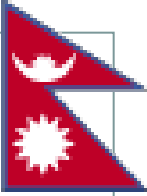




Regional Expertise Training Workshop on Pest Surveillance



Pest Surveillance activities on Fruit fly in Nepal

Pest Surveillance activities on Fruit fly in Nepal



Hanoi, Viet Nam 29 July – 01 August 2014

Dilli Ram Sharma
Program Director
and

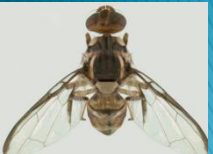
Head, National Plant Protection Organization, Nepal





Coverage of presentation

- ▶ Country Profile
- ▶ Background Information
- ▶ Introduction (The Fruit Flies)
- ▶ The quarantine fruit fly species to export citrus fruit to China
- ▶ Fruit fly in Nepal
- ▶ Citrus Fruit Fly Surveillance activities in Nepal
- ▶ Conclusion





Country Profile: Nepal



Geography:

Location: Southern Asia, between China and India

Area: 147,181 km²

Climate: The climate in Nepal varies with elevation, **tropical** in the lower southern part Tarai, mid-hills alpine and the high mountains **polar**; elevation ranges from 90 to 8848 meters.

Population: 26.6 million (2011 census)

Currency: Nepalese Rupee (NPR)

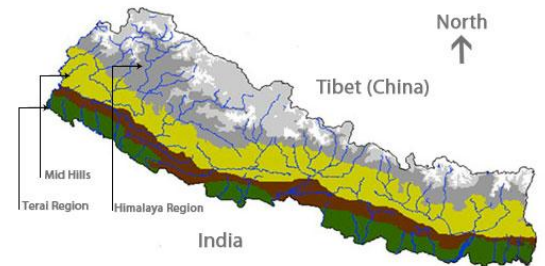
Land use:

Total area: 147181 km²

Cultivated area: 3091000 ha. (**29%** of total area)

Noncultivated area: 1030000 ha. (6.9% of total area)

Irrigated area: 1331521 ha. (**43%** of cultivated area)



Pest Surveillance activities on
Fruit fly in Nepal



The Country

- Land locked country
- Birth place of Lord Buddha
- Bordering countries:
 - China (Tibet): North
 - India: East, south and west
- Geographical region: (3)
- Altitude ranges from few meters to 8,848m
- (Mt Everest; the highest peak of the world)

Major crops : Rice, Wheat, Maize, vegetables, potatoes and fruits.

Cash crop- Tea, Coffee, Sugarcane, Jute and cardamom

NEPAL



Geographical and Political division of Nepal

Geographical division: 3 Eco-zones

Mountain (16 districts)

- 35% of total area. (4800 masl and above)
- Yak/Nak, sheep, alpine goats (*Chyangra*) and mule rearing forms the way of life of people in this region.

Hills (39 districts)

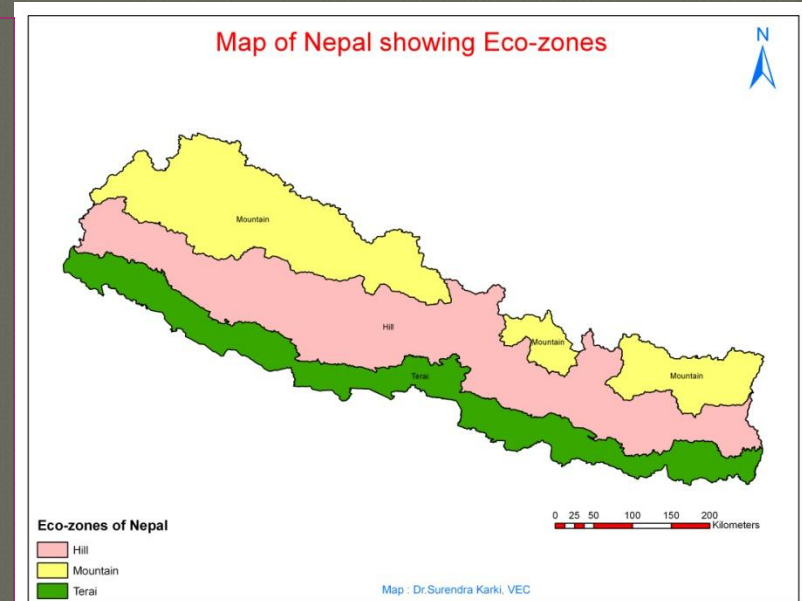
- Covers about 42% area.(300 to 4800 masl.)
- Agro-based livestock industries and horticultural production in the region are the main source of income of the people.

Terai (20 districts)

- Covers about 23% of the total area.(<300 masl.)
- This region serves as a main source of food supply to other region of the country.

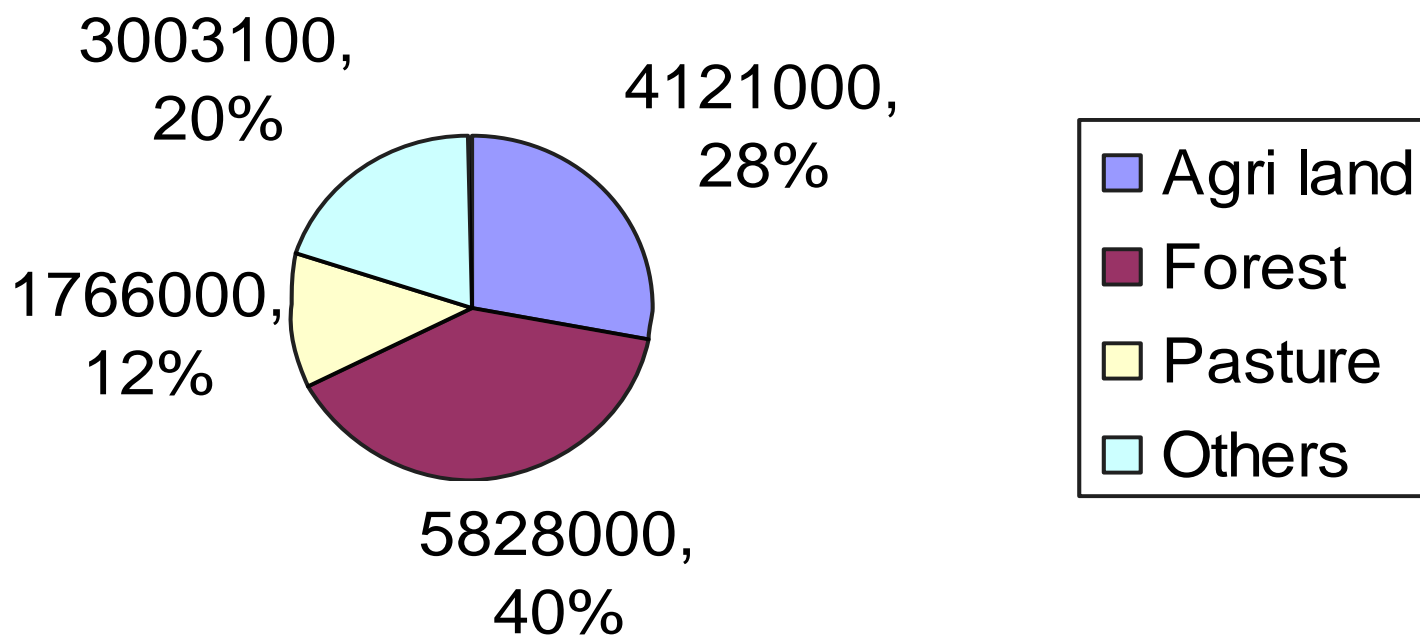
Administrative division

- 5 Development regions
- 75 Districts
- 3995 Village Development Committees





LAND UTILIZATION



Source: Agri-business Promotion and Statistics Division, 2006



Background Information



Pest Surveillance activities on Fruit fly in Nepal

Fruit flies are one of the world's most destructive horticultural pests and pose risks to most commercial fruit and vegetable crops.

Worldwide there are 4,000 species of fruit flies in the family Tephritidae of which around 350 species are of economic importance (Asian Fruit Fly IPM Project, 2011). That cause direct damage to fruits and vegetables which can lead to up to 90-100% yield loss depending on fruit fly population, locality, variety and season.

In addition, to the direct losses, fruit fly infestation can result in serious losses in trade value and export opportunity due to strict quarantine regulations imposed by most importing countries.





Introduction (The Fruit Flies)



Fruit flies as a number of species **infest** a wide variety of fruits, vegetables, flower heads, seeds, leaves and other plant parts (Prabhakar et al., 2012).

They are found in nearly all habitats with suitable plant life. Their distribution is cosmopolitan covering tropical, subtropical and temperate regions (Agarwal and Sueyoshi, 2005).

Scientific classification

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Diptera
Family: **Tephritidae**
Subfamily: Dacinae
Tribe: Dacini
Genus: ***Bactrocera***





Introduction



Nepal has vivid geo-climatic conditions and different types of fruits and vegetables are growing here. Among the different pest problems of these horticultural crops fruit fly is an important insect pest in Nepal.

Farmers are practicing use of pheromone traps, application of chemical measures and field sanitation as management options.

In Nepal MoAD / NPPO and its offices in regional, district and service centre level provides the services regarding surveillance, monitoring and management of insect pests.



Pest Surveillance activities on
Fruit fly in Nepal





The quarantine fruit fly species to export citrus fruit to China



Pest Surveillance activities on
Fruit fly in Nepal

1. *Bactrocera correcta* (Bezzi),
Guava fruit fly



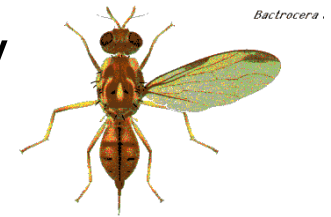
2. *Bactrocera cucurbitae* (Coquillett),
Melon fruit fly



3. *Bactrocera dorsalis* (Hendel),
Oriental fruit fly



4. *Bactrocera tsuneonis* (Miyake),
Japanese orange fly



5. *Bactrocera zonata* (Saunders),
Peach fruit fly





Fruit fly in Nepal



In Nepal, Fruit flies are among the major pests of cucurbitaceous vegetables and citrus fruits.

Several study and research activities were conducted to prevent yield loss.

GC in 2001 mentioned there was 42-68% fruit attack by this insect in bitter gourd.

Pest Surveillance activities on
Fruit fly in Nepal





Fruit fly in Nepal



Hardy (1964) studied 11 species of fruit flies collected by the British Museum (Natural History) Nepal expedition teams (1954, 1961-62) and described 5 new species of it from Nepal.

Kapoor and his associates also mentioned these flies of Nepal in their book Fruit flies of India, 1980. There are 32 species under 18 genera among them **6 species are described from Nepal.**

Pest Surveillance activities on
Fruit fly in Nepal



Fruit fly in Nepal cont..

- A survey was done in Kathmandu valley and adjoining district Kavre in 1994-96 and found that-

Kathmandu		Kavre	
Year/ Period	Month	Year/Period	Month
1994-1996	February- December	1996	May- September
Critical period	March -Nov	Critical Period	May-Jun

- *B. yoshimotoi* was found only during **June-Sept.**
- *B. dorsalis* and *B. cucurbitae* was found to be more in Kathmandu and
- *B. Zonztus* and *B. cucurbitae* found in Kavre
- **The observation showed that *B. ccucurbitae* not only damage vegetables but it equally problem in fruits.**



Fruit fly in Nepal



During the working period of (1990-1995), We had collected and there are 6 reference fruit fly species are available in Entomology laboratory of Fruit Development Directorate, Kirtipur. These are *Bactocera dorsalis*, *B. cucurbitae*, *B. zonata*, *B. tau*, *B. scutellaris* and *B. yashimotoi*.

Pest Surveillance activities on
Fruit fly in Nepal





Fruit fly in Nepal



There are 9 fruit flies species of Nepal reported by [Entomology Division of NARC](#), Khumaltar, Nepal.

1. *Bactrocera caudatus* (Fabricius, 1805),
2. *Bactrocera correctus* (Bezzi, 1913),
3. *Bactrocera cucurbitae* (Coquilett, 1899),
4. *Bactrocera diversus* (Coquilett, 1904),
5. *Bactrocera dorsalis* (Hendel,),
6. *Bactrocera minax* (Enderlein),
7. *Bactrocera scutellaris* (Bezzi, 1913),
8. *Bactrocera tau* (Walker) and
9. *Bactrocera zonatus* (Saunders, 1841).





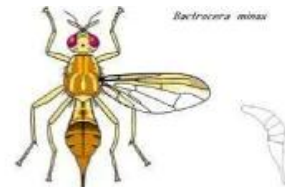
Fruit fly in Nepal



Pest Surveillance activities on Fruit fly in Nepal

Citrus fruit flies are the most serious insect pest of sweet orange and hill lemon in the eastern hills of Nepal. Chinese citrus fly (*Bactrocera minax*) is very serious insect causing up to 97 % loss by the end of harvesting season. It has been recognized as a serious pest of commercial sweet orange, especially in eastern regions of Nepal and is considered one of the major limiters of production.

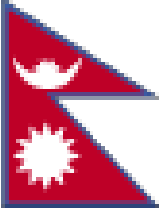
Despite several years of effort to control fruit flies through male annihilation using methyl eugenol and affected fruits sanitation tactics, fruit losses of sweet orange did not decrease at the farm of NCRP Dhankuta and farmer's fields of eastern region of Nepal. Since last five years even mandarin fruits are being damaged (about 15%) by the fruit flies (NCRP, 2012).



A female Chinese fruit fly, *Bactrocera minax* Pinned up male and female *Bactrocera minax*, respectively.



Fruit fly in Nepal



Pest Surveillance activities on Fruit fly in Nepal

A study in National Citrus Research Program (NCRP), Paripatle Dhankuta in 2006 confirmed that Chinese citrus fly (*Bactrocera minax*) is the species affecting the citrus fruits of NCRP, Dhankuta and vicinity areas but not the oriental fruit fly.

- These previous studies confirmed that in eastern part of Nepal the problematic fruit fly species is *Bactrocera minax*. Thus, there is strong need to identify appropriate method of monitoring and management.





Fruit fly in Nepal



- The fruit fly trap (pheromone trap) was found very useful in terms of minimizing damage caused by fruit fly and farmers also liked this technology very much (Jaisawal et.al., 1997).
- In Nepal, The pest management programme of fruit fly included the farmer's awareness; male annihilation by using parapheromones (cue lure for *Bactrocera cucurbitae* and methyl eugenol for *B. dorsalis*) and field sanitation have received tremendous interest and support of the farmers and will be continued.



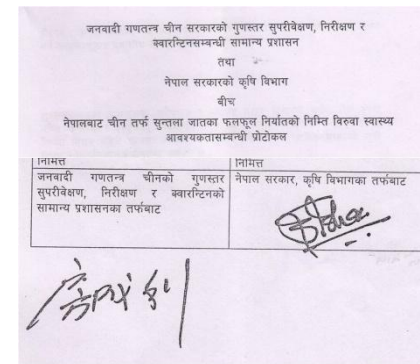


Citrus Fruit Fly Surveillance activities in Nepal



Pest Surveillance activities on Fruit fly in Nepal

- Mid hill district of Nepal is renowned for citrus fruits and has potential to produce quality and more fruit not only for national market but also for export.
- Moreover, Nepalese government and Chinese government had signed in the agreement to export Citrus fruit (Mandarin from Syanja and Sweet Orange from Sindhuli) from Nepal in 2012.
- For the exportable citrus fruits farmers should produce quality fruits and there should not be presence of quarantine pests in fruit to export and citrus orchard too. (Obligation to full fill)
- Citrus orchard should make pest free and for that National Plant Protection Organization (NPPO) had conducted general survey surveillance of fruit fly regularly.





Citrus Fruit Fly Surveillance activities in Nepal



Pest Surveillance activities on Fruit fly in Nepal

- Pest status survey in Sindhuli and Syangja districts during 2012-13.
- In survey team there was involvement of experts from different sectors such as PPD, RPPL, Entomology and Plant Pathology Division of NARC, NCRP, NPQP, RAD and DADO (Adhikari, 2013).
- Report on Pest Status Survey in 2013 mentioned that there were two species of fruit fly found in survey sites i.e. *Bactrocera cucurbitae* and *Bactrocera dorsalis*.





Citrus Fruit Fly Surveillance activities in Nepal



Pest Surveillance activities on Fruit fly in Nepal

- Recently, NPPO had endorsed the protocol for survey surveillance of fruit fly and activities for field survey in two districts namely Sindhuli and Syangja are ongoing.
- Protocol
- Fruit fly traps according to the protocol has been fixed with pheromone lure (Methyl eugenol and Cue lure) and Protein hydrolyses bait for monitoring of fruit fly species, their identification and preparation of database.

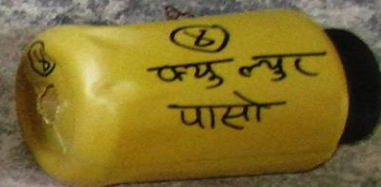
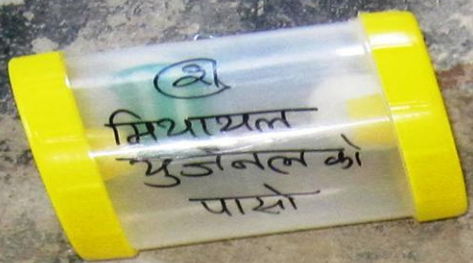




Fruit fly in Nepal



Preparation of pheromone traps by farmers and trapped fruit flies in Nepal



Pest Surveillance activities on
Fruit fly in Nepal

Recent Identification

- 6 species of *Bactrocera*
- *B. cucurbitae*,
- *B. tau*,
- *B. scutellar*
- *B. dorsalis*,
- *B. zonata*,
- *B. yoshimotoi*
- *B. correcta* (suspect)
- *Dacus longicornis*





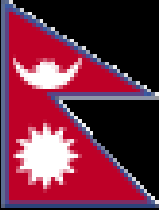


Conclusion



- Fruit fly is one of the major and economic damaged pest of Nepal and found in fruits and vegetables.
- Different types of fruit fly were observed in fruits like pear, grapes, citrus and chestnut and causing severe problems to the Nepalese farmers. Not only fruits but also serious problem in cucurbitaceous vegetables.
- Some activities were accomplished to monitor and manage fruit fly in Nepal. Recently, the surveillance activities were concentrated on quarantine fruit fly species to export Nepalese citrus to China.
- To declare the Pest Free Area is one of the challenge to Nepal to export the citrus to China.
- Nepal has not so strong capacity to diagnose(verification and identification) fruit fly **species**. Thus, it is necessary to maintain a national surveillance system.
- Farmer 's awareness, preparation of pheromone traps and sanitation of the field are the major activities conducted for management of fruit fly in Nepal





THANK YOU

Pest Surveillance activities on Fruit fly in Nepal

