేసి, వైష్ణవం ఒక శక్తిగా విస్తరించుటకు మార్గాన్ని వేసాయి.

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SECTION - III : MODERN ANDHRA HISTORY

Presidential Address

శ్రీ శృంగార వల్లభరాయ స్వామి దేవాలయం

తిరుపతి, తూర్పు గోదావరి జిల్లా

శ్రీమతి దా॥ బొప్పన సౌజన్య, ఎం.ఎ., ఎం.ఫిల్., పి.హెచ్.డి.,
కాంట్రాక్ట్ అధ్యాపకురాలు, చరిత్రశాఖ, గవర్నమెంటు కళాశాల (అ), రాజమహేంద్రవరం.
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తూర్పు గోదావరి జిల్లా అనగానే గోదావరీ నదీ పవిత్రతను మనన చేసుకోవాలి. అట్టి ఈ ప్రాంతము ఎంతో పవిత్రతను, చారిత్రక ప్రాశస్త్యాన్ని కలిగివున్నది. కోరుకొండ[1], సామర్లకోట[2], పిఠాపురం[3], సర్పవరము[4], ద్రాక్షారామము[5], నామగిరి[6], సింహాచలం[7], శ్రీకూర్మం[8] మొదలగు ప్రాంతాలు రాజకీయ ఆధిపత్యాన్ని కలిగి ప్రముఖ శైవ, వైష్ణవ కేంద్రాలుగా కొనసాగి, అడుగడుగునా కళ్ళ ఎదుట కదలాడుతుంటాయి. వీటిలో కొన్నింటికి రాజకీయ ప్రాధాన్యత లేకపోయినప్పటికీ అచట ఉన్న మతసంస్థల ద్వారా తమ చారిత్రక ఉనికిని తెలియజేస్తున్నాయి అనడంలో సందేహం లేదు. ఈ క్రమంలో స్థానిక చరిత్రలకు ఆధారమైన గ్రామాలు దేశాభివృద్ధికే కాదు, మన గత మూలాలకు కూడా సాక్ష్యాలుగా నిలుస్తున్నాయి. అయితే ప్రచారం లేకపోతే ఎంతటి చరిత్ర గలిగివున్నప్పటికీ ఆ ప్రాంతాలు మరుగున పడిపోతాయి అనడంలో తిరుపతి గ్రామమే ప్రత్యక్ష నిదర్శనం. కాబట్టి ప్రాంతీయ స్థానిక చరిత్రలు భారతదేశ చరిత్ర రచనకు అధ్యయనానికి ఎంతో మౌళికమైనవి[9]. దక్షిణ భారతదేశం మీద ఎంతో విలువైన సమాచారాన్ని అందించే క్రమంలో ఆయా కాలాలలో నెలకొన్న రాజకీయ, ఆర్థిక మత మరియు సాంస్కృతిక విషయాలను పరిశీలించిన కల్నల్ కాలిన్ మెకంజీ ద్వారా స్థానిక చరిత్రలకు ఎంతో ఉపయుక్తంగా ఉన్న గ్రామ కైఫియత్తులను సేకరించాడు.

తూర్పు గోదావరి జిల్లాలో పెద్దాపురం మండలములో ఉన్న తిరుపతి[10] అనే గ్రామము కిర్లంపూడి – ప్రత్తిపాడు రోడ్డు మీదుగా సామర్లకోట రైల్వే స్టేషన్ నుండి 15 కి.మీ. దూరంలో గలదు మరియు కాకినాడ నుండి 31 కి.మీ. దూరములో గలదు. ఈ తిరుపతి గ్రామానికి తూర్పు వైపున 2 కి.మీ. దూరంలో దివిలి అనే ప్రాచీన గ్రామం కలదు. పడమర వైపు జగ్గంపేట, ఉత్తరమున కిర్లంపూడి మరియు దక్షిణాన పెద్దాపురం టౌన్ కలదు. ఈ గ్రామాన్ని ఆనుకొని దక్షిణము వైపు ఏలేరు కాలువ ప్రవహిస్తోంది. తిరుపతిలో కొలువైన స్వామివారు "శ్రీ భూసమేత శృంగార పల్లభరాయ స్వామి". ఈ దేవాలయంలో సుమారుగా ఎనిమిది శాసనాలు కలవు. ఎక్కువ భూదాన శాసనాలు. వీటి కాలక్రమణికను బట్టి ఈ దేవాలయం క్రీ॥శ॥ 12, 13, 14 శతాబ్దాల నాటికే నిర్మింపబడివున్నట్లు తెలియుచున్నది. ఈ గ్రామము తొలి తిరుపతిగా, చదలాడ తిరుపతిగా మరియు కొమరగిరిపురము[11]గా పిలువబడుతోంది. అలాగే ఈ క్షేత్రంలో వెలసిన శ్రీ శృంగార రాయుని పేరు మీదుగా కూడా ఈ గ్రామానికి దగ్గరలో శృంగారదార అగ్రహారము, శృంగవరము, తిరుపతమ్మ పేట మొదలగు పేర్లతో ఊళ్ళు ఉన్నాయి[12].

ఈ గ్రామము ప్రాచీన కాలంలో ప్రోలునాడు[13]లో అంతర్భాగముగా ఉండేది. ప్రోలునాడు పెద్దాపురం, పిఠాపురము తాలూకాలు కలసిన భూభాగము. ఈ ప్రాంతము గుప్త సామ్రాజ్యాలలో అంతర్భాగము. వీరి అనంతరం చేది వంశస్థుడైన భారవేలుడు తన అధికారాన్ని కళింగ వరకు విస్తరించినట్లు అతని శాసనం తెలియజేస్తున్నది. ఆంధ్రదేశములో మొట్ట మొదటగా వ్యవస్థీకృతమైన రాజ్యవ్యవస్థగా చెప్పే ఆంధ్ర శాతవాహనుల పాలనా కాలానికి సంబంధించిన అనేక శాసనాలు, నాణాలు ఈ ప్రాంతంలో లభ్యమైనవి. వీరి అనంతరం రాజకీయాలలో అనిశ్చితి వలన అనేక ప్రాంతీయ రాజ్యాల స్థాపన జరిగినది. క్రీ॥శ॥ 624 తూర్పు చాళుక్య రాజ్యస్థాపనతో ఆంధ్రాలో మధ్యయుగం ప్రారంభమైనదని చరిత్రకారుల అభిప్రాయము. వీరు కృష్ణా, గోదావరి నదుల మధ్య ప్రాంతాన్ని వేంగి రాజధానిగా చేసుకొని పరిపాలించారు. తూర్పు చాళుక్య వంశ స్థాపకుడు కుబ్జవిష్ణు వర్ధనుడు వైష్ణవ భక్తుడు. అతని శాసన ప్రశస్తిలో పరమభాగవతుడుగా కీర్తించబడెను[14]. వీరి అనంతరం చాళుక్య చోళులు, పిఠాపురం చాళుక్యులు, కాకతీయులు, రెడ్డిరాజులు, ఒరిస్సా గజపతులు మరియ పెద్దాపురం జమీందార్లు కూడా ఈ ప్రాంతాన్ని పరిపాలించిరి. తిరుపతి క్షేత్రములో శ్రీ శృంగార రాయస్వామి దేవాలయములో కాలక్రమణిక గల కొన్ని శాసనాలలో ఉన్న సమాచారాన్ని బట్టి ఈ ప్రాంతాన్ని రెడ్డిరాజులు, గజపతులు, రఘుదేవపురపు జమీందార్లు, పెద్దాపురం జమీందార్లు పరిపాలించినట్లు తెలుస్తోంది. వీరు తిరుపతి దేవాలయానికి భూదానాలు చేసినట్లు తెలుస్తోంది. శక సంవత్సరం కాలక్రమణిక

లేని ఒక శాసనములో కపిలేశ్వరపుర రాయల రాజ్యాన ఏలిన కాలమందు దేవగణ పిళ్ళరు భండారు అధికారి శ్రీ పురోహిత అధికారమందు శ్రీ శృంగార రాయుని తిరుపతి మహాజనుల సమక్షంలో భాస్కరభట్లవారు - 15; మాధవ భట్లవారు 1 ; ఒంటెద్దుదోన 10 క్షేత్రాలు శ్రీ శృంగార రాయుడికి సమర్పించినట్లు గలదు[16]. పెద్దాపురం సంస్థాన జమీందార్లు పోషణలో కూడా ఈ దేవాలయం అభివృద్ధి చెందినది. శక సంవత్సరము 1365కు సరియగు క్రీ॥శ॥ 1443 సంవత్సరము నాటి దుందుభినామ సంవత్సర కార్తీక శుక్రవారం శ్రీ శృంగార రాయుని సన్నిధిలో ఆళ్వారులను ప్రతిష్ఠించినట్లు ప్రతాపవత్సవాయ అయ్యప దేవమహారాజులు ఆళ్వారుల ఆరగింపులకు తిరుపతికి ఉత్తరాన శ్రీ రామానుజియ్యార్ గారి సమక్షంలో శ్రీ శృంగార రాయునికి కాలోచిత మూల్యం సమర్పించినట్లు శాసన సమాచారం[16]. గోదావరి మండలములో ప్రసిద్ధి చెందిన సంస్థానాలలో పెద్దపురము ఒకటి. ఈ సంస్థానపు మొదటి పాలకుడు శ్రీ తిమ్మరాజుగారు ఈయన ఫరాక్రమమును ఏనుగు లక్ష్మణకవి రామవిలాసములో వర్ణించెను. 1555 నాటికే సంస్థానం ఏర్పడినది. ఈ సంస్థానము1837లో బ్రిటీష్ వారి ఆధీనమైనది[17].

మధ్యయుగ ఆంధ్రదేశములో దేవాలయాలు బలమైన రాజకీయ, ఆర్థిక పరిపుష్టిని సాధించాయి[18]. దీనికి కారణము ఆ కాలంలో జనాభా పెరుగుదల, అటవీ నిర్మూలన, వ్యవసాయ క్షేత్రాలను అభివృద్ధి చేసే క్రమంలో[19] జైన బౌద్ధాలు తమ ఉనికిని కోల్పోయి ద్రావిడ ఆర్యమతం క్రమంగా పూర్వ ఆదరణను పొంది శైవవైష్ణవాలుగా వ్యాప్తి చెంది ఇష్టదేవతారాధన, ఆలయ నిర్మాణాలు ప్రారంభమయ్యెను. ఈ పద్ధతిలో భక్తుడు తనని తాను సంపూర్ణంగా భగవంతునికి సమర్పించుకుంటాడు. ఈ సందర్భాన్ని భూస్వాములు, కౌలుదారుల మధ్య ఉన్న సంబంధంతో పోల్చవచ్చు[20]. ఈ విధంగా రాజుకు ప్రజల నుండి రాజకీయ మద్దతు లభించును. అనంతరం ఆర్థిక వనరుల సమీకరణకు జయించిన ప్రాంతాల నుండి కప్పం వసూలు చేస్తూ తన పట్ల విధేయత చూపి విశ్వసించిన వారికి[21] బ్రహ్మదేయాలు, అగ్రహారాలు ఇచ్చి వాటిని పన్నుల నుండి మినహాయింపు ఇచ్చి వారిని రాజ్య నిర్వహణలో భాగస్వాములను చేశాడు. కాలగమనములో ఆర్థిక వనరుల సమీకరణలో బ్రహ్మదేయాలను తగ్గించి దేవదానాల సంఖ్య పెంచెను. ఇలా మధ్య యుగంలో ఫ్యూడలీజం చాలా కాలం కొనసాగుట చేత భక్తి సాంప్రదాయం భారతీయ సంస్కృతిలో చొచ్చుకుపోవడం రాజ్యపాలనపై ప్రజలకు విశ్వాసం పెరుగుట ప్రధాన లక్షణాలు కనిపిస్తాయి. ఇలా దేవాలయాలు ఆర్థిక సామ్యవాదాన్ని ఎలా బలపరచుచున్నదో తెలుస్తోంది[22]. తేది లేని ఒక సం॥ శాసనంలో తిరుపతిలో శ్రీ శృంగార రాయ దేవాలయానికి శోభకృత సంవత్సర కార్తీక మాసములో గౌడ కపిలేశ్వర రాయమహారాజు రాజ్యాన పాత్ర బెహరాలకు సుకృతంగా కనక సహస్ర మల్లయ్యంగారి తమ్ముడు కేదా సహస్ర మల్లయ్యంగారు శృంగారరాయ సన్నిధిలో శ్రీవైష్ణవులకు 7 తూముల భూమిని దానంగా ఇచ్చినట్లు శాసన సమాచారం[23]. ఈ భూదాన ప్రధాన ఉద్దేశ్యం ఏ సేవ నిమిత్తం దానం చేయబడిందో ఆ సేవ శాశ్వతంగా నిరాటంకంగా కొనసాగాలనే ఆకాంక్ష మరియు దాతల విశ్వాసము. ఈ క్షేత్రాల నుండి అవసరమయ్యే ఆహార ధాన్యాలు, ఫలాలు, పుష్పాలు, బృందావనాలు సమర్పించబడేవి[24]. శక సంవత్సరం 1330కి సరియగు క్రీ॥శ॥ 1408 సంవత్సరం నాటి శాసనములో తిరుపతిలో శ్రీ శృంగార రాయునికి సర్వధారి సంవత్సర మార్గశిర శుక్లపక్ష సోమవారంనాడు కొమరగిరిపురపు శ్రీ శృంగార రాయునికి కాటమరెడ్డి వేమారెడ్డి తోడబుట్టువైన కొమారుని మల్లసానమ్మ గారికిని తమ తండ్రి కన్నిహోరాజు గారికిని సకృతంగా కాలోచిత మూల్యం సమర్పించి శ్రీ బృందావనమును తిరుపతికి దగ్గరలో పదమర ఏర్పాటు చేసినట్లు శాసన సమాచారం ద్వారా తెలియుచున్నది[25].

లొంగని ప్రకృతి శక్తులను ప్రాచీన మానవులు దైవిక శక్తులుగా భావించి పూజించినట్లు తెలుస్తోంది. ఆర్య ద్రావిడ మతభావాల సమ్మేళనంగా విశిష్టమైన భారతీయ మతభావ జాలం క్రమక్రమంగా హిందూమతంగా పిలువబడినది. ఏ ఒక్క దేవునికో కాక అనేక దేవతలు వారి శక్తులతో కూడినదై చెదును అంతం చేయుటకు హిందూమతం ఉద్దేశింపబడినది. ఇలా హిందూమతంలో అనేక దేవతల ఆరాధనా ఒక విశిష్ట పూజా విధానం ప్రతిమా లక్షణాలు సంతరించుకొన్నాయి[26]. వైదిక మతంలో ప్రధాన శాఖలైన శైవ వైష్ణవాలలో వైష్ణవంకు ఆంధ్ర దేశములో జరిగిన మత వికాస పరిణామ క్రమాన్ని రెండు దశలుగా విభజింపవచ్చు. మొదటి దశ క్రీ॥పూ॥ నుండి క్రీ॥శ॥ 10వ శతాబ్దము వరకు ఈ దశలో అనగా క్రీ॥శ॥ 7వ శ॥లో జైన బౌద్ధాల ప్రాధాన్యత పెరిగెను. ఇవి ప్రధానంగా వైదికములో ఉన్న యజ్ఞ యాగాది కర్మకాండలను, వర్ణవ్యవస్థను తీవ్రంగా వ్యతిరేకించాయి. ఈ క్రమంలో వైదిక మతము నశించిపోవు స్థితి ఏర్పడినది. ఇట్టి క్లిష్ట పరిస్థితులలో వైష్ణవ మతాన్ని జనసామాన్యంలోకి తెచ్చినది పన్నిద్దాళ్వారులు. వీరి కృషి వల్ల వైదిక ధర్మము పునరుజ్జీవనం పొందినది[27] ఇక రెండవ దశ క్రీ॥శ॥ 10వ శతాబ్దము నుండి క్రీ॥శ॥ 16వ శతాబ్దము వరకు. ఈ దశలో రామానుజాచార్యులు శ్రీ వైష్ణవ మతశాఖకు బహుళ ప్రాచుర్యం కల్పించారు. నాదముని, యమునాచార్యులు, ఆనందతీర్థులు, చైతన్య మహాప్రభో, నరహరితీర్థులు కృషి విశేషమైనది. తత్ పర్యవసానంగా శైవం స్థానంలో వైష్ణనంకు క్రమేణా ఆదరణ లభించినది. కాకతీయుల పతనానంతరము

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రెడ్డి వంశీయులలో కుమారగిరి కాలం నుండి వైష్ణవం ప్రబలమైనది. గోదావరి తీరమున కోరుకొండలో తమిళనాడు నుండి వచ్చిన పరాశర భట్టార్ ముమ్మిడి నాయకుని కాలంలో ఒక వైష్ణవాలయాన్ని నిర్మింపజేసారు. అలాగే పశ్చిమాంధ్రాని పాలించిన విజయనగర వంశంలో చివరి రాజులలో సాళువ నరసింహరాయలు పూర్ణ వైష్ణవ భక్తుడు. అప్పటి నుండి తిరుపతి ప్రధాన వైష్ణవ మతకేంద్రమైనది. వైష్ణవ కేంద్రాలలో మఠాలను స్థాపించి వేదవిద్యని ప్రోత్సహించారు. కాలక్రమంలో రామానుజల పిదప వైష్ణవంలో ద్రావిడాచార్య తెంగళై (త్యాగం ప్రపత్తిలో భాగం) సంస్కృతాచార్య వడగళై (కాదు అని) సంప్రదాయాలు ఏర్పడెను. పూజా విధానములో కూడా పాంచరాత్ర (ఐదు జ్ఞానములు)లో నారాయణుడై, కర్త అని, వైఖానసలో విష్ణువును నిర్మాణాత్మకంగా ఆరాధించడం జరిగినది.

దేవుని ఆరాధన లేని ఇల్లయినా, గ్రామమైనా అమంగళకరము. దేవాలయము లేని ప్రదేశములో దప్పిక వచ్చినా మంచినీళ్ళు తీసుకోరాదని శాస్త్రాలు చెబుతున్నాయి. దేవాలయాల నిర్మాణం పవిత్ర కార్యక్రమంగా చెప్పబడిన సప్త సంతానాలలో ఒకటిగా విశ్వసించారు. కాబట్టే దేవాలయ నిర్మాణానికి ప్రజలు, పాలకులు ప్రాధాన్యత ఇచ్చారు. క్రీ॥శ॥ 9వ శతాబ్దము వరకు గర్భగృహం అర్ధమండపం వరకే పరిమితమైన దేవాలయాలు తర్వాత కాలంలో అనేక అనుబంధ నిర్మాణాలతో అభివృద్ధి చెంది సంపూర్ణమైన సంస్థగా రూపొందెను. ఈ ఆరాధనా ప్రదేశాలు స్వయం వ్యక్తం, దివ్యం, సైద్ధం, పురాణం, మానుషికం అను ఐదు రకాలుగా విభజింపబడెను. తిరుపతిలో శ్రీ శృంగార వల్లభరాయ స్వామి దేవాలయం దివ్యక్షేత్రం ఇచట ఆళ్వారుల ప్రతిష్ట జరిగినది[28]. శక సంవత్సరం 1345కు సరియగు 1423 సం॥నాటి శాసనములో అనఓతారెడ్డి, వేమారెడ్డి గారికి సుకృతంగా బోడపాటి చెరువు వెనుక బృందావనం స్వామికి సమర్పించినట్లు తెలుస్తోంది[29].

శ్రీ వల్లభరాయ స్వామి దేవాలయం :

ఈ దేవాలయం తిరుపతి గ్రామానికి ఉత్తరం వైపు గలదు. గ్రామంలో ప్రధాన రహదారికి పశ్చిమం వైపు గలదు. ఆలయం తూర్పు ముఖంగా వుండి 75 సెంట్ల భూమిలో నిర్మింపబడినది. ధ్వజస్తంభం పొడవు 53 అడుగులు, ఎదురుగా నాలుగు స్తంభాలు గల ప్రవేశ గోపురం, లోపలకు ప్రవేశించిన వెంటనే ఎనిమిది స్తంభాలతో రంగ మండపము కలదు. ఈ స్తంభాలపై తామర పుష్పాలు చెక్కబడి ఉన్నాయి. దీనిని ఆనుకొని పదహారు స్తంభాలు గల ముఖమండపము గలదు. ఈ స్తంభాలపై సుమారు 13 శాసనాలు గలవు అని పురావస్తు పరిశోధనా శాఖ కాకినాడ వారు తమ నివేదికలో పేర్కొన్నారు. దక్షిణ భారతదేశ శాసన సంపుటి ఐదవ వాల్యూమ్‌లో ఐదు శాసనాలు గలవు. ఈ స్తంభాలపై నాగబంధన, లక్ష్మీ నరసింహ, విష్ణువు శేషపాన్పుపై ఉన్నట్లు, రథముపై కృష్ణార్జునులు, జానపదకళలు మొదలగునవి చెక్కబడెను. 25 స్తంభాలతో బేడా మండపము కలదు. గర్భ గృహానికి బేడా మండపానికి మధ్య ప్రదక్షిణ పథము గలదు. నాలుగు స్తంభాలతో అర్థమండపము, అంతరాలయములో ఆళ్వారులు కొలువై యున్నారు. గర్భగృహములో శ్రీదేవి, భూదేవి సమేత శ్రీ శృంగార వల్లభరాయ స్వామివారు నాలుగున్నర అడుగుల ఎత్తులో దర్శనమిస్తారు. దేవాలయం అంతా రాతి ప్రాకారముతో ఏడు ద్వారాలు కలిగి ఉంది. వీటి ఆధారాలు కొంత శిథిలమై మరికొంత భూమిలో నిక్షిప్తమై ఉన్నాయి. సభా మండపములో అడుగుపెట్టే ముందు నేలపై ఒక పద్మము దాన్ని పైనుండి చూస్తున్న మరొక పద్మం గలవు. బహుశా ఇచ్చట నిధి నిక్షేపాలు ఉన్నాయని స్థానికుల అభిప్రాయం. ప్రాకార గోడలు శిథిలావస్థలో వున్నాయి. పురావస్తు శాఖవారు దీనిని రక్షిత ప్రాంతంగా గుర్తించిరి[29].

స్థల పురాణము :

పూర్వకాలంలో ధృవుని సవతి తల్లి ధృవుడు సింహాసనము ఎక్కకుండా తంత్రాలు నడుపుతుంది. ఇది తెలిసిన ధృవుని తల్లి సునీత నాయనా ! నీవు సింహాసనము అధిష్టించి, రాజ్యపాలన చేయాలి. అందుకు శ్రీ మహావిష్ణువు దర్శన భాగ్యం కలగాలి. అపుడు ఆయన దయతో రాజ్యపాలన యోగం కలుగుతుంది అని చెప్పెను. వెంటనే ధృవుడు తపమాచరించి విష్ణుదర్శనం పొంది, రాజ్యాధికారము సంపాదించమని చెప్పి అడవులకు పంపినది. అలా బయల్దేరిన ధృవుడు ఈ తిరుపతి కీకారణ్య ప్రదేశమునకు చేరుకున్నాడు. ఇచట శాండిల్య మహాముని ఆశ్రయం ఉంది. ఆ మునీశ్వరుని దర్శం చేసుకున్న ధృవుని చూచి, అతని మనసులోని కోరిక తెలిసినవాడై, ముని అతనిని పిలిచి నాయనా ! విష్ణుమూర్తి యొక్క దివ్య మంగళ రూపమును తలుచుకొంటూ తపస్సు చెయ్యి, నీ కోరిక స్వామి తీరుస్తాడు అని చెప్పెను. ధృవుడు తపస్సు ప్రారంభించెను. కొంతకాలం గడిచిన తర్వాత విష్ణువు దర్శనమిచ్చాడు. దివ్యకాంతులతో ప్రకాశిస్తున్న విష్ణువును చూసి ధృవుడు భయపడ్డాడు. అంతట విష్ణువు బాలకా ! భయమెందుకు? "నేను నీ అంతే కదా ఉన్నాను", అని నవ్వుతూ పలుకుటయే కాకుండా చెక్కిళ్ళు ఒత్తి భయము లేకుండా చేసి స్వామి అక్కడ శిలారూపముగా వెలిశారని స్థలపురాణము.

చూసిన వాళ్ళకు అంతే ఎత్తులో దర్శనమిస్తారు. చెక్కిళ్ళు ఒత్తినందువల్ల కుడి ఎడమలకు ఉండవలసిన శంఖు,

చక్రములు, ఎడమ కుడులకు ఉంటాయి. లక్ష్మిదేవిని నారద మునీశ్వరులు ప్రతిష్ఠించారని స్థలపురాణము చెబుతోంది. భూదేవి అమ్మవారిని కృష్ణదేవరాయలు ప్రతిష్ఠించారని అంటారు.

రుద్రమదేవి, పెద్దాపుర సంస్థాన మహారాణులు స్వామి వారిని దర్శించారని విక్టోరియా రాణితో వచ్చిన వ్యక్తి 6 అడుగుల ఎత్తు ఉండుటచే స్వామి ఆయనకు అంతే ఎత్తులో దర్శనం ఇచ్చారని జనశ్రుతి. ఈ ఆలయ ప్రాంగణములో శివుని ఉపాలయము కూడా గలదు.

ఆలయానికి ఆగ్నేయ మూలగా చతురస్రాకారంలో ఉన్న బావిని 'బొడ్డు బావి'గా పిలుస్తారు. నేలబారుగా ఉన్న ఈ బావిని చుట్టూ రాళ్ళు పేర్చి నిర్మించినట్లు ఉన్నది. కార్తీక మాసములో ఈ బావి నీటితో స్నానమాచరిస్తే సంతానం కలుగుతుందని భక్తుల విశ్వాసం. శాతావళి అనే సంస్కృత గ్రంథంలో ఈ దేవాలయము గూర్చి చెప్పబడినదని, ప్రస్తుతం ఆలయానికి 21 ఎకరాల భూమి కలదు. 1956లో ఆలయాన్ని దేవాదాయశాఖలో విలీనం చేసినట్లు ఆలయ ప్రధానార్చకులు పెద్దింటి గోపాలచార్యులు అందించిన మౌఖిక సమాచారము.

ప్రతీ సంవత్సరం చైత్ర శుద్ధ ఏకాదశి రోజున స్వామి వారి కళ్యాణము ఎంతో వైభవంగా జరుగుతుంది. ధనుర్మాసం నెలరోజులు విశేషంగా పూజా కార్యక్రమాలు జరుగుతాయి. ఈ దేవాలయంలో వైఖానస ఆగమం ప్రకారం పూజలు జరుగుతాయి.

వైష్ణవాలయాలలో జరిగే వార్షికోత్సవాలు, బ్రహ్మోత్సవాలు, రథోత్సవాలలో స్వామివారిని పురవీధులలో ఊరేగిస్తున్నప్పుడు దేవాలయాలలోనికి అనుమతి లేనివారు అంటరానివారు, వృద్ధులు, వికలాంగులు, వ్యాధిగ్రస్తులు మొదలగువారు భక్తిప్రపత్తితో పురవీధుల గుండా స్వామిని దర్శించి భక్తి పారవశ్యంతో పాటలు పాడతారు. ఈ ఉత్సవాలు సమాజంలో వివిధ వర్ణాల వారి మధ్య సమతా భావాన్ని చాటేవి. ప్రత్యేకంగా వైష్ణదేవాలయాలలో వీరముష్కులు, విప్రవినోదులు ప్రదర్శించే అనేక రకాల ప్రదర్శనలు ద్వారా దేవాలయాలు తరతరాల నుండి వస్తున్న మన సంస్కృతి సాంప్రదాయాలను ఆచార వ్యవహారాలను పరిరక్షించడంలో ప్రధాన భూమికను పోషిస్తున్నాయి[30].

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studies. Quantitative methods should be thoroughly characterized for accuracy and limits of quantification. Qualitative methods can determine the presence or absence of a specific compound. The limit of detection (LOD) and limit of quantification (LOQ) should be determined in a well-characterized analytical method. The LOD corresponds to the lowest analyte concentration at which the signal to noise ratio is at least three, but can also be calculated using any one of several statistical methods. The LOQ represents the lowest concentration at which data can be quantified and is equal to the concentration of the lowest calibrator.

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15. The Role of Biodiversity in Sustainable Development and its conservation

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Abstract

The biodiversity on land tend to be the richest in the tropics region and greater near the equator, and it is mainly because of the warm climate and high primary productivity. Discovering, identifying and understanding the various relationships between all the living organisms on the planet Earth are some of the greatest challenges in science. The diversity of plants on the planet earth is an important resource for food, shelter, and agriculture. About thousands of plant crop species have been identified, developed, used and relied on for the purpose of food and agricultural production in human history. Similarly to the plants, the biodiversity of animals is vast and there are several animal species which have been trained, domesticated and used for the food production, for the agriculture and are the primary biological capital for livestock development. This plays a vital role in food safety and also in maintaining the rural development. But its management has been terrible and there have been a lot of plants and animals that have gone extinct over the past few years. Therefore, the conservation of biodiversity of both plants and animals is the need at present.

Introduction

Biodiversity generally refers to a diversity or variability of living organisms present on this planet earth and other species which have driven to extinction million years ago. The term Biodiversity is also referred to as the Biological diversity which mainly denotes to the total number of different living species, living within a particular region including the microbes, plants, animals, and ecosystems such as coral reefs, forests, rainforests, deserts etc. Therefore, in biodiversity, every single living species has an equally important role in the ecosystem. The term biodiversity was coined by Walter G. Rosen in the year 1986. Biodiversity is the degree of variation of life forms within a given ecosystem, biome, or entire planet [1]. It encompasses all species of plants, animals and microorganisms, the

ecosystem, and ecological processes of which they are parts. It is an umbrella term for the degree of nature's variety, including both number and frequency of ecosystems, species, or genes in a given assemblage. Wilson [2] defines biodiversity as the variety of organisms considered at all levels from genetic variants belonging to the same species through arrays of species to arrays of genera, families, and still higher taxonomic levels.

Biodiversity can be studied at many levels. At the highest level, we study about the different species existing on the entire Earth. On a much smaller scale, we study mainly about the different species within a pond or a neighborhood garden. There is a great variation in the biodiversity, resulting from human and ecosystem interaction for certain food and development for the survival of human populations regardless of the pests, climate fluctuations, diseases, droughts and other unexpected environmental events. Currently, there are only a few crop species which provide us with food and essential energy requirements for the total human population all around the world. These crops include rice, wheat, maize, cereals, pulses, etc. As per the requirement on this moderately small number of crops for global food security, it will be essential to maintain a continuity of these plants species along with the increasing environmental stress and to provide an opportunities for the farmers to breed more amount of crops that can be cultivated under unfavourable conditions such as poor soil, salinity, drought, flooding, and extreme temperatures.

Man affects the forest ecosystem with activities such as agro industries, shifting cultivation, and hunting. There has been an overwhelming concern about the loss of tropical diversity and an emphasis on the identification of biodiversity hot spots in an attempt to optimize conservation strategies [3]. Biodiversity is in need of wise management not only to satisfy international pressures and obligations, but also because biodiversity could be the basis of most rural sustainable livelihoods in new economic sectors. The population needs to be educated on sustainable farming techniques (e.g., agroforestry that maximizes production in reduced surface area) and sustainable forest management. This will help reduce the pressure on the forest and thus conserving the natural environment.

More research should be geared towards effects of climate and land use changes factors on vegetation establishment in this area as this will help in the management of landslide activities in these ecosystems.Reforestation programmes should be carried out by the government and councils to improve the water catchment.

The Biodiversity Crisis

Biologists estimate that species extinctions are currently 500–1000 times the normal, or background, rate seen previously in Earth's history. The current high rates will cause a precipitous decline in the biodiversity of the planet in the next century or two. The loss of biodiversity will include many species we know today. Although it is sometimes difficult to predict which species will become extinct, many are listed as endangered (at great risk of extinction). However, many extinctions will affect species that biologist have not yet discovered. Most of these "invisible" species that will become extinct currently live in tropical rainforests like those of the Amazon basin. These rainforests are the most diverse ecosystems on the planet and are being destroyed rapidly by deforestation. Between 1970 and 2011, almost 20 percent of the Amazon rainforest was lost.

Biodiversity is a broad term for biological variety, and it can be measured at a number of organizational levels. Traditionally, ecologists have measured biodiversity by taking into account both the number of species and the number of individuals of each species (known as relative abundance). However, biologists are using different measures of biodiversity, including genetic diversity, to help focus efforts to preserve the biologically and technologically important elements of biodiversity.Biodiversity loss refers to the reduction of biodiversity

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due to displacement or extinction of species. The loss of a particular individual species may seem unimportant to some, especially if it is not a charismatic species like the Bengal tiger or the bottlenose dolphin. However, the current accelerated extinction rate means the loss of tens of thousands of species within our lifetimes. Much of this loss is occurring in tropical rainforests which are very high in biodiversity but are being cleared for timber and agriculture. This is likely to have dramatic effects on human welfare through the collapse of ecosystems.

Biologists recognize that human populations are embedded in ecosystems and are dependent on them, just as is every other species on the planet. Agriculture began after early hunter-gatherer societies first settled in one place and heavily modified their immediate environment. This cultural transition has made it difficult for humans to recognize their dependence on living things other than crops and domesticated animals on the planet. Today our technology smooths out the harshness of existence and allows many of us to live longer, more comfortable lives, but ultimately the human species cannot exist without its surrounding ecosystems. Our ecosystems provide us with food, medicine, clean air and water, recreation, and spiritual and aesthetical inspiration.

Importance of Biodiversity

Loss of biodiversity may have reverberating consequences on ecosystems because of the complex interrelations among species. For example, the extinction of one species may cause the extinction of another. Biodiversity is important to the survival and welfare of human populations because it has impacts on our health and our ability to feed ourselves through agriculture and harvesting populations of wild animals.

Conservation strategies

According to Chamberlain et al., 2002[4], Sustainability is the principle the management which will meet current societal needs without affecting future generations.

The Government recognizes the importance of biodiversity conservation and, in collaboration with states and territories, has set a national framework for biodiversity conservation over the next decade. Biodiversity, or biological diversity, is the variety of all species on earth. It is the different plants, animals and micro-organisms, their genes, and the terrestrial, marine and freshwater ecosystems of which they are a part. Biodiversity is both essential for our existence and intrinsically valuable in its own right. This is because biodiversity provides the fundamental building blocks for the many goods and services a healthy environment provides. These include things that are fundamental to our health, like clean air, fresh water and food products, as well as the many other products such as timber and fiber. Other important services provided by our biodiversity include recreational, cultural and spiritual nourishment that maintain our personal and social wellbeing. Looking after our biodiversity is therefore an important task for all people. Over the last 200 years India has suffered the largest documented decline in biodiversity of any continent. Despite efforts to manage threats and pressures to biodiversity, it is still in decline.

The main threats to our biodiversity are:

- Loss, fragmentation and degradation of habitat
- The spread of invasive species
- Unsustainable use of natural resources
- Climate change
- Inappropriate fire regimes
- Changes to the aquatic environment and water flows.

Forest resources play a key role in protecting the environment and are of tremendous importance to the sustainable development of every society [5].National Parks are the most extensive type of protected areas globally. They are classified under category II of the IUCN categories of protected areas [6]. National Parks are created to:

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(1) protect the ecological integrity of one or more ecosystem for present and future generations; (2) exclude exploitation or occupation detrimental to the purposes of designation of the area; and (3) provide a foundation for spiritual, scientific, educational, recreational, and visitor opportunities, all of which must be environmentally and culturally compatible [6].

National Parks comprise the highest percentage (23%) of the total area covered by protected areas worldwide [6].Conservation of forest biodiversity has received much attention in recent times, compared with any time in human history, because of the rate of loss [7]. Various conservation methods have been used to protect forest biodiversity loss and encourage natural regeneration. While sacred groves were not created for biodiversity conservation [8], their complex sociospiritual or sociocultural associations with deities and spirits of dead ancestors have contributed to the protection of some ecosystems [9]. This makes communities hold so much respect and fear for the sacred grove, because of their apparent spiritual link to the ancestors, who are custodians of the land. Traditional respect for the environment and access restrictions to sacred sites had often led to well-conserved areas with high biological diversity within otherwise degraded environments [10].Most sacred groves are considered as refuge for endangered species [11,12].The apparent similarity in species evenness distribution in the two habitats was probably due to the spatial patterns of stands that enable them to effectively utilize resources such as sunlight, soil fertility, and species coexistence from the same functional group. Variations in basal area could be attributed to differences in age of plants, type of species, ability to compete for limited resources, and other environmental mediating factors in the two habitats. Similar variations in plant attributes have been reported in sacred groves and forest reserves [13].Insects' higher diversity in the state could be attributed to the slight habitat perturbation, log dumps, and the open canopy, which allowed light penetration into the forest floor. This observation suggests that disturbance tends to create a favourable condition for the colonization of diverse insects, while simultaneously negatively impacting plant species. This compensatory role of disturbance in ecosystem functioning appears to contribute to harnessing biodiversity integrity. Secondly, it is thought that the diversity of insects in could be due to the presence of some palatable species, leaf litter, and dead wood/twigs, brought about by logging, farming activities, and charcoal production. Thus, their presence and abundance help to speed up the decomposition process of leaf litter and dead wood, leading to improved soil fertility. The relationship between leaf palatability to insect herbivores and litter decomposability is one of the important factors determining the direction of effects of insect herbivores on ecosystem processes [15]. But [14] showed that the large area of the forest reserves could account for higher insect species richness than the sacred groves. Other studies suggest that forest condition or level of degradation can be determined by observing some insect species that are more specialized in either degraded or nondegraded forest ecosystems [16]. These species could be used as an early warning indicator for conservation purposes [16]

Theoritical concepts of management:

The process, by which resources are allocated, regenerated, managed and conserved over time and space to meet the needs of humankind has been termed as resource management [18]. On the same document, resource management involves an interaction of three major elements. These are:

1) Physical resource base (land, water, forests, wildlife etc.)
2) Production system (the mix of technologies and productive activities) and
3. Social regulation (laws, rules and principles)

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Sociological approach

This approach emphasizes on significance of culture, ecological and social ethics, indigenous knowledge, the role of local people and social institutional arrangements in resource management. The sociological aspect of resource management has been the most neglected area in the resource management strategies of many countries until recently [18]. For instance, Chambers [19] examined that failure of a number of resource management programs was associated to the disregard of local culture and wisdom. This approach involves research methods such as participatory rural appraisal (PRA) and institutional arrangements including administrative structures and procedures, policies and laws and financial management [18].

Economic approach

This approach is based on the principle that there is a need to rationalize the allocation of natural resources, and optimize their use through competitive market economies to achieve maximum economic efficiency [18]. However, this approach is limited as it assumes that firstly, cost and benefits from the use of natural resources must be known and quantifiable and secondly costs and benefits from one resource need to be isolated from those of another. But sometimes it is difficult to price/determine economic value of intangible benefits from natural resources such as ecological uniqueness, biodiversity, etc. Moreover, minimizing production costs and maximizing monetary benefits in order to strive for economic efficiency tends to increase pressure on some resources and neglect other resources for being of little/no significance in terms of economic development.

Ecosystem approach

This approach considers the whole ecological system and the relationship among its various components [18, 20] It recognizes the dynamics of the ecosystem as the basis for resource management. The approach aims at the rational allocation and management of resources based on ecological characteristics, component behavior, change processes and functional relationships among different components within ecosystems [18]. The primary concern is to manage resources in a manner that minimizes ecological destruction. This approach involves practices such as; resource inventory, identification of natural processes that affect ecological stability; evaluation of functional significance of different components in an ecosystem and design of alternative management strategies to ensure ecological stability, productivity and sustainable development.

Ecological factors

Ecological issues, if not addressed, could result in long-term and perhaps permanent decline in biological diversity [4]. The same document revealed that current scientific knowledge cannot adequately determine sustainable harvest levels of biological resource from which it is collected; research is needed to examine and determine effects of harvesting on plant populations, as well as the impact on associated ecosystems, and concluded that sustainable management will remain elusive until knowledge concerning is developed. Ecological impacts of harvest is not only observed in plants but also in animals where it has the potential to alter ecosystem structure and functioning where one/more important animal species are depleted.

Conclusion

The importance of sacred groves as a tool for in situ conservation of biodiversity has widely been acknowledged. Their complex socio-spiritual or sociocultural associations with deities and spirits of dead ancestors have contributed to the protection of some ecosystems. Sacred groves showed a traditional conservation approach, supported more species turnover than the conventional state managed forest reserve. Given the recent human-led disturbance and climate change impacts on ecosystems, it will be prudent to direct effort at sustaining traditional beliefs about

sacred groves, since they serve as a haven for both endangered species. Environmental organizations such as IUCN, Convention on Biological Diversity, should consider declaring sacred groves as global "hotspots" of biodiversity significance.

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16. Sustained dual drug delivery of 2-hydroxyethyl starch microparticles impregnated with Ofloxacin and Ketoprofen

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Abstract

The aim of the present study is to fabricate the dual drug (ofloxacin and ketoprofen) loaded 2-hydroxyethyl starch microparticles by sonication process for sustained drug delivery system. The microparticles were crosslinked with the help of STPP and used for controlled oral delivery of ofloxacin and ketoprofen. The obtained microparticles were characterized by Fourier transform infrared (FTIR) spectroscopy, differential scanning calorimetry (DSC), scanning electron microscopy (SEM). Drug release kinetics of the microparticles is investigated in simulated intestinal fluid (pH 7.4) and gastric fluid (pH 4.0) at 37°C.

1. Introduction

Drug delivery systems through microspheres, hydrogels and nanospheres are generally produced with natural or synthetic polymers. Natural polymers are preferred because of their biocompatibility, hydrophilicity, biodegradability and low toxicity. They have demonstrated excellent performance in controlled delivery of active molecules. Simple drug delivery system are effective on single therapy, where as dual drug delivery system are much effective on dual therapy. From the past few years researchers have been huge interest on dual drug delivery because simple drug delivery cannot fulfil the needs as effective as dual drug delivery. But the challenge of dual drug delivery is to control the release of each drug independently. Few researchers report dual drug delivery systems L. Wei et al. [1], Jiang-l.an Li et al. [2], Lee et al. [3], and L.Y. Qiu et al. [4].

Hydroxyethyl Starch (HES) (Fig.1.a) is modified natural polysaccharide and it is similar to glycogen. HES, is derived from amylopectin, a highly branched starch that is obtained from waxy maize or potatoes. It has been used in medicine for a long time as volume therapy [1]. Starch shows immense attraction in drug delivery applications due to its versatile properties such as biocompatibility, biodegradability, non-toxicity, ease of availability and low cost, making it amenable for nano-drug delivery [2].

Ketoprofen (Fig.1.b), an effective non-steroidal anti-inflammatory drug (NSAID), has been widely used for the treatment of pain and inflammation in osteoarthritis and rheumatoid arthritis. It is an inhibitor of cyclo oxygenase group of enzymes and is associated with gastrointestinal irritation when administered orally [3-5]. Ketoprofen is a weak acid and it belongs to class II in the

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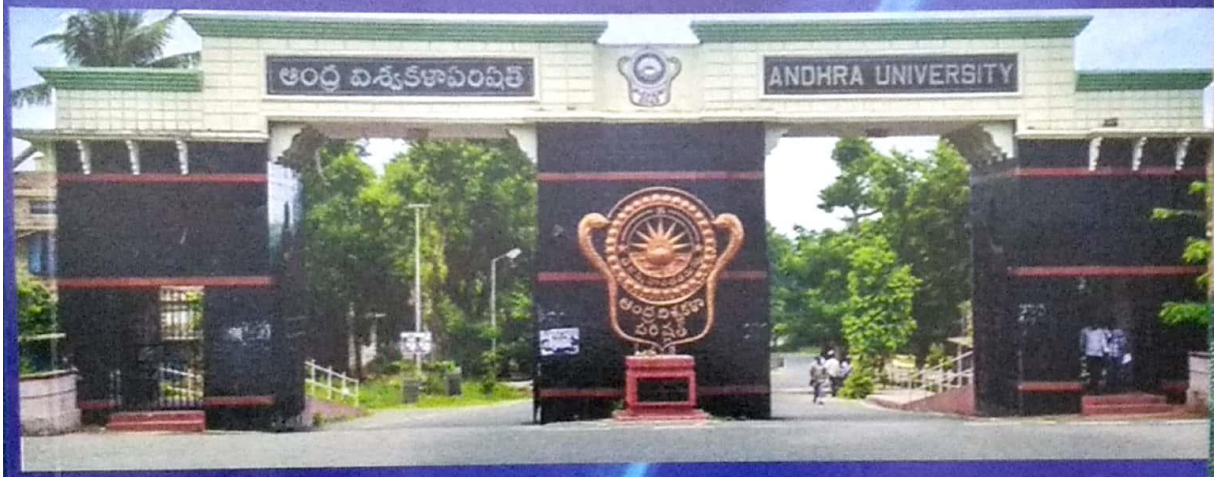

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OP No: 11

IN VITRO CYTOTOXIC ACTIVITY OFPHYLLANTHUSAMARUSS*CHUM&THONN.*

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Some bioactive compounds from plants are excellent sources of anticancer drugs. These natural phytochemicals are used in active research for cancer prevention and treatment. In our present studyinvitro anticancer activity was evaluated using dimethyl formamide leaf extract of Phyllanthusamarus as its GC-MS analysis revealed many active principles which exhibited good antimicrobial and antioxidant properties. There were reports that anti-proliferative activity is always coupled with antioxidant activity. Anti-cancer activity of the P. amarus leaf extract was tested against HCT 15 and T47D cell lines and inhibitory effect on HCT 15 cell line was found to be greater than T47D cell line. With the increasing concentration of extract, the percentage of viability of cell lines was found to be decreased for both the cell lines. The anticancer activity of leaf extract of P. amarus is comparable to positive control drug doxorubicin. N-Hexadecanoic acid, lignans and polyphenol compounds in leaf extract may be responsible for the anticancer activity. These phytochemicals block cancer cell propagation by controlling cancer stem cells and can influence all the stages of cancer development effectively.

Key words: Anticancer, Phyllanthusamarus, medicinal plants, GC-MS, cell lines, MTT assay.

S.K.S.D. MAHILA KALASALA DEGREE & PG (A), TANUKU

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This is to certify that Kum./Smt./ Sri/Dr./ Prof. P.S.S. Sravanthi, Lecture in Botany, SVRK Govt. degree *has participated as Resource Person / Chairperson/ Delegate/Author/ Co- Author, presented a paper on* Process of social transformation in India *in the UGC Sponsored Two-Day National Level Workshop Organized by the Dept. of History & Internal Quality Assurance Cell, S.K.S.D.Mahila Kalasala Degree & PG (A), Tanuku on 12th and 13th February, 2019.*

D.M. Neeraja

Dr. D.M. Neeraja
Convener

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B N P

Dr. B.Nagapadmavathy
Principal & Chairperson

Process of Social Transformation among women in India

-Dr. P.S.S.Sravanthi, Lecturer in Botany, S.V.R.K (M) GDC, Nidadavole

ABSTRACT

A woman is a human being she has a soul similar to that of a man. A "woman" defined as the "feminine component of the human species who, apart from serving as a vehicle for nurturing human life also equally contribute in social, economic and political development in society". The concept of social transformation have a similar definition as social change, many authors have used both terms interchangeably. Social change refers to fundamental changes in the social structure, patterns of culture and social behavior. "Change" means variations or a difference in anything observed over some period of time. Social change is very complex. Since society is a process not product. If it had been product then there would not have been changes. Processes are ongoing change therefore they bound to change. Society is changeful and dynamic. We can say that change is a law of society unchanging society is a myth. Hence, social change is important for society as well as women. In this paper attempt has been made to analyze social change taking place in India especially among Indian women.

Keywords: Social Transformation, Social Change, Status of Women in India, Literacy in India, Female Population in India, Constitution of India.

INTRODUCTION

Social transformation is a philosophical, practical and strategic process, to effect revolutionary change within society. It is systematic approach applied to social change, which is comprehensive and progressive approach to social change. That is why social transformation is different from ordinary or conventional social change. When social transformation is applied, identity (way of seeing, thinking, reflecting on ourselves and others) will be altered, not only this but emotions, embodiments (relationship and connectedness to and within our bodies how we show up), actions, creativity and paradigm (overall perspective and mode of operating).

Social transformation is the process by which an individual alters the socially ascribed social status of their parents into socially achieved status for themselves.

The last quarter of the 20th Century was a period of rapid growth in transitional linkages and flows affecting all areas of human life: economy, politics, environment, culture, society and even interpersonal relations. These transitional linkages have also affected women, So

we see more women representations in these fields, and the question arises that how far Muslim women has gone through these changes.

Social transformation is an accumulative process – that is a process in which insignificant changes accumulate quantitatively until they become significant enough to generate to qualitative changes in the entire society. As women education was considered as insignificant because of the quantitatively changes now importance is being given to women education as well.

Women in India have been in the process of transformation in past few decades. Earlier Indian women did not enjoy the social, economic, political and legal rights. It is only after the independence Indian women got all these rights through Indian constitution. Women in India have been in the process of transformation in past few decades. Earlier Indian women did not enjoy the social, economic, political and legal rights. It is only after the independence Indian women got all these rights through Indian constitution. The Constitution of India guarantees to all Indian women equality (Article 14), no discrimination by the State (Article 15(1)), equality of opportunity (Article 16), and equal pay for equal work (Article 39(d)). In addition, it allows special provisions to be made by the State in favor of women and children (Article 15(3), renounces practices derogatory to the dignity of women (Article 51(A) (e)), and also allows for provisions to be made by the State for securing just and humane conditions of work and for maternity relief. (Article 42)

On the other hand women in India continue to face discrimination and other social challenges and are often victims of abuse and violent crimes. As per the global poll conducted by Thomson Reuters, India is the "fourth most dangerous country" in the world for women and the worst country for women among the G20 countries.

According to 2011 census female population constitutes the 58, 64, 69, 174(48%) of the total population and whereas male population is 62, 37, 24, 248(52%) of the total population 1, 0\, 1, 93,422.

In the state of Karnataka the total population as per 2011 census is 61,130,704 and among them male 31,057,742(51%) and female 30,072,962(49%).

Mysore city in particular total population is 8, 87,446 (50.46%) of which male are 4, 43, 813(50.0) and female 4,43,633(49.98%).

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STATUS OF WOMEN IN INDIA

Woman status in the Indian society has been through many ups and down in ancient to modern era. While discussing about the status of women, Kumari opines that in ancient India, women occupied a very important position, in fact a superior position to men. In Vedic times women and men were equal as far as education and religion was concerned. Women participated in the public sacrifices alongside men. The Haritasmriti mentions a class of women called brahmavadinis who remained unmarried and spent their lives in study and ritual. There were also many noteworthy women scholars of the past such as kathi, kalapi, and Bahvici .

In Medieval period India witnessed many social practices which were anti-women, such as sati, child marriage, and restrictions on widow marriage, became a part of social life. In spite of these anti- women elements, some women excelled in the fields of politics, literature, education and religion.

During British rule in India, Biswas says it was the ruling East India Company that First hit the conservative Indian Society in the 18th century. Women' education started in 1818 with the setup of a girl's school with 14 students in Chinasura by Robert May.

European scholars observed in the 19th century Hindu women are virtuous than other women. They tried to improve the status of women by raising their voice against women exploitation. Even the Indian social reformers worked hard to bring changes among women conditions.

In Independent India we can see the participation of women in all activities such as education, politics, media, art and culture, service sectors, science and technology, etc. Women in India have been in the Process of transformation in past few decades. Though women are nearly half of the total population but their representation in public life is very low. Women bear the major load of the household work. Her primary role is often viewed by the society as housewife. The plight of women in India ranges from domestic disparity to societal oppression. In most of the areas in India, a strong cultural bias favors sons over daughters. Female children frequently suffer neglect in terms of health care and education. Studies reveal that boys receive health care more often than girls, and the average amount spent on treatment was also significantly higher for boys. Subordination of women in society acts a structural constraint to their participation in political activities.

On the other hand today's India offers a lot of opportunities to women, so that women can have a voice in everyday life, the business world as well as in political life. Nevertheless India is still a male dominated society, where women are often seen as subordinate and inferior to men.

Ahuja opines that the status of women in India has changed a lot from early 1950s onwards. Both structural and cultural changes have not only provided equality of opportunities to women in education, employment and political participation, but have also reduced the exploitation of women, and oriented women to develop their own organizations which can take keen interest in their problems.

The Constitution of India guarantees to all Indian women equality (Article 14). There also several commissions in the centre and state governments to study the causes of low status and problems of women and to safeguard their rights in various aspects. Ahuja consider that Indian women today are still not economically emancipated from man. In social, psychological and moral dimension also, her situation is not identical with that of man.

Today modern woman is so deft and self-sufficient that she can be easily called a superwoman, juggling many fronts single handedly. Women are now fiercely ambitious and

are proving their metal not only on the home front, but also in their respective professions. Women in Indian are coming up in all spheres of life. They are joining the universities and colleges in large numbers. They are entering into all kinds of professions like engineering, medicine, politics, teaching, etc. A nation's progress and prosperity can be judged by the way it treats its women folk. There is a slow and steady awareness regarding giving the women their dues, and not mistreating them, seeing them as objects of possession. Despite progress, the very fact that women, along with being achievers, also are expected to fulfill their roles as wives or mothers, prioritizing home against anything else. This point of view hasn't changed much. There is still a large section of women who are uneducated, and married off before the age of 18.

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The Indian constitution grants women equal rights to men, but strong patriarchal traditions persist in many different societal parts, with women's lives shaped by customs that are centuries old. Hence, in these strata daughters are often regarded as a liability, and conditioned to believe that they are inferior and subordinate to men, whereas sons might be idolized and celebrated.

There are a couple of reasons, why men might be regarded an asset for a family among Hindus:

- Considered capable of earning money
- Carry on the family line
- Able to provide for their aging parents
- Bring a wife (and with this a capable domestic helper) into the family
- Play an important role in death rituals in Hindu religion, which ensure, that the soul

is released from the body and can go to heaven.

On the other hand, there are a couple of reasons why women might be regarded more of a liability for a family:

- Not considered capable of earning money
- Seen as economically and emotionally dependent on men
- While they help with domestic duties during childhood and adolescence, they go to live with their husband's family after marriage, which means less help in the household of their originating family, and most importantly loss of money due to the dowry tradition.

This might explain why the birth of a daughter may not always be perceived as equally blissful as the birth of a son, and why "*May you be blessed with a hundred sons"* is a common Hindu wedding blessing.

These kind of attitudes and believes creates imbalance in sex ratio that is females for thousand males. India is one of the few countries where males outnumber females.

When we analyze sex ratio of India in 2014, it is 940 females for 1000 males; sex ratio in 2001 was 933. This is mainly because of the female feticide and infanticide. The main reason of parents committing female feticide and infanticide is the fear of paying dowry in the marriage of their daughter. The reason behind increasing numbers of incidents of feticides and infanticides is lack of education among women. Indian Literacy rate itself shows the lack of education of women.

Total literacy rate is 74.04 of which male literacy rate is 82.14 whereas female literacy rate is 65.46 and the gender gap is 16.68. This shows the lack of education among Indian women. An educated woman is able to meet the modern and advanced requirements of family such as vaccination of children and hygienic environment in the house, empowerment of women etc. It has been witnessed that there is a need of increasing awareness about empowerment of women so that measures such as social economic and political and broader access to fundamental human rights and improvement in nutrition, basic health and education.

CONCLUSION

Social transformation is an accumulative and continuous process. Women in India have been through social transformation since many decades. Indian women enjoyed liberty and choice of selection of partner, later period was not so good for women, status of women deteriorated. It was only after independence that women got their rights partially. So, it can be said that status of women has considerably improved. Because of which we find women in all sort of fields, giving tough competition to men and proving their skill and potential.

The present paper is a review paper, highlighting various stages of social transformation among Indian women. And also analyzes different aspects of social transformation.

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Mobile-Assisted Language Learning (MALL) in Classroom Activities

-Dr.K.Lakshmi Sudheshna* and Dr. P.S.S.Sravanthi**

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ABSTRACT:

Mobile phone has been studied by researchers in its connection with education-related activities. This study was aimed at investigating: 1) students' perception toward mobile phone to support classroom activities; 2) students experience in using mobile phone use to support classroom activities. This study employed qualitative method. To collect the data, two methods were used namely: questionnaire and observation. Subjects participated in this study were 70 students. Findings showed that students had positive perception and attitude toward mobile phone to support classroom activities. In classroom they used mobile phone to support classroom activities. Reading e-books that support Phonology subject, playing audio and video file to get visualization of Phonological concept, operating offline dictionary to solve vocabularies were examples of classroom activities supported by mobile phone use.

Keywords: classroom activities, language learning, mobile phone, mobile-assisted language learning.

INTRODUCTION :

Education always gets benefits from information and communication technology (ICT) since students and teachers are always assisted by the current technology that support their classroom activities. Improvement in teaching can be achieved through ICT (Kee & Samsudin, 2014). Modern technology has provided many inventions for human life. In communication field, mobile phone has played pivotal role in shaping our life and it goes without saying that education will try to reap its benefits. Internet, used to be accessed through personal computer, can be operated through mobile phone and this allows
students who are mostly at their teen and youth period to go online anywhere and anytime (Lenhart, 2015). Compared to personal computer, Mobile phone has been primarily used by teens to access internet (Madden, Lenhartm, Duggan, Cortesi, & Gasser, 2013). Several features are offered by mobile phone to its users and one of the features is texting. It helps people to interact anywhere and anytime for communication purposes regardless time and place. This is what teacher and students, as mobile phone users, need to explore its features in order to boost

their learning process. This is likely to happen since the collaboration among teacher and student will be maintained through messaging or texting service from mobile phone (Looi, Seow, Zhang, So, Chen, & Wong, 2010). In addition to communication maintenance between students and teacher as mobile phone benefit, some studies found that texting has improved students's vocabulary and reading skill of students learning English (Plester, Wood, & Joshi, 2009). These benefits exhibit how mobile phone supports communication and vocabulary enrichment in English learning context. In addition to texting feature, other features and function that mobile phone offers have been studied. One of the features that mobile phone offers is texting. It helps people to interact anywhere and anytime. This is what teacher and students need to boost their learning process since the collaboration will be maintained through this promising application (Looi, Seow, Zhang, So, Chen, & Wong, 2010). Some studies found that texting has improved students's vocabulary and reading skill of students (Plester, Wood, & Joshi, 2009). Feature of texting helped students vocabulary and reading skill (Plester, Wood, & Joshi, 2009). This is what teacher and students need to boost their learning process since the collaboration will be maintained through this promising application (Looi, Seow, Zhang, So, Chen, & Wong, 2010). Another feature that mobile phone always advertises and boasts is camera feature. This feature can serve as a powerful tool for educational activities in terms of reading and writing assistance (Bull & Thompson, 2004). Since mobile phone offers camera, it helps users to record and take picture any object they need especially for learning purposes. This function has been attracting teacher and students to use it in supporting classroom activities. This is to say that camera feature can be used by the students to collect data in their learning process. In language and art faculty, camera functioned to assist reading, witing and visualizing (Bull & Thompson, 2004). Mobile phone has also feature that entertain users to play music and video. This feature is classified as audio and video feature. For educational purposes, the feature can help students to create and explore podcast for learning. studies showed that this feature when used for podcast learning project improved students' motivation and their higher order thinking in reading, writing and listening skill when learning English (Smythe &Neufeld, 2010). Seizing feature of audio video for podcast project was proven to be helpful device in improving English language learners (ELL) in terms of their language skills (Gromik, 2012). It can be concluded that mobile phone with its features has the ability to play audio file which can be used to help English learning language. In a nutshel mobile phone which offers texting, camera, audio and video recorder has no doubt given

benfit for students in learning process (Thomas & Munoz, 2016). In addition to the benefits that mobile phone offer mentioned earlier, there are many

benefits that teacher can gain by using mobile phone for teaching and learning activities. Liu (2015) found that teacher could provide differentiated learning pathways for students, offered

multiple modality for students to produce their portfolio, supported students improvisation and learning creation (Liu, Scordio, Renata, Navarete, Yujung, & Lim, 2015). Mobile phone goes beyond its basic features if teacher and students can seize its feature and function for educational purposes. Mobile phone with all its supporting features has allowed teachers to personalize instruction (Steel, 2012). It is the teachers with their creativity that make possible for personalizing instruction to achieve objective of instruction. The need to collaborate between students and teacher and among students can be facilitated by mobile phone since there are many applications that support the collaboration (Corbeil & Valdes Corbeil, 2007). Personalizing instruction and facilitating collaboration can be achieved by means of mobile phone. It goes without saying that teachers and students are challenged to explore and seize mobile phone benefit for classroom activities. Sha (2012) found that students got benefit from mobile phone for their learning purpose. They gained benefit by using mobile phone for learning activities because they had the opportunities to regulate their progress in learning activities. This benefit might provide additional value for student to organize their learning need (Sha, Looi, Chen, & Zhang, 2012). In the same vein, Al-Fahd (2009) investigated students' readiness to use their mobile phone for learning purpose. Students as the users of mobile phone showed their readiness to integrate mobile phone in classroom activities. They had positive attitude, perception and attitude in using mobile phone for mobile learning (Al-Fahd, 2009). Since mobile phone is mobile gadget in nature, it meets the demand of students need for communication. Students always carry mobile phone for their daily activities and this is the most contributing factor to integrate mobile phone for classroom- related work. Their availability and mobility really matter and they need to be explored for learning purposes (Pegrum, Oakley, & Faulkner, 2013). Studies on the effectiveness of mobile phone application for classroom activities have been well-documented. Mobile phone use in classroom improved students learning process (Liu, Scordio, Renata, Navarete, Yujung, & Lim, 2015). Mobile phone use in terms of texting function has been studied. Study showed that using messaging service increased classroom interactivity among teachers, students and faculty staff (Markett, Sanchez, Weber, & Tangey, 2006). Mobile phone has been proven to bring benefit for students. They can access educational content or e-book and textbook through their mobile phone anywhere and anytime. It is very likely that mobile phone has the power to promote the so-called ubiquitous learning. Students in university can learn anywhere and anytime as long as they bring their mobile devices that they operate and access for learning and it goes without saying that this promotes the trend of ubiquitous learning (Lee, Lee, & Kweon, 2013). Previous studies on using mobile phone in the classroom and outside classroom had been conducted. Khabiri (2013) reported mobile phone use practices among Iranian EFL learners. The study found that mobile phone offered many promising features that can be tailored for students' learning

process (Khabiri & Khatibi, 2013). The study suggested that mobile phone should be designed appropriately with its supporting application in order to be able to promote students' reading habit (Oyewusi & Ayanlola, 2014). The findings showed that student had positive perception and attitude toward mobile phone use for learning anytime and anywhere (Kee & Samsudin, 2014). However Studies investigating the use of mobile phone in higher education institution are still relatively rare in the literature. This study aims at filling the gap and it tries to investigate how to tailor mobile phone to support classroom activities as an effort toward MALL. Specifically this study seeks to explore students' perception of mobile phone use to support classroom activities and how they engage in the mobile phones use during classroom activities. The specific research questions that guided the study are as follows: (1) What are students' perception concerning their mobile phone to support classroom activities?
(2) How do students use mobile phone to support classroom activities?

METHODS:

This study is qualitative in nature and it applied case study. The method was aimed at investigating students' perception on mobile phone use and their experience in using mobile phone to support classroom activities. To collect data, this study applied questionnaire and observation

Data Collection and Analysis:

The first research question deals with students' perception toward mobile phone use to support classroom activities. To answer research question one, this study employed questionnaire and observation. Questionnaire had been prepared to investigate students perception on mobile phone. Items in the questionnaire served to seek answer on the following information: time of purchasing mobile phone; brand and product of mobile phone; function students performed when using mobile phone and apps students used to support classroom activities. Observation was conducted to investigate how students engage in using mobile phone to support classroom activities. The teacher acted as researcher and he collected data through one semester. In the first meeting students were told that they will fill in questionnaire on mobile phone use. In the following meeting, teacher asked students to participate in using mobile phone for classroom activities. For this purpose, teacher had prepared and given e-book, audio and video material that can be accessed through their mobile phone. The data gathered were analysed qualitatively to answer research questions. Data from questionnaire and observation were described, categorized and interpreted to answer the research questions in this study. Triangulation was applied to enhance the validity and support sound conclusion in this study. DISCUSSION This study was aimed at investigating students' perception and attitude toward mobile phone and exploring students' experience in using mobile phone to support their classroom activity. There were two types of data that will be described in this section namely data from questionnaire and

observation. Questionnaire data will be first described in this section to investigate students perception on their mobile phone to support classroom
activities. Students' Perception of Mobile Phone There is four items constructed in the questionnaire to fill in by the students. Questionnaire were designed to explore information concerning students' purchase of their mobile phone, brand of their mobile phone, function they performed and application they used

to support learning process. Here are the findings gained from questionnaire:

1. When did you purchase your mobile phone?
   Students had their own mobile phone. In terms of purchasing time, there are three categories. The highest number of students purchasing time It goes without saying that students need and treat their mobile phone as their basic need that they need to fulfill by owning mobile phone. They belong to digital natives who are closely associated with mobile phone.
2. What brand of mobile phone did you purchase?
   This data shows that there were various brands of mobile phone that students own. Students have various options to buy mobile phone since there is a high competition among mobile phone manufacturers. This condition is beneficial for customers especially students. With affordable prices, they can purchase any mobile phone they want. All that students need is that the capacity and feature that they can operate to explore mobile phone. This is to say that brands of mobile phone are not their concern, function and apps do matter.
3. What function do you frequently perform when using mobile phone?
   Students wrote some apps that support their learning activity. Offline dictionary, e-book material and other learning apps were used to support their learning. This findings show that mobile phone is open to explore for learning purpose. Students used their mobile phone to access offline dictionary in order to learn English. PDF reader was also supporting tool for students to facilitate learning. There are various book, article and files that can be run in pdf format. These file can be accessed by students from their mobile phone. How Students Use Mobile Phone to Support classroom activities .This data was collected to answer research question concerning students' experience in using mobile phone for classroom-related activities during classroom observation. There were several findings in terms of students experience in using mobile phone for classroom activities.
   1. offline dictionary use The teacher prioritized this application to be investigated first from their mobile phone. He checked some students' mobile phone to check whether or not offline dictionary installed. Students, some felt proud, showed

their offline dictionary installed in their mobile phone to convince the teacher concerning the application. This was important for the study since students had supporting tool available in their mobile phone to support classroom activities. Since offline dictionary was installed in their mobile phone, there are many learning activities that could be facilitated. Based on the observation, teacher found out that many students had installed the apps in their mobile phone.

One interesting opinion expressed by the student as can be seen in the dialog excerpt as follows: Teacher: "Why did you install this offline dictionary in your mobile phone?" Student: "I need this offline dictionary installed in my mobile phone sir, so I can read it anywhere and anytime." To reap the benefit of offline dictionary, the teacher had designed the activity where looking up dictionary was implemented. He had some vocabularies from each unit of Phonology course that required students to look up their dictionary. Since those vocabularies were new and they had no previous knowledge on those vocabularies, they had to access their mobile phone to look up their offline dictionary in dealing with words they did not know. In each meeting, teacher asked students to look up dictionary every time they encounter new word. Students used their mobile phone with the instruction from teachers. On other occasion they opened dictionary for group project and individual inquiry. They were encouraged to actively use their mobile phone for vocabulary enrichment. They found mobile phone helpful in providing tool that they need in searching for meaning of particular word during their learning activities in the classroom.

2. Pdf reader app (e-book) use this application was important to make sure that the course enabled the students to access material. Mobile phone can run this application to help users read files that they usually run in their computer. The teacher prepared and shared e-book and file in form of Pdf that can be operated in students mobile phone. Some students, who had not installed pdf reader in their mobile phone, downloaded the application and installed it in theirs.

The teacher prepared and shared e-book material that can be operated in students' mobile phone. Since students' mobile phone had PDF Reader inside, it was easier for students to read and display their learning material. Both students and the teacher used mobile phone to read the e-book and learning material from their mobile phone. From meeting three to last meeting, student and teacher run the application to access the file, read and discuss

the file shown in their mobile phone. The teacher in many occasions suggested students to read the material outside classroom to prepare
before the meeting in the classroom. In some meetings, the teacher investigated their opinion concerning the use of mobile phone in accessing their material through mobile phone. Using pdf reader to access material in their phone might provided those different experiences compared to using computer. The teacher investigated students' opinion concerning e-book that students operated through mobile phone. There were several comments

that students expressed to show their support in using mobile phone to read e-book for their learning material. One of the examples can be seen from
the excerpt below: Teacher: "What is your opinion about using mobile phone to read e-book?" Student: "This is paperless way of learning sir, mobile phone really helpful to facilitate learning. I love this sir." This comment clearly expressed students' support for using mobile phone in classroom activities. Students viewed mobile phone as supporting tool that facilitated students in accessing material they were learning in the classroom. It was easier for student to carry mobile phone everywhere they go and they could read the material everywhere. This condition showed that mobile phone supported learning activities in the classroom. In addition the teacher also suggested students to read the ebook material outside classroom. This is to promote the so called mobile-assisted language learning (MALL).

3. Audio video player use:
   This third feature built in mobile phone was investigated in this study. To design the classroom activities using audio video inside mobile phone, the teacher provided students audio video file. These audio video files were supporting material and they were complementary to the course of Phonology. They consisted of video explaining vowel, consonant sound and etc.

The teacher prepared and shared audio and video material that supports the e-book in phonology course. Since Students' mobile phone has supporting apps to play audio and video, it was easier for them to play the files they got from the lecturer in Phonology course. This audio video player was really important for students as an effort to understand some material that need to be visualized from Phonology concept. To show how students were happy because they got visualization from the video, the dialog excerpt below can illustrate: Teacher: "How helpful is the video to explain the concept?" Student: "I find the concept confusing when reading e-book, but this video helps me to

understand easily the concept. My mobile phone is useful to support my learning process." It was very clear that their mobile phone was very helpful to deliver audio video file that helped students to understand the material. There were some video material that students needed to play in their mobile phone and sure they could play it in the classroom and outside classroom. The findings showed that students seized their mobile phone to support learning activities in classroom. 4. Audio video recorder use This feature was useful in assisting students to produce their project in classroom. to achieve this objective, the teacher assigned students projects that showed their understanding in the subject matter. These projects should be accomplished by using their mobile phone offering the audio video recorder. This application helped student to produce their project. Students worked in group and they used their mobile phone to accomplish their project. They demonstrated in their video project concerning their knowledge and on consonant and vowel and other topics learned
in several meeting. Their mobile phone was capable of producing quality video to accomplish their project. Even though their devices were not professional device, they could accomplish their project by using their mobile phone. One of the comments is as follow: Teacher: "is mobile phone helpful to produce the project?" Student: "yes it is. Even though it is not professional device, it helped us to create the video project" The statement clearly supported that mobile phone supported classroom activities and learning process. Students used their mobile phone to demonstrate their knowledge and understanding about the course by creating video project by the mean of mobile phone. The results indicated that each student had their mobile phone. It goes without saying that mobile phone ownership among youth is high. This is in line with the previous findings that students in higher education are increasingly using mobile phone to access internet (Kennedy, 2014). Many mass media reported the successful sale of mobile phone. It can be concluded that youth customer is the largest customer of mobile phone. The findings in this study confirmed the previous research by Lenhart (2015) that teens and youth are the largest customer of mobile phone and they have used their mobile phone to go online. Since they are digital natives they need mobile phone to fulfill their need (Prensky, 2001). Based on the observation, the teacher knew that students spent their time mostly in using social media. There were two main functions student performed when accessing mobile phone. Given the internet access, they put chatting and social media as their core function to access mobile phone. Some studies found that social media is the most frequently visited and accessed platform when using internet by teen and youth. They preferred to use their mobile phone compared to computers when accessing social media (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). If designed

appropriately, this connectivity and mobility of mobile phone and internet can promote mobile-assisted language learning (Ducate & Lomicka, 2013). Students had installed in their gadget offline dictionary. This app was the most frequently installed app in students' mobile phone that they usually use to support learning. It goes without saying that mobile phone has promoted the learning of vocabulary for students (Nisbet & Austin, 2013). Other apps they use is PDF Reader for operating e-book. This apps was useful app for students to read e-book and other reading materials. These findings confirmed a previous study that features in mobile phone help students learn reading, vocabulary (Plester, Wood, & Joshi, 2009). In other words mobile phone when used appropriately may build reading habit among students (Oyewusi & Ayanlola, 2014). From observation, students seemed to enjoy the ease and portability of mobile phone that helped them learn in classroom. They found it more practical to use mobile phone compared to notebook in classroom activities (Lenhart, 2015). Mobile phone served as a learning tool in the 21st century and it call for teachers creativity to tailor mobile phone for classroom activities (Kee & Samsudin, 2014).

In classroom students used their mobile phone to play audio video material. Without difficulties, students could access and play their files in their mobile phone. According to their opinion, it was clear that feature of audio video player in their mobile phone helped them in learning proces as the previous research had proven (Smythe & Neufeld, 2010). Collaboration among students and teachers had been shown in this study. Video project was facilitated by the use of mobile phone. In other words mobile phone helped student to produce their portfolio in order to demonstrate their achievement in learning (Liu, Scordio, Renata, Navarete, Yujung, & Lim, 2015). Students were ready to integrate their mobile phone in classroom activities. Their mobile phones were equipped with application that facilitated them to support learning in classroom. Since they belong to digital natives they face no problem and difficulties to use mobile phone for classroom activities (Pegrum, Oakley, & Faulkner, 2013) Mobile phone in this study facilitated students to learn Phonology. It stores files of pdf that students could access when they needed to read. In addition it helped student to understand material in video files. In other words it organized students learning need (Sha, Looi, Chen, & Zhang, 2012). It provided not only material for learning but also facilitated portfolio creation to demonstrate students understanding (Liu, Scordio, Renata, Navarete, Yujung, & Lim, 2015). Students got benefit from mobile phone use to facilitate their learning process. Their learning improved by the assistance of their mobile phone since they used mobile phone to access material by reading pdf file, playing video and created project podcast.

Mobile phone improved students learning process in their classroom (Liu, Scordio, Renata, Navarete, Yujung, & Lim, 2015).

CONCLUSION:

This study discussed mobile-assisted language learning (MALL) and focuses on English language. MALL has emerged as the branch of global movement in conducting mobile learning which serves as an umbrella project for educational purposes. This study is important in the context of higher education for implementing mobile assisted language learning. To date, the issue of MALL has not been studied extensively in Higher Education. This study might initiate the development of MALL for English learning in higher education context.

The lack of research in MALL should be addressed to find out new way that propose promising method in delivering English. Education should respond to this emerging technology to reap the benefit they offer in supporting learning and teaching process. This study has shown that students had positive perception toward their mobile phone for supporting their classroom activities. They also showed their engagement in using mobile phone to support classroom activities and English learning activities. There were several activities that students performed in reaping benefit of mobile phone to support classroom activities and English learning. Using offline dictionary, operating PDF reader, playing audio file and recording

their video project using their mobile phone were the examples. The findings of this study have confirmed and supported previous research on

MALL in an effort to offers some brand new approach in English learning activities by the existence of mobile phone. To support their learning experience, mobile phone offers much benefit that students can gain in supporting classroom activities and English learning. It is expected that this approach and method of mobile English learning will be studied further in higher education context to propose a promising solution in English learning. Future studies should conduct in depth and large scale in investigating how mobile English learning implemented. With largest sample and the result might be generalizable.

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P.S. Brahmachary

Sri P.S.Brahmachary

Convener

28/2/2020

Dr.M.Syambab

Principal & Chairman

Impact of ICT in Rural Development

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Abstract:

Information and communication technology (ICT) can be thought of as an umbrella under which there reside communication system, device and applications. Main importance of ICT is given to its ability to provide greater access to information and communication to the populations and the quality of service provided than the technological backbone required. Rural development includes economic betterment of people as well as greater social transformation to eliminate poverty, ignorance and inequality of opportunities. In developing countries a large number of people are resident of rural area, thus rural development program is a necessary aspect. Use of information and communication technology can contribute a lot in socioeconomic development of rural area. In the current communication we have mainly focused on rural education, agriculture, health care facility, disaster and emergency response and E-governance facility in rural areas of developing countries.

Keywords: *ICT, rural development, developing country*

1. Introduction

Information and Communication Technology abbreviated as ICT consist of Information technology, enterprise software, audio-visual system, middleware using which user can access, store, transmit and modify information as required. Exponential growth of internet user, invention of modern communication devices, significant development in cloud and grid computing etc. have helped ICT to flourish as an rapid developed technological field in the last decade [1]. Mass use of information and communication technology with proper guidance helps a nation to create information rich society and helps in supporting livelihoods [2]. Rural development is a systematic ongoing process of improving the quality of life by socioeconomic well-being of the people living in rural areas. In this work we have mainly concentrated on the improvement of education, agricultural process, health care facility, disaster management, tourism (if exist) etc. with the help of Information and communication system and thus contributing towards economic growth and changing quality of life.

An analysis has been made on technology enhanced learning in developing nations [3]. This paper focuses on education gaps, success and challenges of open and distance learning and recommends the need of a uniform policy to incorporate new inventions related to ICT in

primary education infrastructure in rural areas. A detailed discussion on ICT enabled rural education on Indian perspective is discussed in [4]. A 24 × 7 online learning platform, with tele/videoconferencing among multiple groups of geographically dispersed learners may contribute a lot in rural education. Rahaman *et al*. [5] have analyzed the impact of ICT on socio-economic condition of rural areas and highlighted the drastic growth in use of mobile, computer and internet to rural people. A current research [6] proposed a framework of using ICT for the rural development of South Africa. Authors have examined the known implementation failures of using ICT and proposed a model containing goal determination and plan for sustainability. Some literature review of ICT based rural development model for South Africa are available in [7, 8]. China has world largest population and a large percentage of that are inhabitants of rural area. The country has adopted ICT as a catalyst for its rural development and boosting the quality of life. A large scale survey on middle and schools in China [9] reveals that use of ICT is diminishing the gap between urban and rural area. Though the report has suggested in building proper ICT infrastructure to bring more number of people to ICT based education. Growth of rural economy of China with availability of ICT is highlighted in [10]

Agriculture is the backbone of the rural economy. Rao [18] proposed a framework for implementing ICT for agriculture development in India. Role of information technology for agriculture and rural development in Kenya is available in [19]. Role of ICT in farmer decision making according to the supply chain model is discussed in [20]. A plenty of researches [21, 22, 23, 24] pointing the role of ICT in agricultural sector are available in literature. ICT enabled rural financial service of China is discussed in [11]. Almamy *et al.* [12] discussed the barriers and success factors of implementing ICT in developing countries. Present paper is grouped into eight possible critical success factors and compared the degrees of severity of those.

To provide service to a big percentage of people maintaining quality of service a strong backbone infrastructure is required. The bottlenecks for setting up the infrastructure are geographical location, changing climatic condition; civil infrastructure factor, per human capita etc. and those are very significant for developing countries especially in rural area. In [13] authors have critically analyzed the factors affecting the ICT expansion in Latin American countries. Opportunities and challenges for ICT implementation in agricultural sector mainly in India are addressed in [14]. Several technical issues related to infrastructure built up for ICT are available in [15, 16, 17]. In this current communication we have mainly pointed some fields like education, agriculture, health, economic, disaster management etc. which are keenly related to rural development. Organization of rest of the paper is as follows. Section 2 focuses on the infrastructure for ICT, section 3 puts light on the use of ICT in rural education. Role of ICT in rural healthcare is discussed in section 4. Section 5 contains ICT in agriculture. Use of ICT in

disaster management in rural areas are enlighten in section 6. Finally conclusion is drawn in section 7.

2. Infrastructure for ICT

To provide quality service using ICT a strong infrastructure backbone is required. Infrastructure backbone includes workstation, high speed network, Projection/Display technology, interactive devices, video conferencing equipments, printer etc. For mobile workstation devices like laptop, tablets, notebooks are essential. In hill area or island where setting up wire network is costly, there wireless network infrastructure is the best choice. The workstations must have a focused coverage and publicly access. It aims to provide free service or service at low cost. Those must be set up in some convenient locations, accessible in walking distance. Selection of proper application software and graphical user interface (GUI) are important for smooth operation using ICT. Now a days Cloud computing are becoming popular to provide support to a large number of users without buying individual software copy. The services provided by cloud computing may be thought as `whenever and whatever needed'. It reduces the implementation and maintenance cost. Software as a service, Platform as a service and infrastructure as a service are various cloud computing models as per the user requirement. Technical support is also a part of the infrastructure to keep the backbone in proper health. Knowledgeable technicians in the field of IT community must be staffed to provide the technical support. They can be grouped into problem solver and problem preventer. Technical Support acts as a liaison with vendors on technical matters.

2. ICT in Education

Education is the backbone of the nation. In many developing countries bringing a large percentage of students to education system is a great challenge. The reasons may be the geographical location, socio-economic condition etc. As example the north east states of India many villages are scattered in impassable hill regions. Poor transport facility discourages the rural students to come to school regularly. Scarcity of efficient teacher in the rural schools and a large student teacher ratio to the student side is also a reason for dropout of a large percentage of students in the midway of their education. Thus a great mismatch of education quality is observed when comparison is made with rural and urban students. Adoption of ICT in education can minimize the gap. Role of a teacher is shifted from leader to facilitator in ICT based education system. Adoption of ICT in teaching system enables and supports the move from traditional `teacher-centric' teaching styles to more `learner-centric' methods. A diverse

group of students can learn simultaneously even in the absence of teacher. An online repository must be maintained for accessing the study materials 24×7. There must be facility for teleconferencing, video conferencing with experts and for this a certain pre-defined time span must be broadcasted to the target learners. A pre assigned interactive session may provide the opportunity to the geographically diverse learners to interact with each other. Internet and World Wide Web open the door of the wealth of learning materials in variety of subjects- thus can be thought as any time anywhere library. Achieving higher education from rural areas is a great challenge. Most of the male has to contribute to their family income in their pre-youth and the girls are got married. ICT based distance learning facility can help a lot in providing higher education to the rural students. Not only in primary or higher education, anytime anywhere feature of ICT helps to provide adult education in the rural area. Online vocation training in engineering fields like civil, electrical, computer, mechanical etc. prepares experts in rural areas who can easily handle the rural needs in daily life activities of people.

3. ICT in Healthcare

The medical facility is the mostly neglected section in connection to the rural people. In the perspective of developing countries there is no health center, even not a degree holder doctor available in each village. In many rural hospitals there is no full time doctor. Even the doctors do not want to stay in rural areas due to lack of facility, opportunity, poor communication facility etc. For this reason the rural people depend on other for health issues. This gives an alarming figure of child death and mother death in rural areas. ICT has a great role to play in health section in rural areas. Adoption of telemedicine in some rural areas of India has given an encouraging result for its accessibility, affordability and availability. With this ICT based facility a small E health kiosk with a trained person can provide medical facility to a large number of people. When a patient is brought to the health kiosk, he enters the health details and problems of the patient to a central server. The server communicates with some doctor in district or urban hospital. The person at the kiosk communicates with the doctor to the other side and performs checkup and gives medicines according to the instructions of the doctor. By video conferencing doctor sited at some urban health center can face to face talk with the patient. Facility of pathological center is inadequate in rural areas. Even in some health centers the pathological instruments are kept unused. Recruitment of some trained persons (Not pathologist or radiologist) can operate the instruments and the captured images or results from some patients are sent to some radiologist/ pathologist for analysis using ICT facility. For any major problem a patient can take appointment of any doctor or clinical center located in urban area using ICT.

The health centers can also help the serious patients to get appointment of a doctor of any district or major government hospitals with the help of ICT.

4. ICT in Agriculture

Rural economy is mostly depends on agriculture. Agriculture provides a square meal for filling the stomachs of the growing population of a country, and this has made it critical for global stability and development. Even with a noticeable growth in industrialization, agriculture still accounts a major part in GDP of developing countries. But till in many rural areas the farmers are cultivating same crops years after years, while in the meantime the weather, soil condition of the land are changed, the pest have acquired immunity against the known pesticides - resulting a declined production graph. ICT can transform the common agriculture process to a smart one. With the help of ICT based service a farmer can directly seek advice in his own language from some agricultural expert. He can apply online for soil test and get suggestion from experts regarding the type of crop which will give best production to that type of land. In developed countries ground sensors set up in agricultural field are used for crop protection. The sensors provide information to the farmer regarding the necessity of irrigation, deficit of mineral (To select appropriate amount of fertilizer), increase of pest etc. Adoption of this technology can provide a better production in developing nations. Use of satellites and remote sensors provides accurate weather forecast even a month ago. This gives farmer a long time for crop selection for a season. He can seek for improved seed, best market price for his production, government's credit program etc. from internet. Bulk purchasing policy of some multinational companies directly from the farmer has eliminated the role of middleman as well as providing beneficiary to the cultivators. Different state governments in India have adopted the facility of bringing fresh vegetables directly to urban kitchen from farmers' field. ICT has given wings to these initiatives.

5. ICT in Disaster Management

Natural calamities or Disaster is unpredictable and can occur at any place irrespective of the developed, developing or underdeveloped country. Severe natural disaster leads to massive destruction of properties and even loss of human lives- effect of which remains as a scar for a long time. It is experienced that a large scale natural calamity impacts more severely to the developing or least developed countries than the developed one. Devastation of 2004 Tsunami at Indian coastal regions or 2015 Nepal earthquake is some of the examples which tremble the world. It is observed that rural areas are mostly affected than urban areas in natural disaster

mainly due to poor transportation and communication facility. In relation to natural disaster for some cases like cyclone, flood, tsunami, volcanic eruption etc. an early warning system can be setup using remote sensing technology. An earlier forecast helps people for preparedness and to take safe shelter. This may save a lot of lives and properties from destruction. As examples tsunami warning facility in Japan, Indonesia; cyclone warning facility of Cuba, Mexico, USA have brought life loss figure to single digit even zero. Proper use of ICT tools help to build knowledge warehouses and data warehousing techniques. Those can facilitate planning and policy decisions for preparedness in right time, quick response and recovery at all levels. Communication system is largely affected by natural disaster which makes the situation worse. GIS based system is governed by satellite and can easily identify the location of any person having the system (May be mobile phone) and stuck in the disaster. GIS with GPS have been found useful in 2013 sudden flood in Uttarakhand, 2014 flood in Kashmir and even in 2015 Nepal earthquake. Ham radio is an ICT component for emergency communication in disaster affected areas. Remote sensing technique and satellite data may be useful for measuring the ground water situation, which provides an early warning of draught situation. Plan and strategies for relief work for the inhabitants and farmers like well-digging, setting up submersible pump, choosing crop which can grow in less irrigation etc. can be started. Setting up of earthquake sensor can provide a warning for volcanic eruption.

6. Conclusion

The impacts of ICT in the rural development of the developing nations are discussed in this paper. The authors have mainly focused on the role of ICT in education, agriculture, healthcare and disaster management of rural area. ICT is an examined key for development of the geographically scattered rural people in developed nation and it is getting its popularity in the developing nations. The primary cost for establishment and set up of ICT infrastructure may be a barrier for developing nation but its enormous usefulness for the rural people cannot be denied. Though education, agriculture, healthcare etc. are common to all rural regions, but there are several other sections like tourism, banking and finance etc. in which ICT also has a great role to play.

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Dr M Madhu Sudhan Rao
Conference Secretary

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Conference Chairman

Phytochemicals and their anticancer activity: An update on their mode of action

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Abstract: Many medicinal plants are well known in our country since time immemorial which reveals the invaluable knowledge of medicinal herbs which helps in curing various diseases. Plants adapt to many physical and physiological defense mechanisms by production of secondary metabolites. The synergistic effects of herbal medicine contribute to greater potential in curing diseases compared to synthetic drugs. Role of research using herbs of medicinal importance is increasing rapidly during the preceding decade for development of new phytopharmaceuticals. Many new species of medicinal plants and their therapeutic effects were added to the already existing pharmacopeia. Modern medicine analyses biological effects of medicinal plants technically for novel drug development for accurate mode of action. This is an era where herbal medicine re-emerged as secondary metabolites showing numerous therapeutic effects focusing on identification, isolation and scale up of phytopharmaceuticals for manufacturing of drugs beneficial to humankind.

Keywords Medicinal plants, secondary metabolites, phytochemicals, antimicrobial activity, mode of action.

Introduction:

Phytochemicals and their derivatives have been identified as potential candidates for anticancer drug development due to their pleiotropic actions on target events with multiple manners. They have a promising role to improve efficiency of treatment in cancer patients and by decrease adverse reactions. Many phytochemicals are natural showing biological activity with significant antitumor potential. Dry and wet plant material is used for potential testing of biological activity in phytochemical based anticancer therapy. Active

phytochemicals are purified and tested in *vitro* and *in vivo* as they are effective and free of side effects (Choudhari *et al.*, 2020). There are serious toxicity concerns to normal cells using numerous potent synthetic drugs causing obstracles in clinical utility over prolonged time duration.

Although numerous potent synthetic drugs have been introduced for cancer chemotherapy, yet their serious toxicity concerns to normal cells apart from drug resistance have emerged as the major obstacles for their clinical utility over a prolonged duration of time(Dutt . *et al.*, 2019). Several medicinal plant species and their phytochemicals inhibit the progression and development of cancer (Aung, 2017). Phytochemicals and their derived analogues are present in different parts of the plant and primary and secondary metabolites of plants were found to play significant role in either inhibiting cancer cell activating proteins, enzymes and signaling pathways . The efficacy of these phytomolecules in cancer therapy is increased due to high biodegradability and biocompatibility. (Javed Iqbal *et al.*, 2017). Advancement of information technology and bioinformatics, increases the trend to build resources and databases on herbal formulations of active components and related information (Khan *et al.*, 2020)

Role of plants in anti-cancer activity

After cardiovascular disease, cancer is the leading cause of death (Kutluk and Kars, 1998) as it is related with complex mechanisms both at cellular and molecular level. Phytochemical rich diet lessens cancer risk by 20%. These phytochemicals are generally natural plant derived secondary metabolites. Many challenges were faced during cancer treatment as patients undergo various types of therapies such as radiation, chemotherapy *etc*. Even then six million people die because of this disease worldwide every year. It is recorded that there are about 22 million cancer patients in the world (Pinar, 1998). Anti-cancer agents avoid or repress the growth of cancer. Cancer is a serious disease caused by invasive growth of cells which tend to proliferate rapidly causing malignancies in body. Cancer cells are formed as a result of imbalance in body metabolism and destroy healthy cells of our body. It is treated by

regulating body imbalance thereby correcting abnormal behavior of cells. Imbalance in diet and hormones are the most important causes of cancer (Ames et al., 1995). Cancer cells overlook the signals that normal cells take; thereby disturbing the process of programmed cell death (apoptosis). Some natural plant sources acting as anti-tumor agents against various types of cancers in clinical use are vinblastine and vincristine from *Catharanthus roseus*, Taxol from *Taxus brevifolia* Nutt., podophyllotoxin from *Podophyllum species* and homoharringtonine from *Cephalotaxus harringtonia* (Rajandeep Kaur et al., 2011). With the increasing concentration of *Phyllanthus amarus* leaf extract, the percentage viability of cancer cell lines was decreased (Sravanthi and Giri, 2021)

Antimetastatic effects of four species of *Phyllanthus* namely *P. amarus*, *P. niruri, P. watsonii* and *P. urinaria* have been evaluated against human lung (A549) and breast cancer (MCF-7) cell lines and found that this plant has high anti-metastatic potential. It increases the level of caspase activity causing apoptosis induction. Polyphenol compounds present in plant extracts of *P. amarus* were found to be responsible for anti-cancer activity (Lee et al., 2011). It was reported that aqueous extract of *P. amarus* was found to inhibit aniline hydroxylase and DNA topoisomerase II enzymes in carcinogenic mice, which reduces tumor formation (Rajeshkumar et al., 2002). Lignan compounds namely phyllanthin, niranthin and nirtetralin of *P. amarus* also proved to cause anti-cancer effects (Abhyankar et al., 2010). Inhibition of cancer cell growth by cell cycle modulation and apoptosis induction using aqueous and methanolic extracts of four *Phyllanthus* species namely *P. amarus*, *P. niruri, P. watsonii, and P. urinaria* were also investigated against prostate cancer and skin melanoma (Tang et al., 2010). The compounds phyllanthin and

hypophyllanthin of *P. amarus* proved to have cytotoxic activity (Itharat and Ooraikul, 2007).

Mechanisms of anti-cancer action

Many plants are reported to exhibit anticancer property since ancient times. Natural sources such as plants, micro-organisms and marine-organisms serve about 60% of the total anti-cancer agents (Cragg and Newman et al., 2005). Plants heal diseases like cancer without toxic side effects. It was proved that approximately 60% of cancer patients use medicinal herbs for effective cure of cancer (Madhuri and Pandey, 2008). The main causes behind the development of cancer such as chemical and biological agents, ionizing radiation, somatic mutations, reactive oxidative species were identified by WHO (Stewart and Wild, 2014) (Fig. 1).

Roots of *Phyllanthus pulcher* Wall.ex Mull. Arg. were used for extraction of triterpenes compounds using dichloromethane, ethyl acetate and methanol solvents and these compounds were tested against breast, lung and prostate cancers (Bagalkotkar et al., 2011). Many medicinal plants play a major role as anticancer agents without causing any side effects. Medicinal plants such as *Podophyllum peltatum, Taxus brevifolia, Camptotheca acuminate, Cephalotaxus harringtonia, Catharanthus roseus etc.* have been reviewed and compounds such asbetulinic acid, combrestatin, and silvesterol were found to be responsible for anticancer activity (Kaur et al., 2011). Methanolic extract of *Salacia oblonga* was evaluated for antiproliferative action against breast cancer. Compounds such as Gammasitosterol, N-Methoxy-Nmethylacetamide, Hexadecanoic acid, 12-dien-3-ol, Ursa-9(11) *etc.* have been identified through GC-MS analysis (Anjaneyulu et al, 2015). Different anticancer drugs have different mechanism of action and these mechanisms differ at various drug concentrations (Fig.2). *P. amarus* in leaf extract revealed the presence of Sylvatesmin which was reported to have high radical scavenging activity (Sravanthi *et al.*, 2016). The aqueous extract of *Phyllanthus amarus* demonstrates potent anticancer activity against 20- metylcholanthrene (20-MC) induced sarcoma development. The aqueous extract inhibits DNA topoisomerase II of mutant cell cultures and inhibited cell cycle regulatory enzyme cdc 25 tyrosine phosphatase of *Saccharomyces cerevisiae*. The anticarcinogenic and anti-tumour activity of *Phyllanthus amarus* proposed to

be inhibition of metabolic activation of carcinogen as well as the inhibition of cell cycle regulators responsible for cancerous growth and DNA repair (Sravanthi *et al.*, 2016). Genistein reduces the risk of tumor formation and arrests invasion and angiogenesis by inhibiting protein tyrosine kinase and topoisomerase II. It also acts synergistically with other anticancer drugs. Genistein can also be used to supplement radiation treatment for prostate and breast carcinomas (Anil Kumar *et al.*, 2017). In-Silico Docking analysis is done *in Phyllanthus amarus* plant for recognition of anticancer compounds *viz.* Carissanol Dimethyl Ether , Sylvatesmin, Fumaric acid- 2-isopropylphenyl pentadecyl ester using AutoDock tools(Sravanthi *et al.*, 2017).

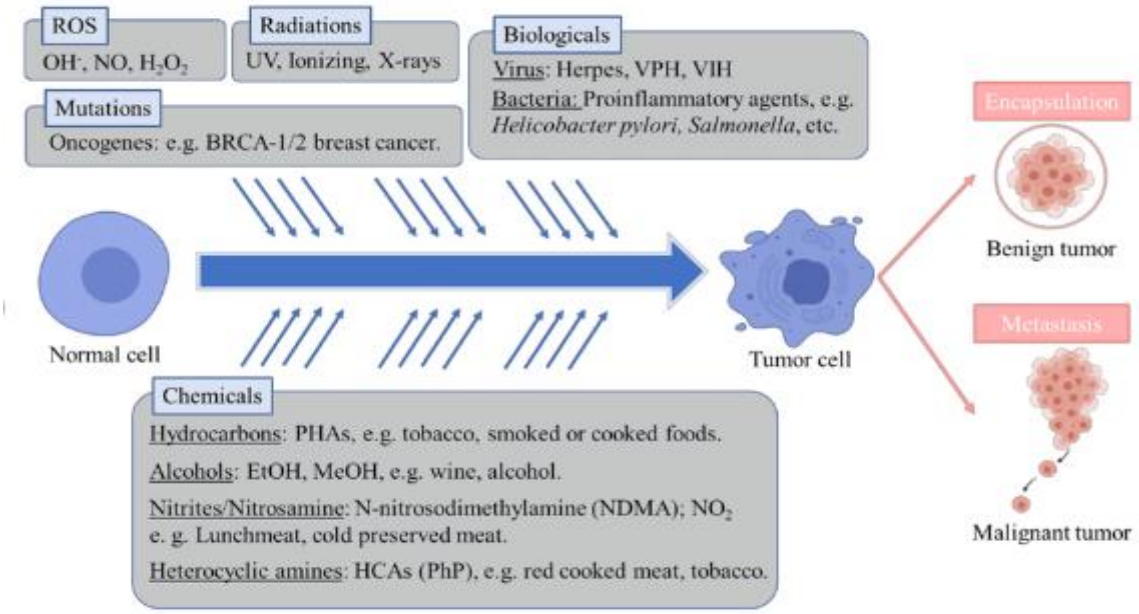

Fig.1 Main causes involved in the development of cancer, according to WHO. Plant derived bioactive compounds exert anticancer effects by the following mode of action (Rindsjo, 2015):

- Interferons induced cell death by blocking signaling pathway of growth factors.
- Cell death by DNA damage.
- Autophagy induction in response to starvation and stress by activation of tyrosine kinase and proteosome inhibitors.

- Induction of programmed cell death by use of glucocorticoid hormones in diseases such as lymphoblastic leukemia, where the hormones affect glucose uptake by inhibiting glucose transporter expression.
- Disconnection of cellular metabolism from availability of nutrient and growth factors for limiting tumor cell growth as the metabolic demandis high.

Other mechanisms include (Payne and Miles, 2008):

- Triggering apoptosis by inducing mutations in cancer cells.
- Interfering with DNA replication by use of alkylating agents.
- Cross linking in DNA strands inhibiting DNA, RNA and protein synthesis by use of heavy metals.
- Blocking of nucleic acid synthesis in cell cycle by use of antimetabolite compounds which compete with natural substances such as vitamins, nucleosides or amino acids due to their structural similarity for receptors on essential enzymes.
- DNA fragmentation by using mixture of glycopeptides.
- Preventing reunion of DNA double helix during replication by stabilizing the DNA tomoisomerase II complex using compounds such as anthracyclines.
- Preventing DNA replication by Topoisomerase inhibitors. This can be by:
    - Topoisomerase I inhibitor, which stabilizes the Topoisomerase I enzyme–DNA complex.

      Eg: Camptothecin derived from *Camptotheca acuminata.*
    - Topoisomerase II inhibitors, which causes DNA strand breaks by stabilizing Topoisomerase II enzyme and DNA.

      Eg: Epipodophyllotoxin derivatives of *Podophyllum peltatum.*

- Inhibiting mitotic spindle formation by blocking tubulin synthesis. This inturn influences DNA repair mechanism. Eg. vincristine and vinblastine extracted from *Catheranthus roseus,* Taxol derived from *Taxus brevifolia.*

There are numerous mechanisms for plant-derived anticancer drugs and most of them induce cell death by intrinsic or extrinsic apoptotic pathways, caspases or p53 dependent or independent mechanisms. Other methods include autophagy, senescence, necrosis and mitotic catastrophe causing cell death. Alkaloids, terpenoids and other secondary metabolite compounds of plant are found to exhibit anti-cancer properties (Gali-Muhtasib et al., 2015).

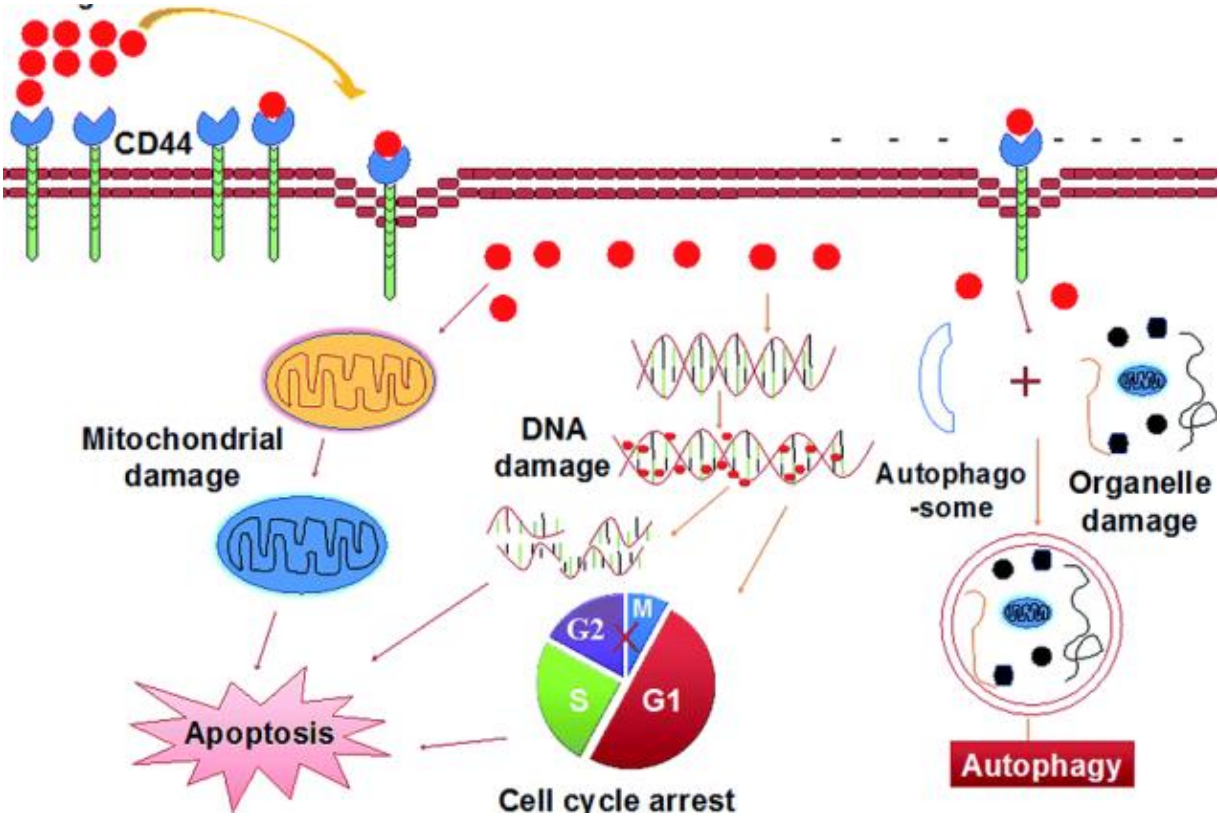

Fig.2 Multiple mechanisms involved in anticancer activities (Jianming Liang et al., 2015)

As there is a problem of side effects with synthetic chemotherapeutic agents, plant derived compounds are gaining insight for exploiting novel pathways in cancer therapy. Cytotoxic compounds do not specifically target cancerous cells, but they influence ordinary cells also showing adverse effects. As plant

based drugs have fewer side effects, research in plants is in continuous progress for isolating the active principles for curing various types of cancers in an effective way. There should be more focus on target specific therapy and drug usage time for significant cure of cancers. Identifying the compounds which puts a check for malignant development is a hot topic in research at present (Fig.3).

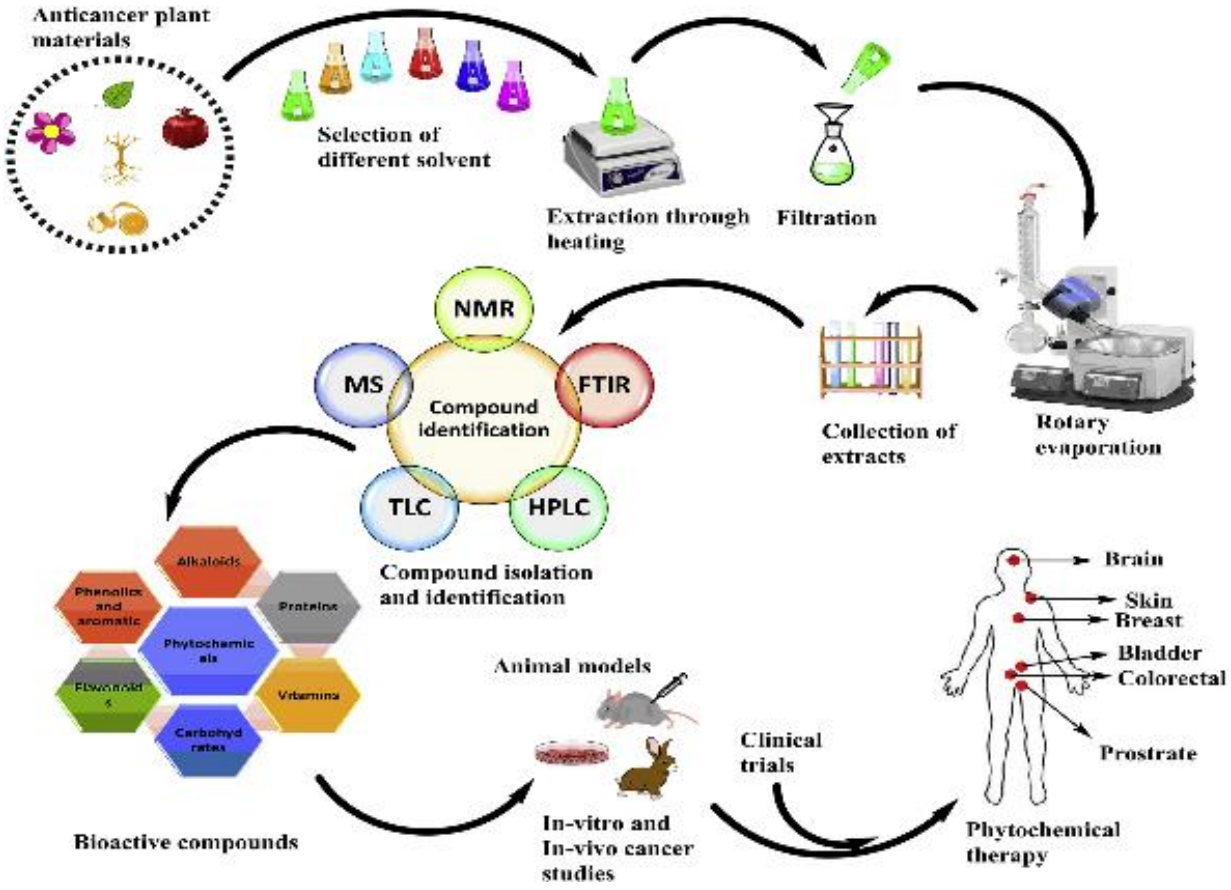

Fig 3. Detailed scheme of anticancer phytochemical synthesis, optimization, characterization and prospective use as cancer therapeutic agent (Iqbal et al., 2017).

Many medicinal plants possessing anti-cancer properties were listed in Table 1.

Table 1. List of medicinal plants possessing anti-cancer properties

S.No	Name of the plant	Family	Phytochemicals	Anti-cancer	References
1.	*Abelmoschus moschatus*	Malvaceae	Phenols and Flavonoids.	Colorectal adenocarcinoma and retinoblastoma human cancer	Gul et al., 2011.
2.	*Acacia pennivenia*	Mimosaceae	Saponins and tannins.	Lung cancer, Urinarybladder Cancer and breast cancer.	Mothana et al., 2009.
3.	*Acanthospermum hispidum*	Asteraceae	Sesquiterpene lactones	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
4.	*Acridocarpus socotranus*	Malpighiaceae	Flavonoids, terpenoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
5.	*Aloe perryi*	Aloaceae	Anthraquinons, flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
6.	*Anthemis palestina*	Asteraceae	Phenols and flavonoids. α-terpinene, β-terpinene, β-terpinolene, 1,8-cineole, menthone, isomenthone, and citronellal, 1,8-cineole and terpinen-4-ol, thymol and carvacrol, eugenol.	Human breast adenocarcinom,human ductal breast epithelial tumor, Human colon adenocarcinoma, human	Bardaweel et al., 2014.

				epithelial carcinoma, human prostate adenocarcinoma, human clear cell renal cell carcinoma and human kidney carcinoma.	
7.	*Ballochia atro-virgata*	Acanthaceae	Terpenoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
8.	*Bergenia ciliata*	Saxifragaceae	Tannins, alkaloids, saponins, carbohydrates, flavonoids, steroids, phlobatannins, terpenoids, cardiac glycosides. tannins, alkaloids, saponins, carbohydrates, flavonoids, steroids, phlobatannins, terpenoids, cardiac glycosides Tannins, alkaloids, saponins, carbohydrates, flavonoids, steroids, phlobatannins, terpenoids and cardiac glycosides.	lung carcinoma and malignant melanoma	Ahmed et al., 2016.
9.	*Blepharis spiculifolia*	Acanthaceae	Phenolic compounds and terpenoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.

10.	*Boswellia dioscorides*	Burseraceae	Volatile oil, terpenoids and flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
11.	*Boswellia socotrana*	Burseraceae	Volatile oil, terpenoids and flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
12.	*Capparis cartilaginea*	Capparaceae	Glucosinolates and flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
13.	*Cassia siamea*	Fabaceae	Chromone (anhydrobarakol), Chromone alkaloids (barakol, cassiarin A-B), anthraquinones (chrysophanol, emodin), bianthraquinones (cassiamin A-B), flavonoids and phenolics.	Hepatic and mammary gland tumors, Human epidermoid carcinoma.	Kamagate et al., 2014.
14.	*Commiphora ornifolia*	Burseraceae	Volatile oil, terpenoids and flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
15.	*Corchorus erodioides*	Tiliaceae	Flavonoids and phenolic compounds.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
16.	*Crataegus monogy*	Rosaceae	Phenols and flavonoids.	Human skin fibroblasts and	Nunesa et al.,

	na L.			hepatocellular carcinoma.	2016.
17.	*Croton socotranus*	Euphorbiaceae	Flavonoids, terpenoids and tannins.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
18.	*Equisetum telmateia L.*	Equisataceae	Phenols and flavonoids.	Human skin fibroblasts and hepatocellular carcinoma.	Nunesa et al., 2016.
19.	*Euclea divinorum*	Ebenaceae	Phenolic acids and tannins.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
20.	*Euphorbia socotrana*	Euphorbiaceae	Terpenoids, flavonoids, steroids and tannins.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
21.	*Eureiandra balfourii*	Cucurbitaceae	Terpenoids and flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
22.	*Ficus cordata*	Moraceae	Tannins and terpenoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
23.	*Ficus*	Moraceae	Phenol and 2, 4-bis	MTT assay	Lee et al.,

	deltoidea		(dimethylbenzyl)-6-t-butylphenol.	against human breast adenocarcinoma.	2011.
24.	*Garcinia cowa*	*Clusiaceae*	flavonoids, phloroglucinols , Xanthones and triterpene.	Hepatoma.	Ritthiwigrom et al., 2013.
25.	*Geranium purpureum Vil.*	Geraniaceae	Phenols and flavonoids. Phenols and flavonoids.	Human skin fibroblasts and hepatocellular carcinoma.	Nunesa et al., 2016.
26.	*Glossonema revoili*	Asclepiadaceae	Steroids and flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
27.	*Helicteres isora*	Sterculiaceae	49-O-b -D-glucopyranosyl rosmarinic acid , 4,49-O-di-b -D-glucopyranosyl rosmarinic acid and 2R-O-(49-O-b -D-glucopyranosyl caffeoyl)-3-(4-hydroxyphenyl), lactic acid named as 49-O-b –D gluco pyranosyl isorinic acid and Rosmarinic acid.	oral carcinoma	Bhakya et al., 2016. Kumar, 2014.
28.	*Hibiscus noli-tangere*	Malvaceae	Tannins and lignans.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
29.	*Hypoestes pubescens*	Acanthaceae	Alkaloids and terpenoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
30.	*Lannea transulta*	Anacardiaceae	Tannins and flavonoids.	Lung cancer, urinary bladder	Mothana et al., 2009.

				cancer and breast cancer.	
31.	*Lavandula stoechas L. spp. luisieri*	Lamiaceae	Phenols and flavonoids.	Human skin fibroblasts and hepatocellular carcinoma.	Nunesa et al., 2016.
32.	*Leucas samhaensis*	Labiatae	Volatile oil, terpenoids and flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
33.	*Leucas virgata*	Labiatae	Volatile oil, terpenoids and flavonoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
34.	*Limnophila aromatica*	Scrophulariaceae	Eugenol, γ-terpinene.	--------	Gorai et al., 2014.
35.	*Lycium sokotranum*	Solanaceae	Alkaloids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
36.	*Maerua angolensis*	Capparaceae	Glucosinolates and tannins.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
37.	*Melissa officinalis*	Lamiaceae	Phenols.	Human epithelial cervical cancer and breast cancer.	Brunet et al., 2008.
38.	*Mentha suaveolens*	Lamiaceae	Phenols and Flavonoids.	Human skin fibroblasts and	Nunesa et al., 2016.

	Ehrh.			hepatocellular carcinoma.	
39.	*Michelia champaca*	Magnoliaceae	Alkaloids, saponins, tannins, sterols, flavonoids and triterpenoids.	Colorimetric MTT (tetrazolium) assay against human breast adenocarcinoma.	Lee et al., 2011.
40.	*Peperomia pellucida*	Piperaceae	Phytol, 2-Naphtalenol, decahydro, Hexadecanoic acid, methyl ester ,9,12-Octadecadienoic acid(Z,Z)-and Methyl ester.	MTT (tetrazolium) assay against human breast adenocarcinoma	Lee et al., 2011.
41.	*Polygonum odoratum*	*Asparagaceae*	homoisoflavanones, isoflavones , flavone glycoside, triterpenoid aglycon, steroidal sapogenins, steroidal saponins , lignanoids and fatty acids.	Breast cancer carcinoma.	Nanasomba t and Teckchuen, 2009 and Quan, 2015.
42.	*Psidium guajava*	Myrtaceae	Tannins, flavonoids (myricetin, quercetin, luteolin and kaempferol), essential oils (caryophyllene, nerolidiol, β-bisabolene, aromadendrene, p-selinene, α-pinene and 1,8-cineol), triterpenoids (oleanic acid, ursolic acid, catecolic acid, guayavolic acid, maslinic acid, ellagic acid) and β-sitosterol.	Squamous cell carcinoma, meningioma cells, colon cancer.	Braga et al., 2014.
43.	*Rhus thyrsiflora*	Anacardiaceae	Flavonoids, terpenoids and tannins.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
44.	*Ruta*	Rutaceae	Furanocumarins,	MTT assay	Pushpa et

	graveolens		carotenoids, furanoquionolones.	against breast cancer cell line	al., 2015.
45.	*Strychnos lucida*	Loganiaceae	Brucine, brucine N-Oxide, loganic acid, loganin, ligustrinoside, chlorogenic acid, 3,4-di-O-caffeoylquinic acid, ®-D-glucoside, syringaresinol 4-O-®picconioside I, sylvestroside I, vanillic acid 4-O- adenosine and 4-O-(3,5-dimethoxy-4-hydroxybenzoyl) quinic acid.	hepatocellular carcinoma, cholangio carcinoma, lung carcinoma and T-lymphoblast, acute lymphoblastic leukemia cell lines.	Sarmento et al., 2015.
46.	*Swertia chirata*	Gentianaceae	Phenols and Flavonoids.	human epidermoid *carcinoma*	Naqvi et al., 2013.
47.	*Syzygium caryophyllatum (l)*	Myrtaceae	Flavonoids, phenolic compounds, alkaloids and saponins.	Human liver carcinoma	Annadurai et al., 2012 and Raj et al., 2016.
48.	*Teucrium sokotranum*	Labiatae	Volatile oil and terpenoids.	Lung cancer, urinary bladder cancer and breast cancer.	Mothana et al., 2009.
49.	*Tiliacora acuminata*	Menispermaceae	Phenols and Flavonoids. alpha.-Tocopherol-beta.-D-mannoside, n-Hexatriacontane and Neophytadiene.	Human laryngeal carcinoma.	Chandrakanthan et al., 2014.

Conclusions

Further studies on anticancer active ingredients (of plant origin) were encouraged using present study for their pharmacokinetic activities basing on the fact that plant-based drug formulations generally consists of a number of phytochemicals from more than one plants. The major challenge would be to predict the role of phytochemicals other than active compounds that are present in the traditional medicine. Comprehensive analysis of different plants proved that medicinal herbs possess a huge anticancer potential. This review highlights the mechanism of antitumor action of some of the recent findings which focusses on regulating signaling pathways in plants. Many studies have reported that stops tumor by inhibition of enzymes. It is highlighted that many plants play an important role in anticancer properties through their different classes of secondary metabolites (Table 1.). However, the study of medicinal plants should still continue on various unexplored plants without limitation. Mechanism of anticancer action of many explored and unexplored plants needs to highlighted.

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Conflicts of Interest

The authors declare no conflict of interest.

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24. PHYTOCHEMICALS AND THEIR ANTIOXIDANT ACTIVITY: AN UPDATE ON THEIR MODE OF ACTION

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ABSTRACT

Medicinal plants are used for health care either directly or indirectly as they are rich source of several ingradients. Ethno-medical traditions prove that they have a great therapeutic value and are important bioresources. Phytochemicals are naturally occurring compounds having immense antioxidant potential and are of great interest in securing health benefits of consumers. Each portion of plant has its own medicinal properties possessing different types of secondary metabolites which plays important role in treatment of different types of diseases and for manufacturing of drugs.The phytopharmaceutical preparations should be safely assessed and well established before their usage. Inspite of medicinal uses, phytochemicals have also been used in cosmetics, fragrance and as food supplements. Global research is recently focussing on search of new medicines or active compounds with proven significant scientific output. This review focusses on the metabolic fingerprint and biological properties of various plants which play a major role in antioxidant activity along with their mechanisms of action.

Keywords: Medicinal plants, secondary metabolites, phytochemicals, antioxidant activity, mode of action.

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उच्च शिक्षा आज

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विजयवाडा

उच्च शिक्षा (higher education) उच्च शिक्षा का अर्थ है सामान्य रूप से स्कूलों की जानेवाली शिक्षा से ऊपर किसी विशेष विषय या विषयों में विशेष, विशद तथा सूक्ष्म शिक्षा। यह शिक्षा के उस स्तर का नाम है जो विश्वविद्यालयों, कम्युनिटी महाविद्यालयों, निजकृत आर्ट कालेजों एवं प्रौद्योगिकी संस्थानों आदि के द्वारा दी जाती है। प्राथमिक एवं माध्यमिक के बाद यह शिक्षा का तृतीय स्तर है जो प्राय: वैच्छिक होता है। इसके अन्तर्गत स्नातक, परास्नातक एवं व्यावसायिक शिक्षा एवं प्रशिक्षण आदि आते हैं।

ऐसी शिक्षा का स्वरूप विशदता के साथ भारतवर्ष में प्रतिष्ठित हुआ था। उच्च शिक्षा देनेवाले भारतीय गुरुकुलों की सबसे विशेषता यह थी कि उनमें प्रारंभिक शिक्षा से लेकर उच्चतम शिक्षा शिष्यअध्यापक प्रणाली (मोनीटोरियल सिस्टम) से दी जाती थी। सबसे ऊपर के छात्र अपने से नीचे वर्ग के छात्रों को पढ़ाते थे और वे अपने से नीचे वाले को यथावि प्राप्तगण अधिक और वैद्य के पुत्र ही भर्ती किए जाते थे और वर्गों के अनुकूल ही स्वदक्षता प्रवेश और शिष्टाचार की शिक्षा प्रत्यवर्ग शिक्षा प्रत्येक छात्र को दी जाती थी और प्रत्येक गुरुकुल में रहकर आश्रम का समस्त कार्य स्वयं करना पड़ता था। कुछ गुरुकुल तो इतने बड़े थे कि वहाँ एक एक कुलपति, दस सहस्र ऋषियों और ब्रह्मचारियों का अन्न दानादि देकर उनको पढ़ाने का प्रयत्न करते थे और छात्र भी अपने सामर्थ्य के अनुसार गुरुदक्षिणा देते थे किंतु कोई भी राजा इन गुरुकुलों के प्रबंध में हस्तक्षेप नहीं करता था। इन गुरुकुलों का प्रारंभ संवत् में उन परिस्थितियों से हुआ जिनमें चार से लेकर २५ तक विद्वान् और मनीषी किसी नैतिक सामाजिक या धार्मिक समस्या पर व्यवस्था देने के लिये

एकत्र होते थे कुछ योरप में मिस्र की सभ्यता सर्वप्राचीन मानी जाती है किंतु वहाँ की उच्च शिक्षाप्रणाली का कोई स्पष्ट विवरण नहीं मिलता। बाबुल, असुरिया (असीरिया) के निवासियों तथा हिब्रू और फिनीसी लोगों में राजशास्त्र, नीतिशास्त्र, ज्योतिष और भूगोल की उच्च शिक्षा गिने चुने लोगों को ही दी जाती थी। यूनान में सौंदर्य की उदात्त भावना के साथ व्याकरण, काव्य, भाषा, शैली, अलंकारशास्त्र, वक्तृत्वकला, संगीत, गणित, भौतिकी विज्ञान, अर्थशास्त्र, वक्तृत्वकला, संगीत, गणित, भौतिकी विज्ञान, अर्थशास्त्र और राजनीति की शिक्षा दी जाती थी। एक एक व्यक्ति एक एक विषय का पंडित होता था। उसी के पास युवक शिक्षा प्राप्त करने जाते थे। स्पार्ता के लोगों को केवल युद्ध की ही शिक्षा मिली, अन्य विषयों का पूर्ण अभाव रहा। वास्तव में एथेंस ही युनानी उच्च शिक्षा का विद्यानगर था जहाँ सुकरात, जेनोफन, अफलातून और अरस्तू जैसे विद्वान् शिक्षाशास्त्री और दार्शनिक विद्यमान थे। जब रोमवालों ने यूनान को जीत लिया तब रोम की शिक्षाप्रणाली पर यूनान का यह प्रभाव पड़ा कि वहाँ भी इतिहास, विज्ञान, दर्शन, वक्तृत्वकला और शास्त्रार्थकला की उच्च शिक्षा दी ईसाई मठों में पहले धर्मशिक्षा और प्रार्थना के साथ पढ़ना लिखना, गाना, पूजा करना और गणित की शिक्षा दी जाती थी किंतु इसके पश्चात् वहाँ विद्यात्रयी (लातिन का व्याकरण, ज्यामिति, ज्योतिष और संगीत) का मिलाकर सात ज्ञानविस्तारक कलाओं के शिक्षण का क्रम चला और तभी से इन शास्त्रों के लिये (आर्ट) शब्द का प्रयोग चल पड़ा जो आजकल भ्रामक रूप से हमारे विश्वविद्यालयों की उपाधि में प्रयुक्त हो रहा है। योरप में प्रारंभ में कुछ विद्यार्थी किसी विशेष विद्या के आचार्य के पास अध्ययन के लिये एकत्र होते थे जैसे पैरिस में धर्मशास्त्र के अध्ययन के लिये, सालेरनो में भैषज्यविद्या के लिये या बोलोना में न्यायनीति (कानून) सीखने के लिये। इस प्रकार दक्षिण योरप में बोलोना के आदर्श पर विश्वविद्यालय खुले और उत्तर में पैरिस के आदर्श पर। इनके अतिरिक्त एक शिक्षाचार्य (बैकेलोरिएट) का प्रमाणपत्र भी था जो शिक्षक होने के लिये अनुज्ञापत्र समझा जाता था। धीरे धीरे विश्वविद्यालयों ने वर्तमान रूप धारण किया।

SIR C R REDDY COLLEGE

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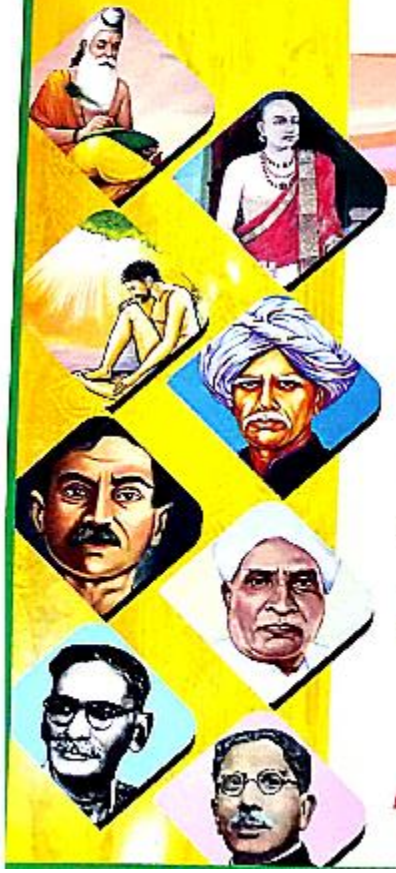

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- डॉ.के. ज्योतिलक
हिन्दी विभाग, भारतिमोरि कालेज, विजयवाडा.

'साहित्य' शब्द की व्युत्पत्ति सहित शब्द से हुई है। 'सहित' शब्द के दो अर्थ है - 'स' अर्थात् साथ साथ और हित अर्थात् कल्याण। इस दृष्टिकोण से साहित्य शब्द से अभिप्राय यह हुआ कि साहित्य एक ऐसी विशेषित सामग्री है जिसके शब्द और अर्थ में लोकहित की भावना सर्वोपरि रहती है। विस्तारपूर्वक विशेषित सामग्री के लिए साहित्य शब्द का प्रयोग प्रचलित है, जैसे -इतिहास साहित्य, राजनीति साहित्य, विज्ञान साहित्य, पत्र साहित्य, आदि। इस प्रकार साहित्यकार की भावनाएँ समस्त जगत् के साथ रागात्मक (प्रेम) सम्बन्ध स्थापित करती हुई परस्पर सहयोग, सहानुभूति और सौन्दर्यबोधी चेतना जागृत करने वाली एक आनन्द प्रदायक होती है जिससे रोचकता और सजीवता उत्पन्न होती है।

साहित्य और समाज का अन्योन्याश्रित सम्बन्ध है। समाजकी गतिशीलताओं में साहित्य सदैव प्रभावित होता है। साहित्यकार समाज का चेतन और जागरूक प्राणी होता है। वह समाज के प्रभाव से अलिप्त और अछूता न रहकर उसका भोक्ता और अभिन्न अंग होता है। उसके साहित्य में समाज का विस्तृत प्रतिबिम्ब रूप दिखाई पड़ता है। समाज का समूचे अंग यथार्थ और काल्पनिक रूप में प्रस्तुत होकर प्रभावशाली हो उठता है। यही नहीं समाज का अनागत रूप भी कार्यान्वित रूप में ही हमें सजग करता हुआ आगाह करता है। इस दृष्टिकोण से साहित्य और समाज का परस्पर सम्बन्ध एक-दूसरे पर निर्भर करता हुआ स्पष्ट होता है।

'साहित्य समाज का दर्पण है' ऐसा कहने का अर्थ यही है कि साहित्य समाज का न केवल कुशल चित्र है अपितु समाज के प्रति उसका दायित्व निर्वाह भी है। वह सामाजिक दायित्वों का वहन करता हुआ उनको अंकित रूप में विवेचने में अपनी अधिक से-अधिक और आवश्यक भूमिका अदा करता है। समाज में फैली हुई अशिक्षा, अराजकता, निरंकुशता जैसे अवांछनीय और असामाजिक तत्वों के दुष्प्रभाव को बड़े ही मर्मस्पर्शी रूप में सामने लाता है।

समाज और साहित्य विषय साहित्य और समाज के ही समान तो लगता है लेकिन दोनों में परस्पर भिन्नता है। साहित्य और समाज और समाज और साहित्य का ध्यान से देखने पर एक सम्बोध तथ्य यह निकलता है कि साहित्य समाज का दर्पण है। साहित्य के द्वारा समाज का निर्माण होता है अर्थात् साहित्य में जो कुछ है वही समाज में भी है और शेष जो

होता है। अब कोई कवि या साहित्यकार समाज की अवांछनीयता या त्रुटियों को देखता है, उसे अनावश्यक समझता है और उसका तिरस्कारन कर आमूलचूल परिवर्तन के लिए दिशा निर्देश या सकारात्मक विकल्प सोचता है तब वह उसके लिए नवसाहित्य का सृजन करना अपना सर्वप्रथम कर्तव्य समझता है और ऐसा करके वह विधाता का पद प्राप्त करता है क्योंकि जहाँ विधाता समाज और सृष्टि का निर्माता होता है वहीं कवि और साहित्यकार भी अपेक्षित और आवश्यक समाज की रचना का सुझाव अपनी रचनाओं के द्वारा करता है।

समाज के प्रति साहित्यकार का दायित्व आशा का संचार करना, उत्साह और कर्तव्यबोध का दिशाबोध देना आदि है। आदि कवि से लेकर आज के सामयिक और समसामयिक साहित्यकारों की यही गौरवशाली परम्परा रही है कि समाज की कुरूपता का कल्याण और सुन्दर रूप पर प्रस्तुत करने में सत् साहित्य का रचनाकार कभी पीछे नहीं दिखता है। वह सामाजिक विषमता रूपी समर में विजयी होने के लिए कलमरूपी तलवार को धारदार बनाए रखने में कभी साहित्यिक नहीं होता है। इसीलिए साहित्य एक शैली है।

हिन्दी साहित्य का महत्व हिन्दी, भारत की राजभाषा, संस्कृत भाषा से उत्पन्न होती है। ९ शताब्दी ईस्वी से हिन्दी भाषा आदी विशेष में विशेष नई की लगभग ११ शताब्दी ईस्वी से यह भाषा इकनामिक विशेष में विशेष नई है। हिन्दी साहित्य कहानियों, कविताएँ, नाटक और उपन्यास से भरी है। हिन्दी साहित्य को चार सांरचनात्मक रूपरेखा में विभाजित किया जा सकता है। आदिकाल (१००० ईस्वी से पहले),

भक्तिकाल (१३७५-१७००), रीतिकाल (१६००-१९००) और आधुनिक काल (१८५० के पश्चात)। आदिकाल के वेदिक ग्रन्थों व उपनिषदों से लेकर वर्तमान साहित्य ने मनुष्य जीवन को सदैव ही प्रभावित किया है।

साहित्य किसी संस्कृति का ज्ञान कराने में महत्वपूर्ण भूमिका निभाती है। उदाहरण के लिए भक्तिकाल के साहित्य से हम हिन्दुओं के धार्मिक परंपराओं की जानकारी मिलती है। किसी भी काल का अध्ययन से हम तत्कालीन मानव जीवन के रहन सहन व अन्य सांस्कृतिकताओं को आसानी से जान सकते हैं। साहित्य से हम अपने विचारों के बारे में सीख उपन्यासों में भारतीय ग्रामों की अंतर्व्यथा से भरी कथा को प्रस्तुत किया। उदाहरण विचारों पर जमींदारों किए जाने वाले अत्याचारों का चित्रण कर जमींदारी-प्रथा के उन्मूलन और भूमि-सुधार की दृष्टि से जो प्रयत्न किए गए हैं, वे प्रमुखत आदि साहित्यकारों के विचारों के ही परिणाम है। बिहारी ने तो एक दोहे की

S.K.S.D. MAHILA KALASALA Degree & P.G (A), TANUKU

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has participated as Resource Person / Chairperson / Delegate / Author / Co-Author, presented a Paper on प्रकृति की सुंदरता का दर्शन *in the Two- Day National Seminar (Autonomous Grant) Organized by the Depts. of Telugu, Hindi, Sanskrit & Internal Quality Assurance Cell (IQAC), S.K.S.D. Mahila Kalasala Degree & PG (A), Tanuku on 6th and 7th September, 2019.*

G. Amruthavalli

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B.N Padmavathy

Dr. B. Nagapadmavathy
Principal & Chairperson

को पूरा करने के लिए देश के पानी और हवा को बचाने के लिए वाटर पाजीचिव और कार्बन पाजीटिव हो गयी है । बस सालिड बेस्ट को खतम करने में कुछ ही कदम चलना बाकी है ।' (अलका सरावगी एक ब्रेक के बाद, पेज नं. - 92) भौतिकता के दलदल में फंसे मनुष्यों को देखकर के. वी. का आत्माभिमान हिकारत से भर उठता है और वे कार्पोरेट सोशल रिस्पांसिबिलिटी का मतलब स्पष्ट करने के लिए उक्त बातें कहते हैं । अलका सरावगी ने बडे ही संजीदे ढंग से स्पष्ट किया है कि किस प्रकार पहले बहु राष्ट्री कम्पनियाँ औद्योगिक विकास की आड़ में प्राकृतिक संसाधनों का अंधाधुंध दोहन कर रही है, इस प्रक्रिया में तीसरी जुनिया के देश उनके लिए कच्चा माल उपलब्ध करने की मंडिया है या कचरे के डंपिंग स्टेशन । इसके बाद दूसरी अवस्था ग्लोबल वार्मिंग के बढते खतरे की है जिसके चक्रव्यूह में विश्व फंसता जा रहा है ।

इस प्रकार कई उपन्यासकार यथा संजीव, मृदुला गर्ग, अलका सरावगी आदि उपन्यासकारों ने अपनी रचनाधर्मिता से साहित्य ऐर समाज के साथ ही स्व मनुष्य, प्रकृति और पर्यावरण को भी जोड़कर पाठक के समक्ष प्रस्तुत किया है जो सर्वहितकारी है ।

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प्रकृति की सुंदरता का वर्णन

डॉ.के. जास्मिन
हिन्दी प्राध्यापिका
मांटिस्सोरि कालेज
विजयवाडा

शाम में मैं अपने घर के सामने बैठते हैं और मुलायम कोमल हवा लाड मेरे चेहरे लग रहा है और मेरे शरीर को ठंडा। हवा बस सुंदर है और प्रकृति मुझे मुक्त करने के लिए देता है। दर असल प्रकृति सभी को मुक्त कर देता हैं। लेकिन यह नहीं हर कोई के बारे में पता है कि लगता है।

कभी कभी आकाश बेहद नीला है। व्हाइट चांदी बदलों इसके खिलाफ लगभग Imperceptibly सरकना। बादलों वे लगातार उनके आकार बदलने के रूप में एक ही कभी नहीं रहे हैं। वे बातें मैं मेरे चारों ओर देखती है कि अधिक सुंदरता हैं।

कुछ दिनों आसमान मोटी भारी बादलों के साथ काले रंग बदल जाता है। गिरती बारिश की दूरी पर्दा देख जा सकता है। कुछ अनदेखी हाथ इसे पोषण के लिए जमीन पर पानी डालने का कार्य कर रहा है के रूप में हालांकि यह प्रतीत होता है। दृष्टि सुंदर है और यह मुझे पृथ्वी की सुंदरता के करीब महसूस करता है।

एक तूफान के बाद हवा कुरकुरा और शांत है। पक्षी बाहर आते हैं और जीवन के लिए उनकी खुशी बाहर गाते हैं। मैं अपने घर के पास शांत गीली घास पर नंगे पैर उल्लास के रूप में मैं भी गाते हैं। आनन्द drogs मार डालना। यहाँ तक कि कीड़ों चर्चा और जोर से चीख करने लगते हैं। मुझे लगता है वे जीवन कितना सुंदर सब के बारे में गा रहे हैं यकीन है। वास्तव में यह है।

रात में सितारों को अपनी उपिस्थति बना। इन मरते जवाहरात के लाखों काले आसमान में देखा जा सकता है। कैसे चमत्कारि यह ब्रहमांड की महिमा पर टकटकी है। मैं

देवानां भद्रा सुमतिर्ऋजूयताम्।। ऋ० १/८९/२

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Table 2

Methodology for University and College Teachers for calculating Academic/Research Score

(Assessment must be based on evidence produced by the teacher such as: copy of publications, project sanction letter, utilization and completion certificates issued by the University and acknowledgements for patent filing and approval letters, students' Ph.D. award letter, etc.)

S.N.	Academic/Research Activity	Faculty of Sciences /Engineering / Agriculture / Medical /Veterinary Sciences	Faculty of Languages / Humanities / Arts / Social Sciences / Library /Education / Physical Education / Commerce / Management & other related disciplines
1.	**Research Papers in Peer-Reviewed or UGC listed Journals**	08 per paper	10 per paper
2.	**Publications (other than Research papers)**		
	(a) Books authored which are published by :		
	International publishers	12	12
	National Publishers	10	10
	Chapter in Edited Book	03	03
	Editor of Book by International Publisher	10	10
	Editor of Book by National Publisher	08	08
	(b) Translation works in Indian and Foreign Languages by qualified faculties		
	Chapter or Research paper	03	03
	Book	08	08
3.	**Creation of ICT mediated Teaching Learning pedagogy and content and development of new and innovative courses and curricula**		
	(a) Development of Innovative pedagogy	05	05
	(b) Design of new curricula and courses	02 per curricula/course	02 per curricula/course

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प्रवासी साहित्य में समाज

डॉ. जैस्मीन
हिन्दी लेक्चरर, एसवी आर. को. पी. डी. सीगिडदावोल, पश्चिम गोदावरी।

प्रवासी साहित्य हिन्दी को एक नयी पहचान दिला रहा है। भारतीय और विदेशी संस्कृति के टकराव एवं विदेशों में भारतीयों के संघर्ष को लेकर ही प्रवासी हिन्दी साहित्य का कथा साहित्य हमारे सामने आता है। प्रवासी साहित्य का गतलब प्रवासी लोगों द्वारा लिखा गया साहित्य है। प्रवास शब्द का अर्थ है, विदेश गमन या विदेश यात्रा। जिसका अर्थ है किसी दूसरे देश में रहने वाली व्यक्ति प्रवासी है। प्रवासी ऐसे लोगों का एक बड़ा समूह है जिनकी विरासत या मातृभूमि एक राष्ट्र है और जो विश्व के अन्य स्थलों में स्थानांतरित हो गए है। डॉ. रामदरश मिश्र ने कहा है कि "प्रवासी साहित्य ने हिन्दी को नई जमीन दी है और हमारे साहित्य का दायरा दलित विमर्श और स्त्री विमर्श की तरह विस्तृत किया है।"

संसार का हर वस्तु या प्राणी गतिशील होता है। जो वस्तु या प्राणी अपने अस्तित्व की चुनौतियों के साथ परिवर्तन नहीं करता, उसका अस्तित्व धीरे–धीरे समाप्त होने लगता है। अगर बात मनुष्य की करें तो मनुष्य की जिन जातियों ने या राष्ट्रताओं ने स्वयं में राष्ट्र के अनुकूल परिवर्तन किया, उन्होंने विश्व में अपनी महत्वपूर्ण उपस्थिति दर्ज की और जो मानव सभ्यताएँ रूढ़िवादी थी और किसी भी तरह के परिवर्तन के विरोध में थी, उनका पतन हो यों कहें कि वे एक सीमित राष्ट्र व सीमित भू–भाग में ही सिमट कर रह गयी। यही स्थिति साहित्य की होती है। विश्व की जिन भाषाओं ने उन्नति की, उनका साहित्य विश्व स्तर का साहित्य बन गया। उदाहरण के तौर पर आज जिस तरह से अंग्रेजी भाषा ने उन्नति की है, उसी तरह से उसके साहित्य ने भी उन्नति की है।

आज इक्कीसवीं सदी में हिन्दी भाषा भी विभिन्न चुनौतियों का सामना करते हुए विश्व भाषा की पंक्ति में आ खड़ी हुई है। इसके प्रमुख कारणों में से एक कारण प्रवासी भारतीय है, जिन्होंने हिन्दी को विदेशों में प्रसारित किया और इन्हीं में से एक है हिन्दी का प्रवासी साहित्य। डॉ. कमल किशोर गोयनका के अनुसार "हिन्दी के प्रवासी साहित्य का रूप–रंग उस की चेतना और संवेदना भारत के हिन्दी पाठकों के लिए नई वस्तु है, एक नए भावबोध का साहित्य है, एक नई व्याकुलता और बेचैनी का साहित्य है जो हिन्दी साहित्य को अपनी मौलिकता एवं नए साहित्य संसार से समृद्ध करना है। इस प्रवासी साहित्य की बुनियाद भारत तथा स्वदेश पर देश की द्वंद पर टिकी है तथा बार–बार हिन्दू जीवन मूल्यों तथा सांस्कृतिक उपलब्धियों तथा उनके प्रति श्रेष्ठता के भाव की अभिव्यक्ति होती है।"

आज प्रवासी साहित्य हिन्दी को एक नयी पहचान दिला रहा है। भारतीय और विदेशी संस्कृति के टकराव

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Organized by Department of Chemistry On 15th & 16th September, 2023.

Organizing Secretary Convener Chairman

Nutrient Behaviour and Eutrophication Assessment in the Visakhapatnam Harbor Waters, Central East Coast of India

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,

Abstract:

More home sewage and industrial effluents are entering harbour waterways as a result of Visakhapatnam's rapid industrialization and urbanisation. Five stations were used for a year-long study on the effects of nutrient pollution and the evaluation of nutrient pollution on the quality of waters in the Visakhapatnam harbor. The eutrophication in these waters was accelerated by the nutrient enrichment. The inner harbor waters become more stagnant as a result of the outer harbor's construction delaying the tidal flushings. The distribution of these nutrients over the study period implies a flow of surface waters that were pollutant-rich towards the sea. Nutrient index has been used to quantitatively determine the degree of nutrient eutrophication in the harbor waters (I). All nutrients' index values in the port waters (I>5) proved the amount of eutrophication in harbor waters. Moreover, the values of the nutrient index declined from the inner harbour to the outside harbour waters, indicating mesotrophic conditions there. This is a result of the dispersion of home sewage and industrial effluents containing organic matter into the outer harbour and the coastal waters of the Bay of Bengal after being discharged into the inner harbor.

Keywords: Nutrients behavior, eutrophication, Visakhapatnam harbor waters.

I. INTRODUCTION

The water quality of Visakhapatnam harbor is deteriorated by the discharge of combined domestic and industrial effluents. There have been reports of pollution studies in the harbor waters of Visakhapatnam (1-7). To examine the nutrient pollution in the harbor waters, it appears that no systematic investigation has been done. Despite being a recognized issue in freshwater environments, eutrophication has not received much attention in marine environments. It may be started by a number of different natural factors that lead to the organic enrichment of water bodies, but typically speaking, anthropogenic impacts are what make it

into a widespread occurrence. Environmental scientists and resource managers are very concerned about the potential for eutrophication of harbor and coastal waters caused by the disposal of biological wastes containing nutrients (7). Estimate for eutrophication detection and measurement. They do, however, necessitate laborious data gathering and processing. Nutrient-salinity relationships for assessing the dilution and transportation of sewage effluents (2, 3), as well as N:P atomic ratios (8) for characterizing eutrophication conditions in the marine environment, are other easier ways to evaluate the water quality. Karydis et al. (8) developed a simpler method based on the calculation of nutrient index designed to be specific for each nutrient to evaluate eutrophication levels in the marine environment influenced by domestic sewage because none of the methods mentioned above could quantitatively explain the eutrophication. The current message discusses the quantitative assessment of nutrient eutrophication levels in harbor waters based on this method, as well as individual nutrient distribution, behavior, and fluctuations in hydrographic conditions.

II. MATERIALS AND METHODS

The harbr in Visakhapatnam is a natural harbour and one of India's busiest ports. It is situated at a latitude of 17° 42' 00" North and a longitude of 83° 23' 00" East on India's central east coast. The port is split into two areas: the outer harbour and the inner harbour. A narrow entrance canal connects the inner harbour, which has 6 berths and a 200-hectare water spread, to the outer harbour. The northern, northwestern, and western arms of the inner harbour, which all unite at the turning basin, extend in three different directions. The "southern lighter channel," a key component of the city's drainage system, also leads to a turning basin. Freshwater flowing from the reservoir that is fueled by the monsoon. During monsoon season, the inner harbor's waters become brackish because the reservoir "Mehadrigedda" pours into the northern arm at its end. The stream also serves as a significant polluting source because it carries several effluents from numerous large, medium, and small companies, including Visakha Dairy, Hindustan Zinc Ltd., Coromandal Fertilizers Ltd., and Hindustan Petroleum Corporation Ltd. Hence, there is a pollution gradient in the area between the inner harbour and the outer harbour (7, 16, 17). Domestic sewage from the city (3 x 103 m3 per day) and industrial effluents (6 x 105 m3 per day) from the nearby industry are both discharged into the port.

In the harbour waters, five stations in the year 2021–2022 were used to collect monthly surface and bottom water samples throughout the course of a year. The results are displayed in Fig.1. Clean plastic buckets are used to collect surface waters, while Niskin bottom water samplers are used to collect bottom waters. After collection, the waters were immediately filtered via Glass Fiber GF/F filter papers. Salinity, nitrite, nitrate, ammonia, phosphate, and reactive silicate were all determined using filtered waters, and their respective concentrations were 0.02, 0.02, 0.01 and 0.02 M. The Winkler's modified method is used to measure dissolved oxygen (19). Using glass and calomel electrodes, an Elico pH metre is used to test pH.

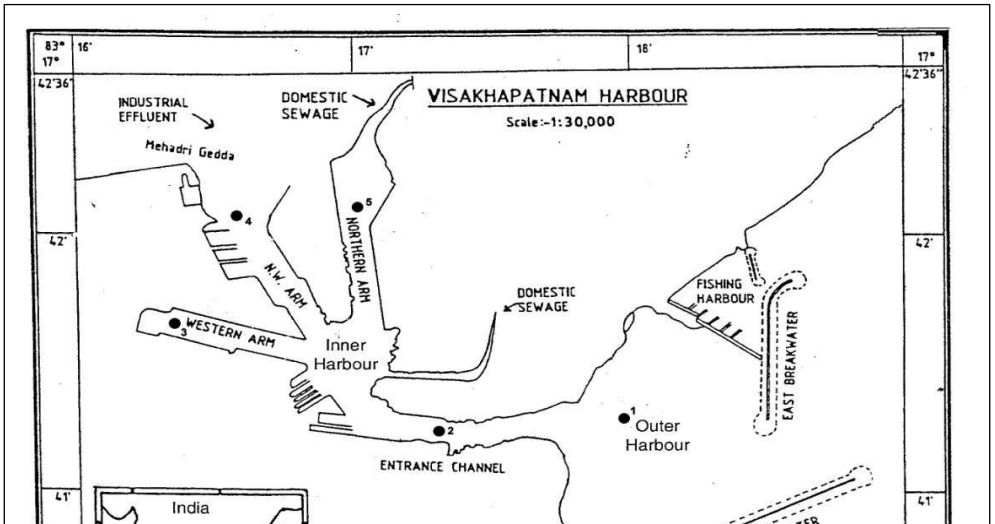


FIG.1. STATION LOCATIONS AT VISAKHAPATNAM

Statistical data on hydrography and nutrient parameters in the harbor waters during the study period are given in Table 1. Annual average concentrations of hydrography and nutrients at individual stations are shown in Fig. 2 and 3 are discussed below.

TABLE 1

STATISTICAL DATA ON THE HYDROGRAPHY AND NUTRIENT PARAMETERS IN THE VISAKHAPATNAM HARBOR WATERS DURING 2021 – 2022

Parameter	Surface				Bottom			
	Min.	Max.	Mean	S.D (±)	Min.	Max.	Mean	S.D (±)
Temp. (^{O}C)	28.00	32.00	30.39	1.06	27.00	30.80	29.14	0.91
pH	6.03	8.03	7.30	0.51	7.04	8.09	7.72	0.24
Salinity (psu)	19.24	34.39	20.18	3.26	26.94	35.64	32.11	2.28
D.O. (mg/L)	4.79	15.70	8.68	2.46	3.51	7.89	5.87	0.77
Chl-a (mg/m^{3})	10.00	245.50	57.43	44.35	3.50	42.32	13.17	8.23
Nitrite (µM)	1.39	64.40	18.86	15.24	0.37	51.50	9.67	9.74
Nitrite (µM)	4.83	106.00	32.07	25.47	3.28	47.00	15.62	12.48
Ammonia (µM)	12.00	100.90	44.20	23.10	2.98	57.42	23.33	11.98

Phosphate (µM)	22.80	279.00	72.62	49.07	8.32	119.23	39.83	23.83
Silicate (µM)	10.80	100.23	42.93	23.54	2.56	60.63	19.43	11.49

TEMPERATURE:

In the surface waters, temperatures vary from 28.0 to 32.0°C with an average of 30.39oC, while in the bottom waters, temperatures ranged from 27.0 to 30.8oC with an average of 29.14oC. Maximum and minimum temperatures were both recorded in May 2021 and January 2022, respectively. The surface and bottom temperatures climbed starting in March 2021 and peaked at all sites in May 2021. The upward trend persisted through July 2021. Following the apex, the temperature displayed a declining trend at all stations up to January 2022. In large part, the temperature dispersion was a reflection of the local climate. Pre-monsoon is the time of year with the highest temperature, followed by post-monsoon and monsoon.

pH :

Surface water pH levels range from 6.03 to 8.03, with an average of 8.03, while bottom water pH values range from 7.04 to 8.09, with an average of 7.72. During March to July (pre-monsoon), when marine conditions predominated more and more in the harbour waters, the pH levels climbed. During August to November (during the monsoon), when the harbour experienced a significant input of freshwater, it displayed a decreasing tendency. Due to the infiltration of very saline water into the bottom, the pH values of the surface were always lower than those of the bottom.

Due to the discharge of (acidic) effluents from a fertiliser complex (Coramandal Fertilizer Limited) and a zinc smelter (Hindustan Zinc Limited) in the station's upper reaches, St. 4 had the lowest pH values of any of the stations. Due to the city's domestic sewage being discharged, the values at St. 5 were also low. These waters (6, 8) and the river Par and its abatement, where industrial effluents predominated, have seen similar pH changes in the past (22).

Salinity:

The harbor's surface waters had salinities that ranged from 19.24 to 34.39 (psu), with an average of 30.18 (psu), whereas the bottom waters had salinities that ranged from 26.94 to 35.64 (psu), with an average of 32.11 (psu) (psu). Highest salinity levels are seen in the

bottom waters of St. 1 in May, while minimal salinity levels are seen in the surface waters of St. 4 during the monsoon season. The following pattern of salinity distribution in the harbour waters may be seen from the monthly distribution of salinities. From March to June 2021, a period of rather high salinity was recorded, and from December 2012 to February 2022, a period of intermediate salinity was recorded. Similar trend of salinities in the harbor and coastal waters are reported earlier (6, 20, 21).

Dissolved oxygen:

The surface waters dissolved oxygen values ranged from 3.79 to 15.70 mg/L with an average of 8.68 mg/L, whereas the bottom waters' values ranged from 3.51 to 7.89 mg/L. Due to the creation of multiple planktonic blooms that have already been observed in these waters, the surface waters are extremely saturated with dissolved oxygen (4). Due to the current weather circumstances, which are conducive for the establishment of planktonic blooms, higher quantities of dissolved oxygen were seen during the post-monsoon and pre-monsoon seasons (23). Due to the unfavourable conditions for bloom development and the monsoonal runoff, which transports organic wastes into harbour waters and uses oxygen for the degradation, low amounts of D.O. were detected during the monsoon season. During the study period low oxygen concentrations were observed in the bottom waters at stations 3 to 5 are attributed to the oxidation of organic matter.

NUTRIENTS

Nitrogen Species:

The harbour waters have abnormally high concentrations of nitrite, nitrate, and ammonia. The highest concentrations of these nutrients are found at stations 2 through 5. Nitrite concentrations in surface waters ranged from 1.39 to 64.40 M, with an average of 18.86 M, while concentrations in bottom waters ranged from 0.37 to 51.50 M, with an average of 9.67 M. Nitrate concentrations in surface waters ranged from 4.83 to 106 M, with an average of 32.07 M, while concentrations in bottom waters ranged from 2.28 to 47 M, with an average of 15.62 M. In the surface waters, ammonia concentrations ranged from 12.00 to 100.90 M, with an average of 44.20 M, whereas in the bottom waters, Its concentrations ranged between 2.98 and 57.42 M, with an average of 23.33 M. Ammonia is the most abundant of the three nitrogen species in harbour waters.

The maximum concentrations of these nutrients are observed at Sts. 3 - 5 when compared to St. 1. Nutrient enrichment through pollution was reported from other marine environments (24, 25). The enrichmentof nutrients enhances the eutrophication and stimulates the algal growth. The seasonal variation in all the nitrogen constitutes shows

similar trend at all stations. Seasonally, higher concentrations of these nutrients were observed during monsoon season due to the discharge of more industrial effluents and domestic sewage into the harbor waters, followed by post and pre-monsoon seasons. Higher concentrations of nitrogen species in surface waters may be the reasons for plankton peaks as reported earlier (26, 27).

Phosphate :

Phosphate concentrations ranged from 22.80 to 279.00 µM with an average of 72.62 µM in the surface waters, where as in the bottom waters its concentration varied from 8.32 to 119.23 µM with an average of 39.66 µM. Higher concentrations of phosphate observed in surface waters of all stations in the harbor. St. 4 recorded highest concentrations of phosphate (279 µM) in October in the surface waters. This could be attributed to the influence of influx of industrial effluents and land drainage in this station. Seasonally, higher concentrations of phosphate were observed during monsoon than those of pre-monsoon and post-monsoon seasons. The maximum concentrations of phosphate in the harbor waters during monsoon season due to the release of industrial effluents from the Coromandel Fertilizer Limited and spillage during loading / unloading of fertilizer. Similar seasonal variations were also observed in the estuarine complex of Cochin (28), off Malpe, South Kanara in the near shore region of Thal, Maharashtra (29). A pronounced horizontal gradient (downward)existed in the concentrations of phosphate from Sts. 3 - 5 to St. 1.

Silicate :

Silicate concentrations ranged from 10.80 to 109.23 µM with an average of 42.93 µM in the surface waters, where as in the bottom waters its concentration varied from 2.56 to 60.63 µM with an average of 19.43 µM. Higher concentrations of silicates were observed during August to October (Monsoon) and lower concentrations were observed during March to May (Pre-monsoon season). High concentrations of silicate in monsoon season is a common occurrence in the coastal and harbor waters (30, 31). It is well known fact that land-born runoff is the chief source for silicate while its removal utilization by phytoplankton and adsorption into the suspended sediments are in the main processes operative in the marine environment (32, 33). With high concentration of silicate in the harbor waters an intense growth of diatoms like *Skeletonema costaum* and *Cyclotella meneghenina* occurs. Major peaks in diatoms production were reported earlier during October to November when the concentrations of silicate also were observed to be maximum (6, 34). Relatively low concentrations of silicate were observed during pre and post-monsoon season may be either to its supply being less (from runoff) or to its biological utilization into both processes operating simultaneously. In general, surfaceconcentrations of silicate were higher than those of bottom waters. Relatively, high values of silicate (100.23 µM) were observed in the surface waters of St. 4, which drastically fell in the direction of St. 1.

Chlorophyll-a : Phosphate concentrations ranged from 10.00 to 245.50 mg.m^3 with an average of 57.43 mg.m^3 in the surface waters, where as in the bottom waters its concentration varied from 3.50 to 42.32 mg.m^3 with an average of 13.17 mg.m^3. Highest concentrations of Chlorophyll-a were observed in January & February and lowest values were observed during July to September. Higher values of chlorophyll-a were observed during pre and post-monsoon season which may be attributed to the favorable conditions of nutrient supply, light intensity and temperature in the ambient waters that led to maxima in primary production. Lower concentrations of chl-a were observed during monsoon season, may be attributed to the unfavorable conditions like high turbidity, low light, low salinity and low pH. Chl-a values were relatively higher at St. 4 (245.5 mg.m^3) in the surface waters, when compared to other stations due to the continous supply of ammonia and phosphate to this station from the industrial effluents of Coramandel Fertilizer industry.

Inter-correlations of hydrography and nutrients parameters

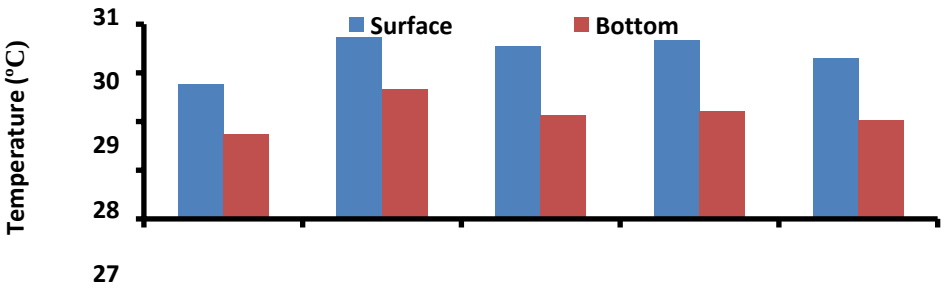
The correlation coefficients have been computed among hydrography and nutrient parameters to understand inter-relationships in the harbor waters is given in Table 3.

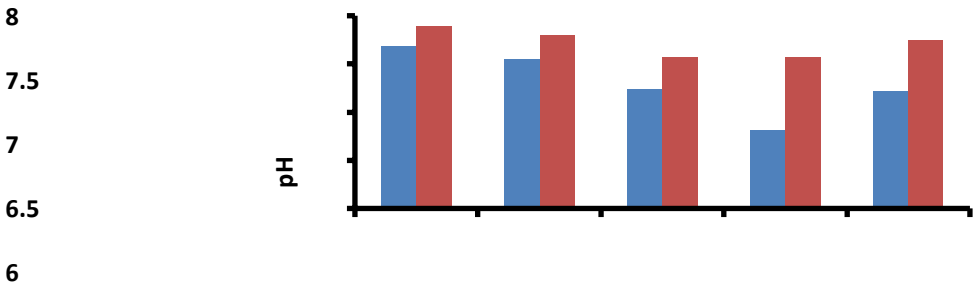
Table 3

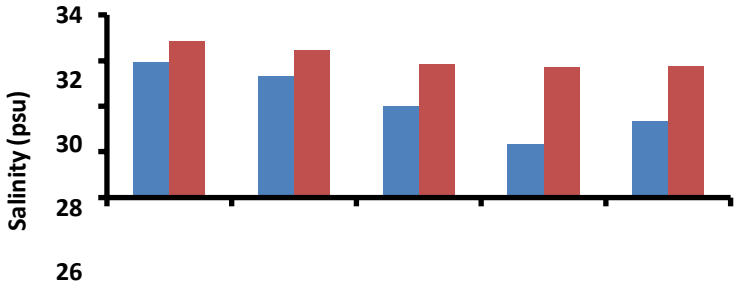
Correlation between hydrography and nutrient parameters in the Visakhapatnam harbor waters during 2021-2022

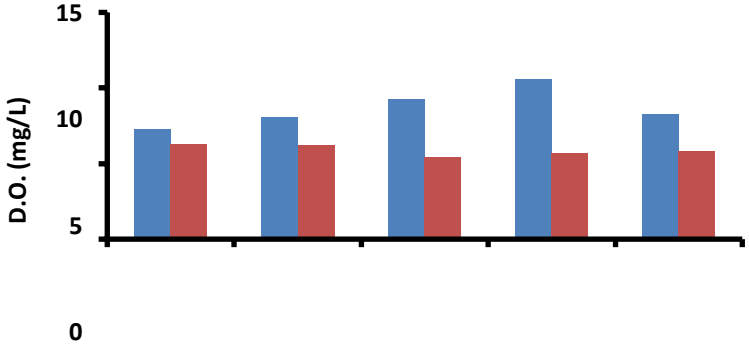
	Temp.	pH	Salinity	D.O.	NO_2	NO_3	NH_4	PO_4	SiO_4
pH	-0.23								
Salinity	0.04	0.76					N =120		
D.O.	0.31	-0.16	-0.09				P<0.0001		
NO_2	0.33	-0.82	-0.69	-0.03					
NO_3	0.25	-0.89	-0.80	-0.01	0.91				
NH_4	0.33	-0.84	-0.73	0.15	0.88	0.88			
PO_4	0.33	-0.84	-0.73	0.15	0.88	0.88	0.98		
SiO_4	0.40	-0.85	-0.68	0.29	0.85	0.85	0.92	0.92	
Chl-a	0.39	-0.25	-0.17	0.82	0.18	0.15	0.36	0.36	0.50

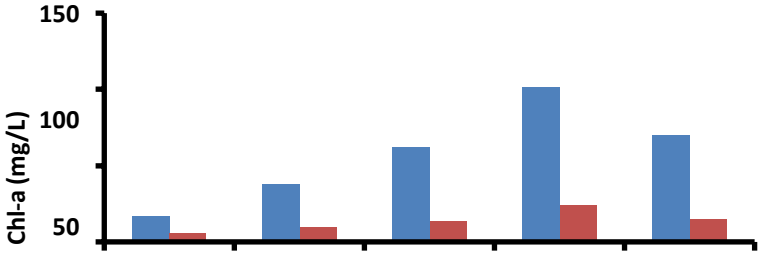
Significant inverse correlations ($p = < 0.001$) were observed between salinity and nutrients in the harbor waters indicating that distribution of these parameters is believed to be primary govern by land runoff along with industrial effluents and domestic sewage. Similar observations have been reported by several workers in different coastal environments of India. Significant positive correlations were observed between pH and salinity indicates that pH increases with increase of salinity. Significant negative correlations were observed between salinity, pH and nutrients may be attributed that the nutrient concentrations are decreased with increasing pH and salinity. Significant positive correlations were observed between chlorophyll-a and dissolved oxygen, indicating that most of the dissolved oxygen produced in the harbor waters through phytoplanktonic photosynthesis. Significant positive correlations were observed within the nutrients attributing their common sources of occurrence in the harbor waters. Chlorophyll-a moderately correlated (positive) with ammonia, phosphate and silicate attributing that these waters are eutrophic in nature.


Temperature (°C)
31
30
29
28
27
Surface
Bottom


8
7.5
7
6.5
6
pH


Salinity (psu)
34
32
30
28
26


D.O. (mg/L)
15
10
5
0


Chl-a (mg/L)
150
100
50

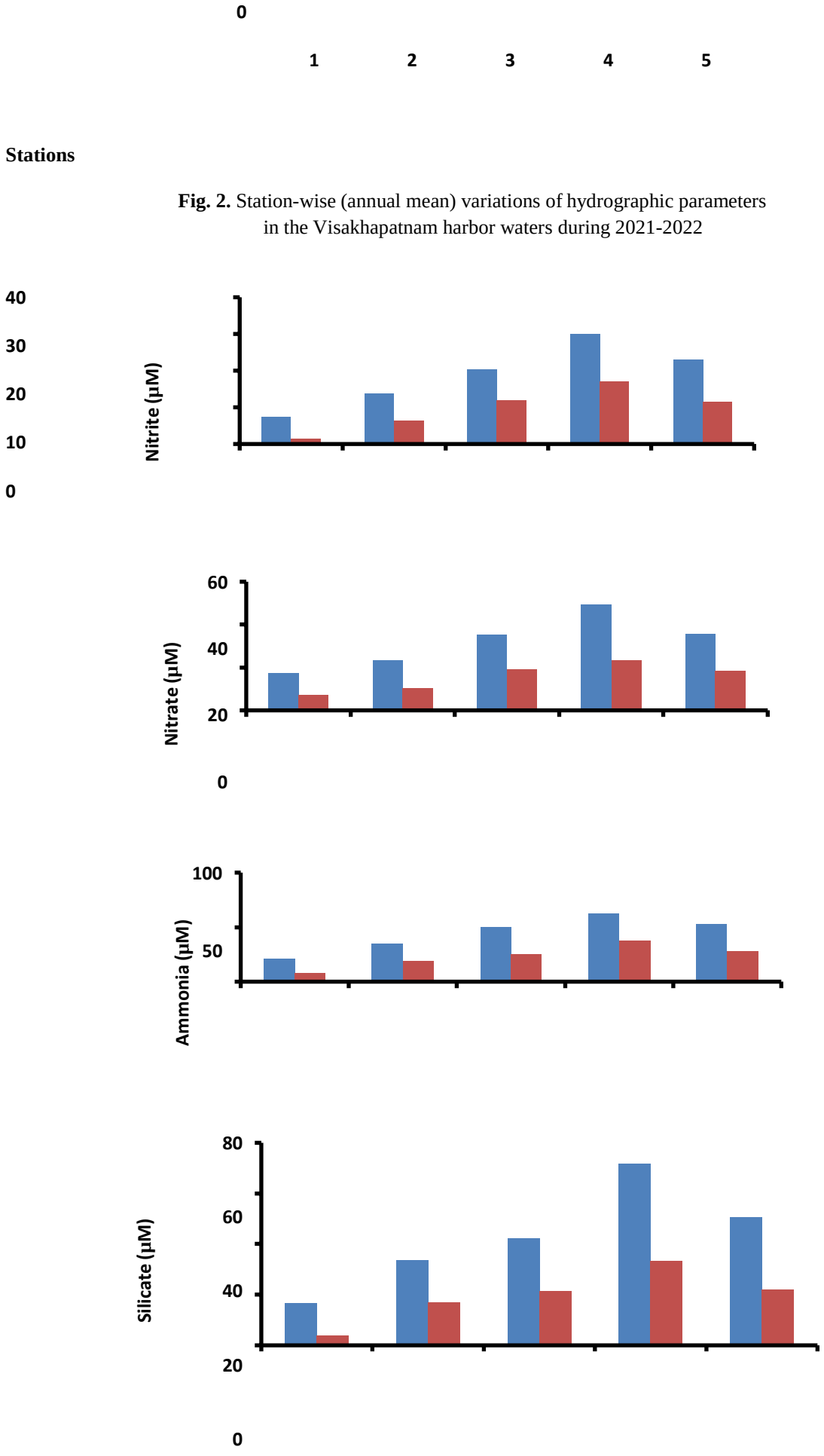


Fig. 2. Station-wise (annual mean) variations of hydrographic parameters in the Visakhapatnam harbor waters during 2021-2022

1 2 3 4 5

Stations

Fig. 3. Station-wise (annual mean) distribution of nutrients parameters in the Visakhapatnam harbor waters during 2021-2022

Acknowledgement : The author thank the authorities of the Visakhapatnam Port Trust for boat facilities.

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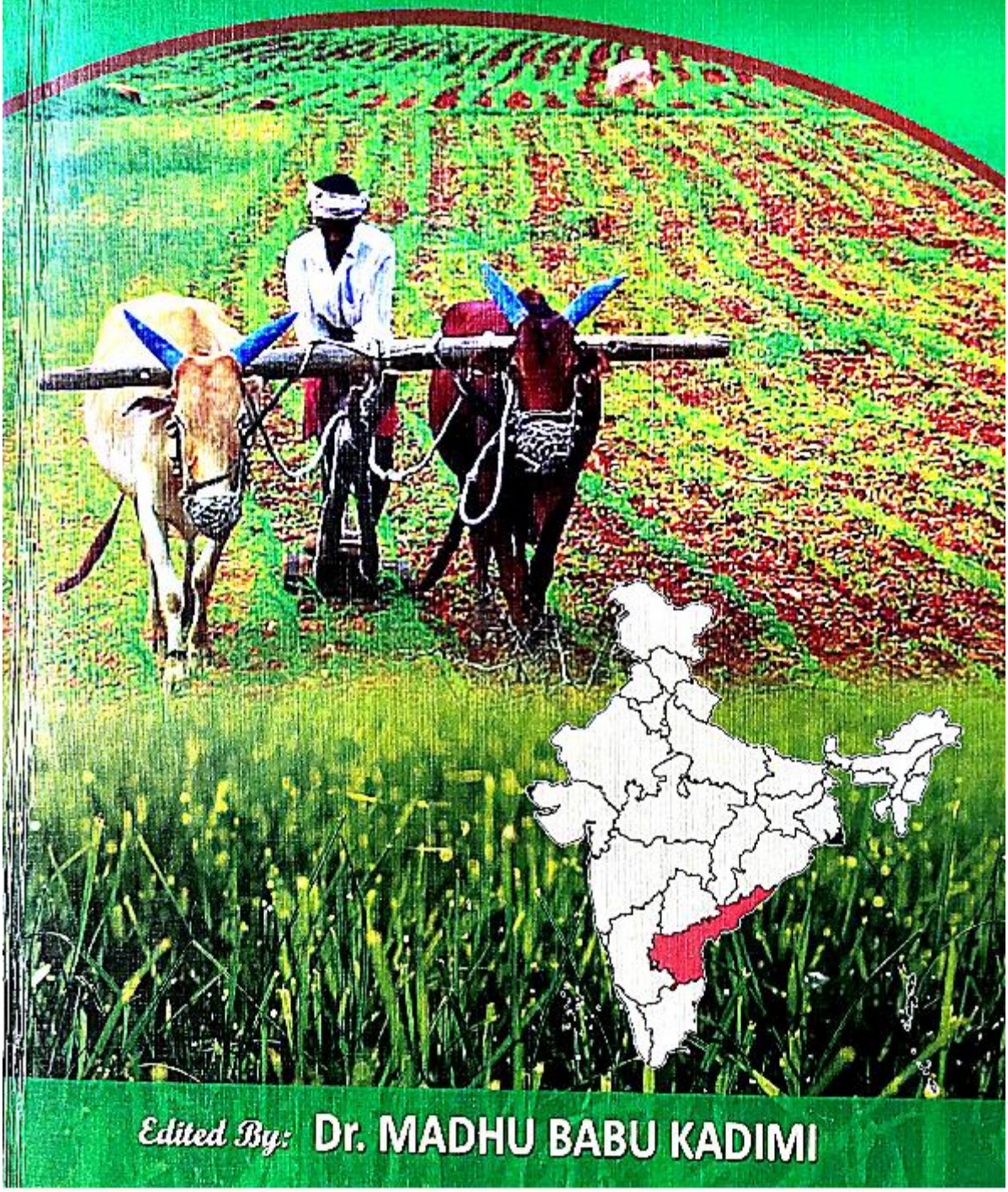

Edited By: **Dr. MADHU BABU KADIMI**

FLORICULTURE IN ANDHRA PRADESH

Dr. T. Hanumantha Rao

Floriculture is a discipline of Horticulture and it includes cultivation of flowers and nental plants not only for selling or for use as an input material in cosmetic industry as well as in harmaceutical sector but also for use in festivals, devotional works and beautification. The nt day floral industry is one of the most dynamic and fast growing industry, which has achieved ficant rate of growth during the past few years and has extended worldwide with the major digm shift of production centres from developed to developing countries.

India is also interested to emerge as an important production base for floriculture output. gular climatic conditions, genetic variety, versatile human resources etc put India a unique scope enormous employment of existing resources and exploration of avenues yet untouched. The duction and export of floricultural products have received a considerable interest in recent decades m the researchers, policy makers, agricultural and horticultural experts. It is often argued that iculture have to be given importance in view of the field's potential in employment, export and ome generation. On this background, floriculture has been provided additional interest in recent rs. The plan outlays have been stepped up in successive plans for development of horticulture as ll as floriculture.

An important emerging activity in horticultural sector is floriculture. This co sector has been couraged, because of its demand both in domestic as well as world markets. The increases in per pita income and urbanisation have led to a greater preference and increased demand for flowers and rnamental plants. At present, flowers are being extensively used in various nations.

Review of Literature

Horticulture Statistics at a Glance 2015, National Horticulture Board, focused that the development achieved in the horticulture sector is indicative of the fact that there is growing demand for horticulture produce. Agricultural and Processed Food Products Export Development Authority (APEDA web port)-2016 shows that the Government of India has considered floriculture as a sunrise industry and accorded it 100% export promotion status. Due to steady increase in demand for flower, floriculture has become one of the important Commercial trades in horticulture also in Agriculture.

According to statistics indicated in the Handbook on Horticulture Statistics 2014, the total area under flower crops in 2012-13 was 232.70 thousand hectares. Total area under floriculture in India is second largest in the world and only next to China. Production of flowers was estimated to be 1729.2 MT of loose flowers and 76731.9 million (numbers) of cut flowers in 2012-13. Fresh and Dried cut flowers dominate floriculture exports from India.

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DALIT WOMEN EDUCATION IN RURAL AREAS OF ANDHRA PRADESH

Dr. T. Hanumantha Rao[1]

Introduction

Education refers to the systematic process of gaining knowledge and skills through study and instructions. The aim of education is not to develop one single virtue but to produce healthy normal human beings who understand the meaning of life and what it demands from them. Education has many benefits and has positive impact in our life. An educated person is an asset for any country. In today's world, human capital is considered the best national resource. On one hand, he/she can explore better opportunities for himself/herself, and on the other hand, the entire nation would get benefited from his/her works.

Women Education in India

Women education is very important for the country to fully develop. It is like an effective medicine to cure a patient completely and provide health back. Women education is a big opportunity for India to be developed socially and economically. Educated women are the weapon who yield positive impact on the Indian society through their contribution at home and professional fields. They are the reason of improved economy in the country as well as society. An educated woman has capability to handle her home and professional life.

Education is a basic human right that should be exercised fully in all nations, but for many girls in India, attending school is not an option. A girl's education is an essential starting point in establishing equality everywhere. Despite the Indian Constitution guaranteeing equality before the law and non-discrimination on the basis of sex, India remains a patriarchal society. Male inheritance and property ownership, early marriage, dowry, honor crimes, lack girls' education, witch hunting, violence against women, and trafficking are all serious issues in the country. There are schools, but most girls do not attend, often because of religious reasons or cultural pressures. According to the 2001 census women literacy rate was 53.67 percent and it is 65.46 percent in 2011 census.

Dalit Women and Education

Dalit women are a social force, a cultural symbol and have a historical background. They are estimated to contribute nearly thirty percent of the total labour of national economy. Such hardworking supporter and builder of the family, society and nation have to undergo a lot suffering in India at present.

There were many hurdles for Dalit education in the past. The caste Hindus objected admission of Dalit into the schools. Some other facts have been the lack of motivation towards education among Dalit, lack of interest by parents and uninterested teachers from dominant castes, who refused to teach them. Low socioeconomic status and lack of proper administration of schools in the Dalit areas was also an important constraint. In spite of several legal measures, Dalit women's progress of education has not been significant. Many reasons lead to poverty and backwardness resulting in high scale dropout rates in higher educational institutions. The key determinant of educational achievement remains far away from Dalit girls

Undoubtedly one of the major achievements of Dalit women has been noticed in the field of education. The level of literacy among the Dalit has grown up considerably during the past two decades. The following Table-1 shows that adult literacy rates (15+ age group)

Table - 1 : Adult literacy rates (15+ age group in percentages)

	2001		2011	
	All	SC	All	SC
Total	61.0	44.1	69.3	60.4
Male	73.4	59.3	78.8	71.6
Female	47.8	28.5	59.3	48.6

Source: Census of India, 2001 and 2011

Objectives of the paper

The main objective of the is analyse dalit women education in rural areas of Andhra Pradesh state (before bifurcation). The other objectives the paper are:

- To analyse importance of dalit women education.

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EMPOWERMENT OF DALIT WOMEN THROUGH APNREGS IN ANDHRA PRADESH

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Introduction

In India, as per 2011 Censes about 65 per cent of population is living in rural areas. It is not the situation in only 2011 Censes but also time immemorial. In spite of rapid urbanization, Indians are still living in Agriculture based society in rural India, different sections of people have been fitting for survival. Among these sections *Dalit*s which are called ***Scheduled Caste*** or ***Panchamas*** or ***Sudras*** or ***Harijans*** are sub sections of Indian society. The problems of rural India reflects in these sections of people. They are far-away from the development, income and etc. On the other side *dalit* women in rural areas have no role like others. Still she has not enough strength to act as a human being in spite of several steps taken by the Central and State Governments as well.

After Indian Independence the Government of India recognized the problems of rural India in particular the problems of depressed sections and continuously introducing polices and programmes for building up and strengthen rural India. The main aim of these polices and programmes is to eradicate the problems which are involved in the rural society. These rural development programmes definitely affects on the life of all sections of rural India in particular on *dalit*s. Hence the study analyzes the impact of these rural development programmes on *dalit*s in particular *dalit* women and suggest suitable measures for better implementation of the rural development programmes.

In order to alleviate the lot of the rural problems the government – the Central Government as well as State Government operates various programmes before and after independence of India. The programmes are: Community Development Programme, Food For Work Programme, National Rural Employment Programme, Rural Landless Employment Gurantee Programme, Jawahar Rojgar Yojana and etc. Mahatma Gandhi National Rural Employment Programme is one among these schemes.

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Exports of Indian Floriculture

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Introduction

Floriculture is a discipline of Horticulture and it includes cultivation of flowers and ornamental plants not only for selling or for use as an input material in cosmetic industry as well as in the pharmaceutical sector but also for use in festivals, devotional works and beautification. The present day floral industry is one of the most dynamic and fast growing industry, which has achieved significant rate of growth during the past few years and has extended worldwide with the major paradigm shift of production centres from developed to developing countries. An important emerging activity in horticultural sector is floriculture. This co sector has been encouraged, because of its demand both in domestic as well as world markets. The increases in per capita income and urbanisation have led to a greater preference and increased demand for flowers and ornamental plants. At present, flowers are being extensively used in various nations.

Objectives

The main objective of the paper is to study role of floriculture in the balance of trade of India. The other objectives of the paper are:

1. To study the trends in area, production and yield of floricultural crops in India.
2. To analyse the infrastructural facilities available for floriculture development in India.
3. To study the trends in exports of floriculture sector to various countries.
4. To suggest policy measures for the growth and exports of Floriculture sector in India.

Data and Methodology

To study floriculture industry in Andhra Pradesh secondary data is used. The secondary data is collected from various reports and documents of Horticulture Department, Government of India. This has enabled us to analyse the trends in area, production and yield of both traditional and modern floriculture, programmes and outlays for floriculture development in the Country and infrastructural facilities across the States. Information and the data has also been collected from National Horticulture Board (NHB) and Agricultural and Processed Food Products Export Development Authority (APEDA) to know the provision for floriculture development as well as flower business. The analysis of secondary data relating to area, production and exports mostly pertains to the period from 2012-2013 to 2014-15. The data have been analysed by simple tabular method. The simple averages, percentages and growth rates have been worked out. Based on the data Bar diagrams are also used for analysis.

Area, production and productivity of Floriculture in India

It was estimated that the area under floriculture in India was 4,000 hectares in 1962 and 7,500 hectares in 1976 (National Commission on Agriculture

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Role of Agriculture Sector in Indian Economy

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troduction

Agriculture forms the backbone of Indian economy and despite concentrated dustrialisation in the last five decades, agriculture occupies a place of pride. Being the ggest industry in the country, agriculture is the source of livelihood for over 70 per cent f population in the country. The significance of agriculture in the national economy can e best explained by considering the role of agriculture. Agriculture sector plays a rategic role in the process of economic development of a country. It has already made a gnificant contribution to the economic prosperity of advanced countries is of vital portance. In other words, where per capita real income is low, emphasis is being laid on griculture and other primary industries. In U.S.A and Japan, agricultural development as helped to greater extent in the process of their industrialization. Similarly various nder developed countries of the world now engaged in the process of economic velopment have by now learnt the limitation of putting over emphasis of dustrialization as a means to attain higher per capital real income.

bjectives of the paper

The main aim of the paper is to study the role of agriculture sector in the velopment of Indian economy. The other objectives of the paper are:

1. To analyse trends in production and productivity of Indian agriculture.
2. To study the contribution of agriculture sector in creation employment in India
3. To study importance of agriculture sector in providing food security in India.
4. To analyse the problems of Indian agriculture sector.
5. To suggest suitable measures for development of agriculture sector in India

ata and **Methodology** : To study role of agriculture sector in Indian economy the condary data is used. The secondary data is collected from various reports and cuments of various departments of Government of India.

ole of **Agriculture sector in Indian Economy** : The agriculture sector employs ore than 50 per cent of the workforce in India. It plays a vital role in our overall conomy.

1. Contribution to National Income

Agriculture and its related activities have always held a significant share in our national income. In recent years, the share of contribution has declined gradually with the growth of other industrialized sectors in the country. In 1950-51, agriculture and allied activities contributed about 59 per cent of the total national income. This number declined to 40 per cent in 1980-81 and then to 18 per cent in 2008-09. But the agriculture share in India still remains very high as compared to many developed countries of the world. For example, agriculture contributes only 3 per cent to the national income in U.K. and U.S.A.

2. Source of Livelihood

Over two-thirds of the working population in India is engaged directly in the agricultural sector. As per estimate, about 57 per cent of the working population is

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CERTIFICATE

This is to certify that Dr/Prof/Mr/Ms Dr. K. Jyothi, Principal from SVRK Degree College, Nidadavole

has participated in the ORAL/POSTER presentation on the topic "Study of Volumetric & Thermodynamic Properties of Binary Mixtures of Propionate with Methylsalicylate/ Ethylsalicylate at different temperatures" in the International Conference on Chemistry and Allied Sciences (ICCAS-2022) held at Auditorium Complex, Pingle Government College for Women (Autonomous), Hanumakonda, Warangal, India during 25-27, August, 2022.

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Thermo-acoustic studies on binary liquid mixtures of ethyl propionate and 1,2-dichlorobenzene/1,3-dichlorobenzene/1,2,4-trichlorobenzene at 303.15 to 318.15 K

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Abstract:

Speed of sound,u, and density,ρ, of binary liquid mixtures of ethyl propionate with 1,2-dichlorobenzene/1,3-dichlorobenzene/1,2,4-trichlorobenzene have been measured at 303.15, 308.15, 313.15 and 318.15 K over the entire composition range. Speed of sound and density are used to estimate various thermo-acoustic parameters along with excess values of molar volume V_m^E, excess isentropic compressibility, κ_s^E, excess molar isentropic compressibility, $K_{s,m}^E$,and excess isobaric thermal expansion α_p^E. Redlich-Kister polynomials corroborated the correlation of extra parameters. The intermolecular interactions between the dissimilar molecules in the binary mixtures are discussed in relation to the observed changes of the aforementioned parameters with concentration and temperature.

Keywords: Thermo-acoustic, ethyl propionate, chlorobenzene, molar volume

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INTRODUCTION

In understanding the intermolecular interactions occurring among component molecules, volumetric and ultrasonic investigations of liquid mixtures are of considerable importance [1, 2]. Since a binary mixture is formed by the replacement of like contacts in the pure components by unlike contacts in the mixture, it may trigger inter or intra molecular changes in either one or both the components or this must be reflected in the excess molar volume. The physicochemical properties of aromatic hydrocarbons are of great significance in the selection of appropriate solvent for (i) gas and liquid

chromatography, (ii) dissolution of materials and (iii) their use in propellants and aerosols.

Ethyl propionate (EP) is highly hydrophobic molecule and it belongs to carboxylic acid ester. EP is generally deployed in the processing of food, flavour industry and a model of fatty acid ethyl esters used as first-generation biodiesel. EP is used in the production of some antimalarial drugs including pyrimethamine. 1,2-dichlorobenzene (1,2-DCB) is used as an intermediate for dyes and certain agricultural chemicals. 1,3-dichlorobenzene (1,3-DCB) is widely used in the manufacture of poly resin, used as a room deodorant blocks and moth control. 1,2,4-trichlorobenzene (1,2,4-TCB) is used in the manufacture of the herbicide, in some pesticides as a dye carrier in dielectric field, as an organic intermediate and a chemical manufacture solvent in lubricants [3].

In this paper, we report speed of sound,u, and density,ρ, of binary liquid mixtures of ethyl propionate with 1,2-dichlorobenzene/1,3-dichlorobenzene/1,2,4-trichlorobenzene at 303.15, 308.15, 313.15 and 318.15 K over the entire composition range. Ultrasonic velocity and density are used to estimate various thermo-acoustic parameters along with excess values of molar volume V_m^E, excess isentropic compressibility, κ_s^E, excess molar isentropic compressibility, $K_{s,m}^E$, and excess isobaric thermal expansion α_p^E. Redlich-Kister polynomials corroborated the correlation of extra parameters. The intermolecular interactions between the dissimilar molecules in the binary mixtures are discussed in relation to the observed changes of the aforementioned parameters with concentration and temperature.

MATERIALS AND METHODS

The purity of these solvents was ascertained by comparing the measured densities, and speeds of sound with the available literature [4-7] with the NIST ThermoLit data compiled in **Table 1**.

The measured values of speed of sound and density are presented in T**able 2**. The coefficients, A_i and corresponding standard deviations, σ where given in **Table 3**.

A detailed description and experimental procedure of the equipment used for measurement of density and speed of sound can be found elsewhere [8].

RESULTS AND DISCUSSION

All the formulas related to this manuscript are given elsewhere [8].

Table 1. Density, speed of sound and molar heat capacity data at different temperatures at 0.1 MPa obtained in this work and from available literature values.

T (K)	ρ (kg m^{-3})		u (m s^{-1})		Cp (J K^{-1} mol^{-1})
	Expt	Ref.	Expt	Ref.	
Ethyl propionate					
303.15	878.5	879.14 [4]	1135.6	1136 [4]	197.0 [4]
308.15	872.6	873.33 [4]	1114.4	1114 [4]	198.5 [4]
313.15	866.7	867.48 [4]	1093.3	1093 [4]	199.9 [4]
318.15	860.9	861.60 [4]	1072.2	1072 [4]	201.5 [4]
1,2-dichlorobenzene					
303.15	1295.0	1294.72 [5]	1263.0	1265 [5]	171.76 [7]
308.15	1289.3	1289.13 [5]	1243.0	1246 [5]	172.87
313.15	1283.7	1276.53 [6]	1222.0	1237 [6]	173.86 [6]
318.15	1278.1	-	1203.0	-	175.15
1,3-dichlorobenzene					
303.15	1277.7	1277.72 [5]	1235	1237 [5]	171.25 [7]
308.15	1272.3	1272.19 [5]	1221		172.36
313.15	1266.8		1206		173.24 [6]
318.15	1261.4		1192		174.65
1,2,4-trichlorobenzene					
303.15	1442.4	1442.48 [5]	1255.5	1256 [7]	195.92 [7]
308.15	1436.4	1436.45 [5]	1240.0		196.81
313.15	1430.5		1224.5		197.26 [7]
318.15	1424.5		1209.0		198.66

Table 2. Densities and Speeds of Sound as a Function of Mole Fraction of EP at Different Temperatures.

x_1	ρ (kg m^{-3})	u (m s^{-1})	ρ (kg m^{-3})	u (m s^{-1})	ρ (kg m^{-3})	u (m s^{-1})	ρ (kg m^{-3})	u (m s^{-1})
	303.15 K		308.15 K		313.15 K		318.15 K	
EP + 1,2-DCB								
0.0000	1295.0	1263.0	1289.3	1243.0	1283.7	1222.0	1278.1	1203.0
0.1007	1253.0	1250.2	1247.4	1230.1	1241.7	1209.0	1236.1	1189.8
0.1943	1214.0	1238.2	1208.4	1218.0	1202.7	1197.0	1197.0	1177.6
0.3017	1169.3	1224.6	1163.6	1204.2	1157.9	1183.2	1152.2	1163.5
0.4030	1127.2	1211.7	1121.4	1191.2	1115.7	1170.1	1110.0	1150.3
0.5047	1084.8	1198.7	1079.0	1178.1	1073.3	1157.0	1067.5	1137.0
0.6026	1044.0	1186.2	1038.2	1165.5	1032.4	1144.4	1026.7	1124.2

0.6977	1004.4	1174.1	998.6	1153.3	992.8	1132.2	987.0	1111.7
0.8065	959.1	1160.2	953.3	1139.3	947.4	1118.2	941.6	1097.5
0.9000	920.1	1148.3	914.3	1127.3	908.4	1106.2	902.6	1085.2
1.0000	878.5	1135.6	872.6	1114.4	866.7	1093.3	860.9	1072.2
EP + 1,3-DCB								
0.0000	1277.7	1235.0	1272.3	1221.0	1266.8	1206.0	1261.4	1192.0
0.1085	1234.4	1224.2	1228.9	1209.4	1223.4	1193.8	1218.0	1179.0
0.2124	1192.9	1213.9	1187.4	1198.4	1181.9	1182.1	1176.3	1166.6
0.3098	1154.1	1204.2	1148.5	1188.0	1142.9	1171.1	1137.3	1154.9
0.4212	1109.6	1193.1	1103.9	1176.1	1098.3	1158.5	1092.7	1141.5
0.5194	1070.4	1183.4	1064.7	1165.6	1059.0	1147.5	1053.4	1129.8
0.6143	1032.5	1173.9	1026.8	1155.5	1021.1	1136.8	1015.4	1118.4
0.7120	993.5	1164.2	987.7	1145.1	982.0	1125.8	976.2	1106.7
0.8128	953.3	1154.2	947.5	1134.4	941.7	1114.4	935.9	1094.6
0.9062	915.9	1144.9	910.1	1124.4	904.3	1103.9	898.4	1083.4
1.0000	878.5	1135.6	872.6	1114.4	866.7	1093.3	860.9	1072.2
EP + 1,2,4-TCB								
0.0000	1442.4	1255.5	1436.4	1240.0	1430.5	1224.5	1424.5	1209.0
0.0995	1386.3	1243.6	1380.4	1227.5	1374.4	1211.5	1368.4	1195.4
0.2095	1324.3	1230.4	1318.3	1213.7	1312.4	1197.0	1306.4	1180.3
0.3080	1268.7	1218.6	1262.8	1201.3	1256.8	1184.1	1250.9	1166.9
0.3975	1218.3	1207.8	1212.3	1190.1	1206.4	1172.3	1200.5	1154.6
0.5150	1152.0	1193.7	1146.1	1175.3	1140.1	1156.9	1134.2	1138.5
0.6003	1103.9	1183.5	1098.0	1164.6	1092.1	1145.7	1086.2	1126.9
0.7120	1040.9	1170.1	1035.0	1150.6	1029.1	1131.1	1023.2	1111.6
0.7997	991.5	1159.6	985.6	1139.6	979.7	1119.6	973.8	1099.6
0.8995	935.1	1147.6	929.3	1127.1	923.4	1106.5	917.5	1085.9
1.0000	878.5	1135.6	872.6	1114.4	866.7	1093.3	860.9	1072.2

Table 3. Coefficients A_j of R-K Equation along with Standard Deviations σ of Binary Mixture Properties.

Parameter	T (K)	A_0	A_1	A_2	σ
EP + 1,2-DCB					
$V_m^E \cdot 10^6$ / (m^3 mol^{-1})	303.15	-1.0466	-0.2031	-0.0392	0.0001
	308.15	-1.1637	-0.2270	-0.0438	0.0001
	313.15	-1.2847	-0.2523	-0.0488	0.0001
	318.15	-1.4089	-0.2783	-0.0543	0.0001

$\kappa_s^E \cdot 10^{10}$ / (m^2 N^{-1})	303.15	-2.0659	-0.3349	-0.0711	0.0002
	308.15	-2.2076	-0.3599	-0.0767	0.0002
	313.15	-2.3508	-0.3858	-0.0826	0.0002
	318.15	-2.5282	-0.4171	-0.0900	0.0003
$K_{s,m}^E \cdot 10^{14}$ /(m^5 N^{-1} mol^{-1})	303.15	-2.4404	-0.4471	-0.0974	0.0003
	308.15	-2.6280	-0.4890	-0.1065	0.0003
	313.15	-2.8202	-0.5332	-0.1175	0.0004
	318.15	-3.0552	-0.5865	-0.1309	0.0004
$\alpha_p^E \cdot 10^3$ / (K^{-1})	303.15	-9.1207	1.8828	-0.341	0.0002
	308.15	-10.0869	2.1038	-0.381	0.0004
	313.15	-11.0769	2.3360	-0.425	0.0004
	318.15	-12.0821	2.5771	-0.471	0.0005
EP + 1,3-DCB					
$V_m^E \cdot 10^6$ / (m^3 mol^{-1})	303.15	-0.4442	-0.0832	-0.0148	0.00004
	308.15	-0.5552	-0.1044	-0.0198	0.00005
	313.15	-0.6705	-0.1275	-0.0235	0.00007
	318.15	-0.7890	-0.1509	-0.0292	0.00008
$\kappa_s^E \cdot 10^{10}$/ (m^2 N^{-1})	303.15	-1.7741	-0.2734	-0.0557	0.0002
	308.15	-1.9347	-0.3019	-0.0620	0.0002
	313.15	-2.1012	-0.3333	-0.0686	0.0002
	318.15	-2.3008	-0.3697	-0.0773	0.0002
$K_{s,m}^E \cdot 10^{14}$ / (m^5 N^{-1} mol^{-1})	303.15	-2.0811	-0.3405	-0.0702	0.0002
	308.15	-2.2877	-0.3844	-0.0800	0.0002
	313.15	-2.5046	-0.4322	-0.0908	0.0003
	318.15	-2.7636	-0.4877	-0.1039	0.0003
$\alpha_p^E \cdot 10^3$ / (K^{-1})	303.15	-3.8389	0.7415	-0.128	0.0003
	308.15	-4.7751	0.9319	-0.167	0.0002
	313.15	-5.7358	1.1355	-0.202	0.0002
	318.15	-6.7146	1.3465	-0.242	0.0002
EP + 1,2,4-TCB					
$V_m^E \cdot 10^6$ / (m^3 mol^{-1})	303.15	4.6358	1.1489	0.2819	0.0010
	308.15	4.5319	1.1292	0.2787	0.0010

	313.15	4.4245	1.1077	0.2748	0.0010
	318.15	4.3122	1.0854	0.2701	0.0010
$\kappa_s^E \cdot 10^{10} / (m^2\ N^{-1})$	303.15	-2.3126	-0.5894	-0.1453	0.0005
	308.15	-2.4897	-0.6386	-0.1590	0.0006
	313.15	-2.6776	-0.6922	-0.1734	0.0006
	318.15	-2.8966	-0.7525	-0.1902	0.0007
$K_{s,m}^E \cdot 10^{14} / (m^5\ N^{-1}\ mol^{-1})$	303.15	-2.5196	-0.4295	-0.0779	0.0002
	308.15	-2.7465	-0.4826	-0.0910	0.0002
	313.15	-2.9893	-0.5422	-0.1053	0.0003
	318.15	-3.2732	-0.6101	-0.1228	0.0003
$\alpha_p^E \cdot 10^3 / (K^{-1})$	303.15	37.9014	-7.9978	2.348	0.002
	308.15	36.8607	-7.8760	2.311	0.001
	313.15	35.8046	-7.7337	2.264	0.001
	318.15	34.7143	-7.5929	2.207	0.001

In all the cases, for each system, the V_m^E over the whole mole fraction range is obviously increasing with increasing temperature from (303.15 to 318.15) K. The reasonable mixtures formed explanation for the fact is as follows. Ethyl propionate is a polar molecule, chlorobenzene is a non-polar molecule. The ethyl propionate and chlorobenzene not only have interaction of self- association between ethyl propionate molecule and chlorobenzene molecule. The kinetic energy of molecules also increase when temperature increase. This leads decrease of the interactions of molecule, so the contraction in volume decrease, that is V_m^E increase.

By comparison of the minimum values of V_m^E (**Fig. 1**) for the three mixtures containing a chlorobenzene at same temperature, it is shown that 1,3-dichlorobenzene is the most favorable one to form close packing with ethyl propionate.

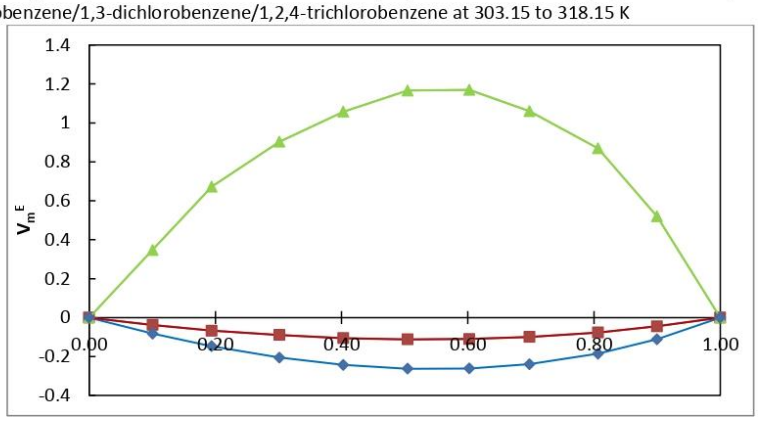

Figure 1: Variation of V_m^E with mole fraction of EP for EP + 1,2-DCB(♦)/ 1,3-DCB(■)/ 1,2,4-TCB(▲) at 303.15 K.

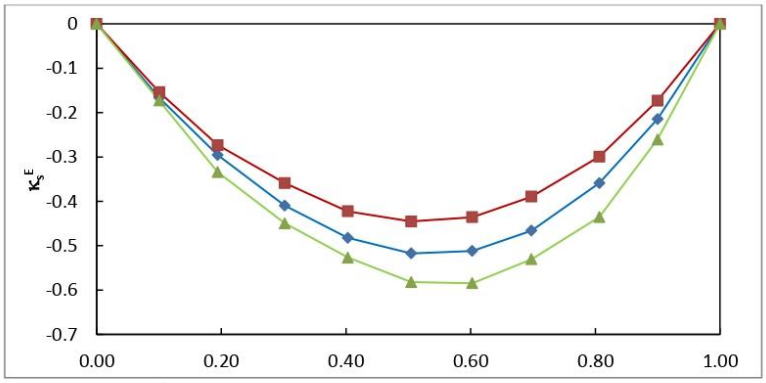

Figure 2: Variation of κ_s^E with mole fraction of EP for EP + 1,2-DCB(♦)/ 1,3-DCB(■)/ 1,2,4-TCB(▲) at 303.15 K.

A perusal of **Fig. 1, 2** indicates that V_m^E and κ_s^E values for these binary mixtures are negative over the entire composition range and investigated temperature range. The sign and magnitude of the volume changes that take place on mixing Ethyl propionate with chlorobenzenes is the result of several effects that operate in the same or in the opposite direction[1,2]. In general, the physical contributions comprise of dispersion forces and non-specific physical (weak) interactions, which lead to positive V_m^E and κ_s^E values. The chemical contributions involve breaking up of the associates present in the pure liquids, resulting in

positive V_m^E and κ_s^E values. The chemical contributions also comprise of specific interactions such as formation of H-bonding, charge transfer (donor-acceptor) complexes, and strong dipole-dipole interactions between the component molecules of the mixture, resulting in negative V_m^E and κ_s^E values. The structural contributions are due to the geometrical fitting (favorable/unfavorable) of the molecules of too different molecular sizes into each other's structures resulting in negative/positive V_m^E and κ_s^E values [9,10].

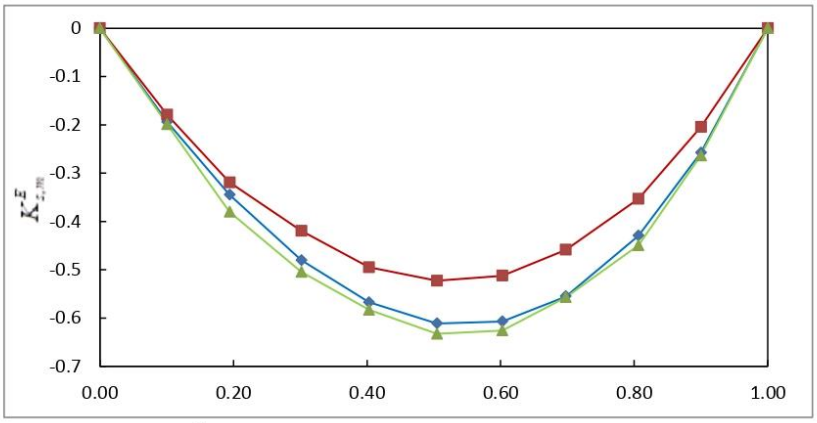

Figure 3: Variation of $K_{s,m}^E$ with mole fraction of EP for EP + 1,2-DCB(♦)/ 1,3-DCB(■)/ 1,2,4-TCB(▲) at 303.15 K.

The results presented in **Fig. 3** indicate that $K_{s,m}^E$ values are negative over the entire composition range and at each investigated temperature The observed negative values of $K_{s,m}^E$ for these mixtures indicate the presence of specific interactions between the dipoles of Ethyl propionate with chlorobenzene molecules with the formation of H-bonds between >COOH of Ethyl propionate and hydroxyl group of chlorobenzene molecules, leading to a decrease in compressibility of the mixture, which results in negative $K_{s,m}^E$ values [11].

The $K_{s,m}^E$ values decrease with increase in temperature ***(*Fig. 3*)*** for these mixtures. The decrease in $K_{s,m}^E$ is attributed to the closer packing of unlike molecules due to increased dipole -dipole interactions by availability of more chlorobenzene dipoles on breaking of hydrogen

bonds with rise in temperature, leading to a contraction in volume, and hence, a decrease in molar compressibility of the mixture.

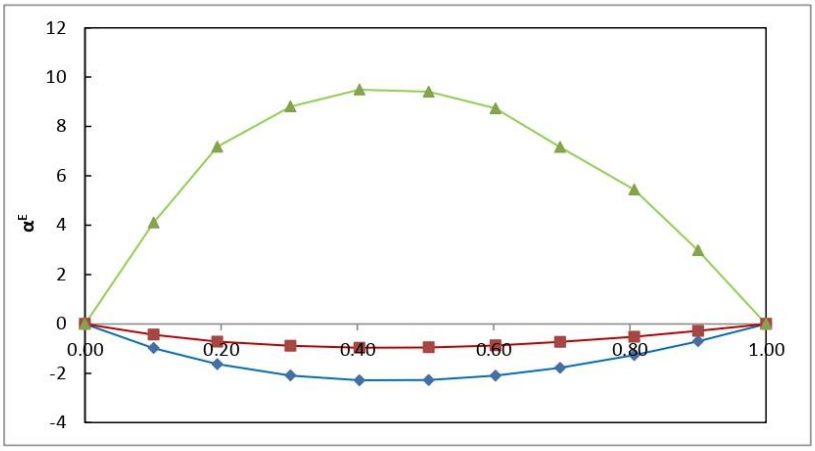

Figure 4: Variation of α^E with mole fraction of EP for EP + 1,2-DCB(♦)/ 1,3-DCB(■)/ 1,2,4-TCB(▲) at 303.15 K.

Excess thermal expansion coefficients α_p^E at 303.15 K are plotted in **Fig 4** with whole range of composition for all the three mixtures. Based on **Fig 4,** the excess thermal expansion coefficient (α_p^E) values for the mixture is negative for EP+1,2-DCB and EP+1,3-DCB whereas it is positive for EP+1,2,4-TCB. Generally, negative α_p^E values indicate the formation of new interactions between unlike molecules, while positive α_p^E values are attributed to self-association of components in the mixtures [12].

Conclusion:

In the present work excess volume and excess thermal expansion coefficient data of binary mixtures of EP with 1,2-DCB and 1,3-DCB are negative whereas with 1,2,4-TCB it is positive over the entire composition range at 303.15 to 318.15 K. This data reveals that weak intermolecular interactions are prevailing in liquid mixtures containing 1,2,4-TCB and strong interactions in liquid mixtures containing 1,2-DCB and 1,3-DCB. Further, negative κ_s^E and $K_{s,m}^E$ data in all the binary mixtures which arise due to changes of free volume in the real mixtures and presence of π-electrons in EP result in the formation of strong intermolecular complexes leading to negative excess isentropic compressibility.

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