COST 873
StoneFruitNutHealth

cost

Stone fruit germplasm resource and exploitation and links with ECPGR and EUFRIN

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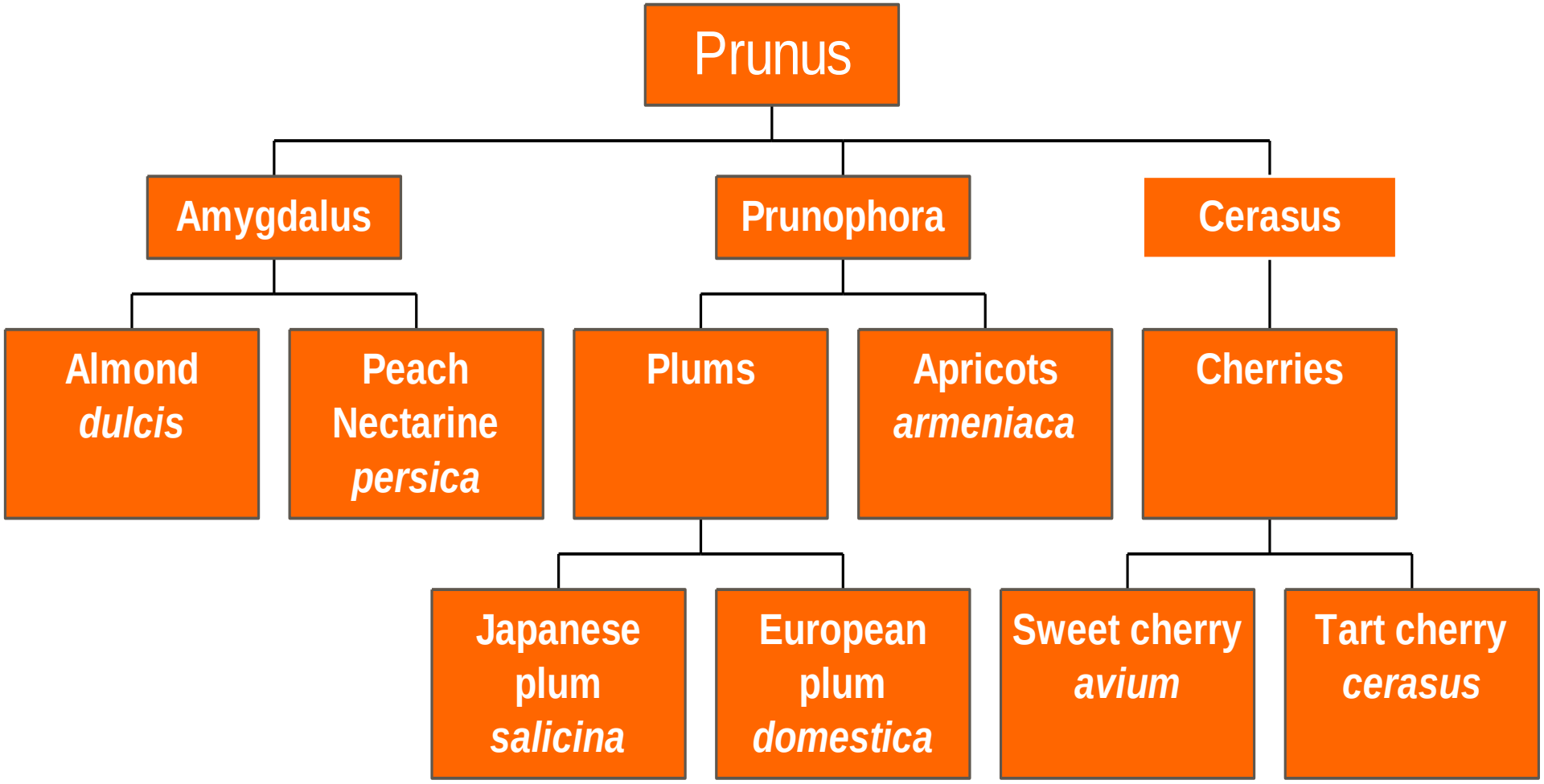
Joint Meeting of European COST & ISHS – 1st International Congress for Bacterial Diseases of Stone Fruits and Nuts;
14-17 February. 2012, Zürich, Switzerland

Stone Fruit - Classification



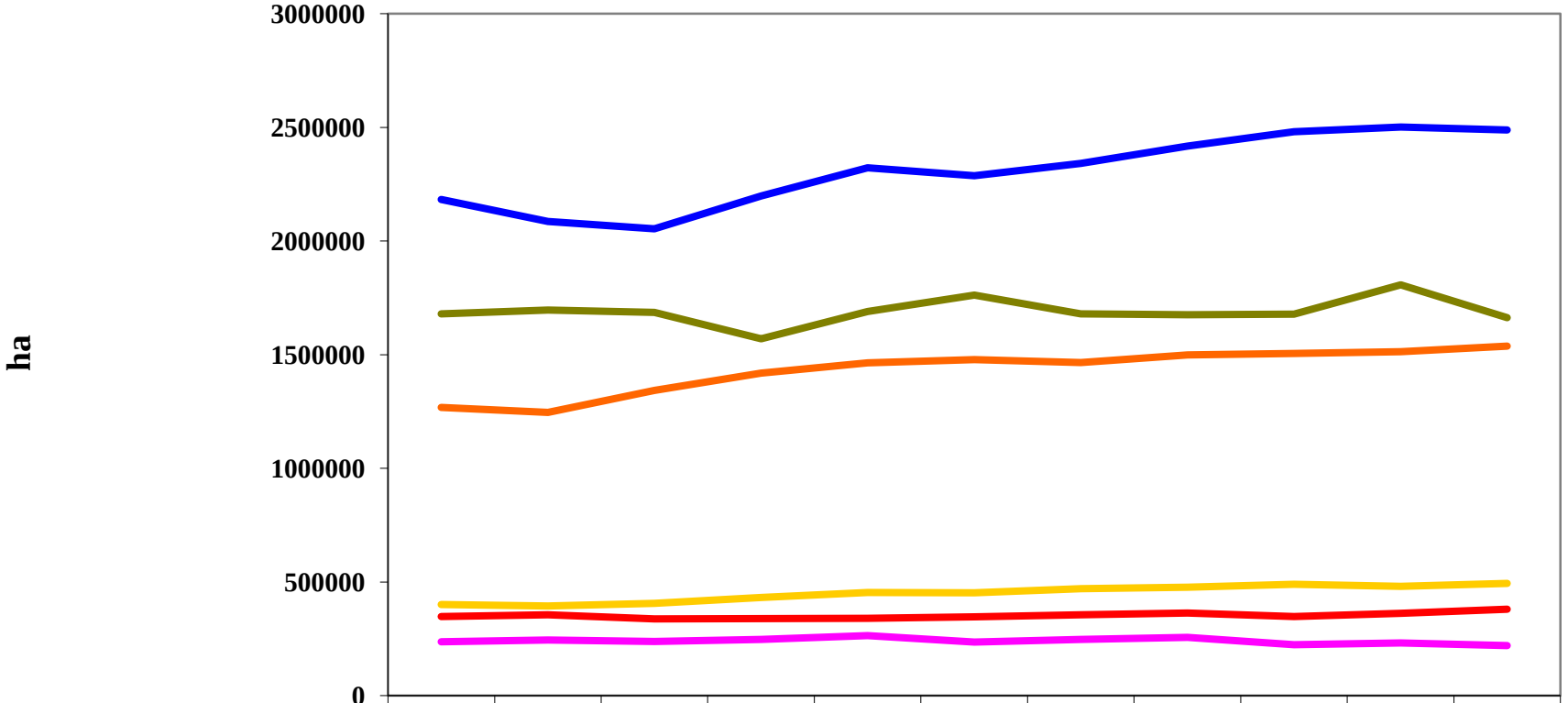
Prunus is a large diverse genus of woody plants which belongs to the subfamily *Prunoideae* of the family *Rosaceae* (Rehder, 1940).

The *Prunus* genus includes more than 400 species of flowering shrubs and trees, some of which are economically very important worldwide (Benediková and Giovannini, 2011).

Many species of this genus are economically important as 46 sources of edible fruits (e.g., apricots, cherries, nuts (almonds), peaches, and plums), oil, timber and 47 ornamentals (Lee and Wen, 2001; cited by Bouhadida M., 2009).

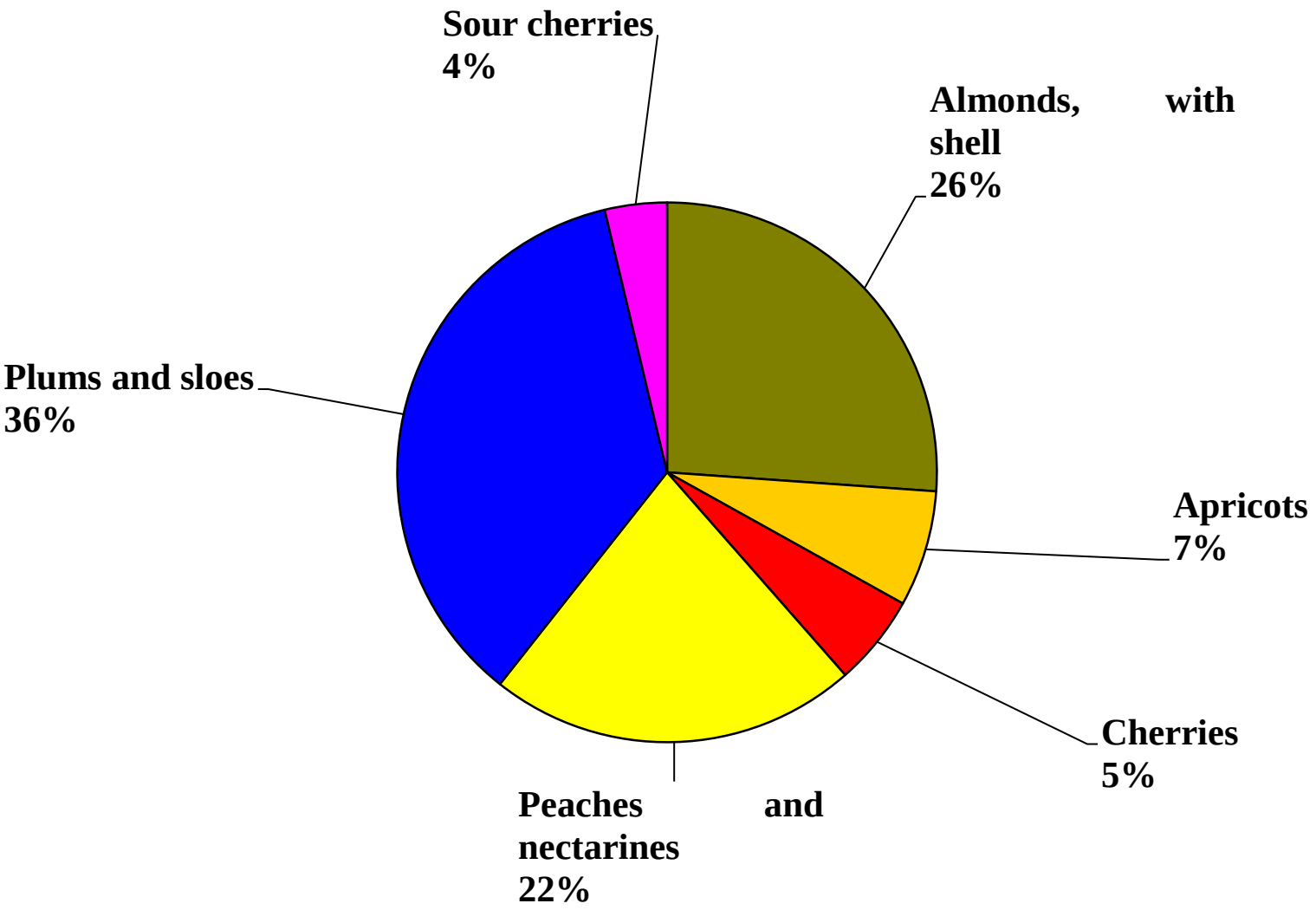
Other several species of *Prunus or* interspecific hybrids *are* used as rootstocks.

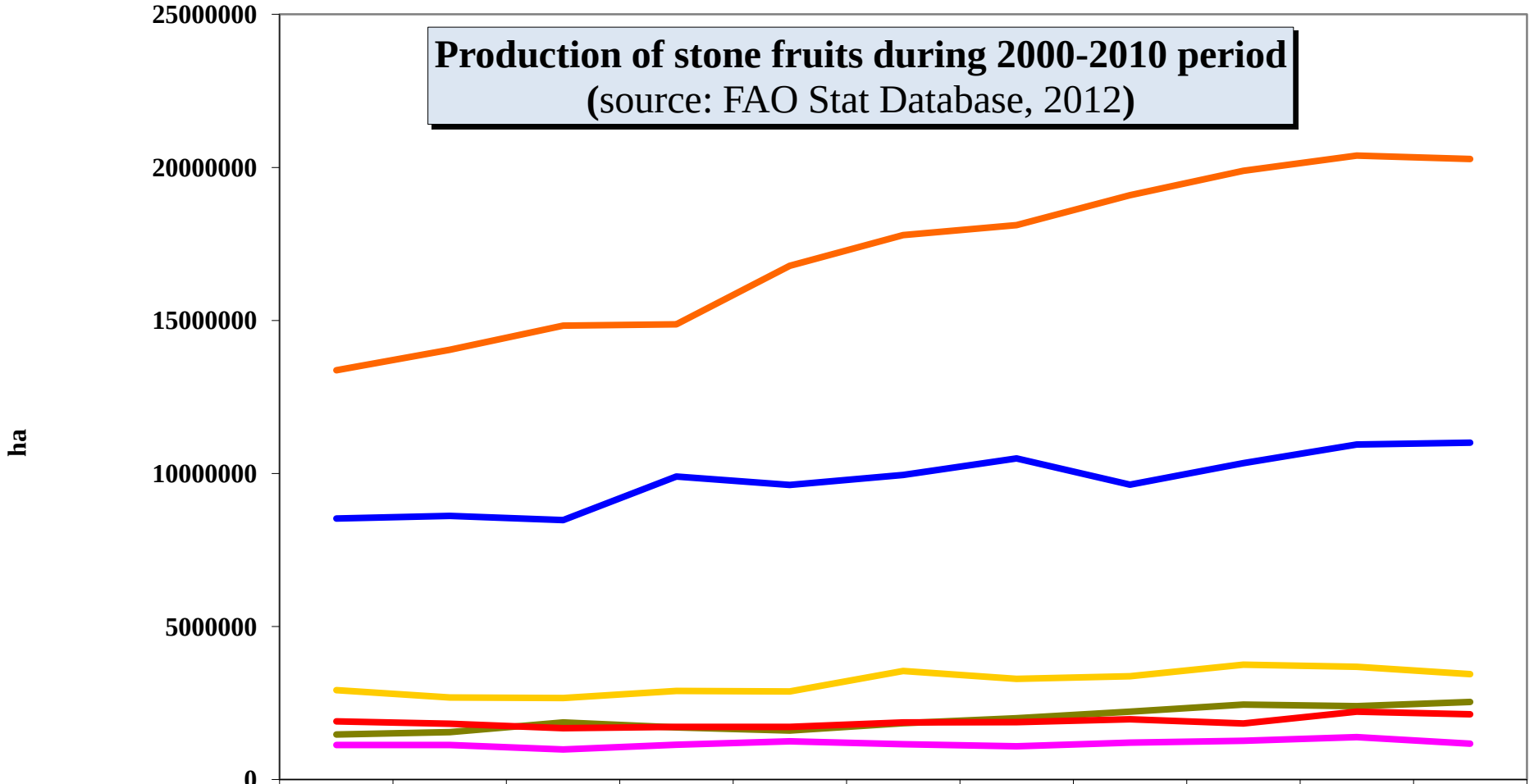
Area harvested of stone fruits during 2000-2010 period
(source: FAO Stat Database, 2012)



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Almonds, with shell	1679653	1696286	1686504	1569626	1689569	1761598	1679412	1675253	1678884	1807852	1663268
Apricots	400538	394533	405585	431257	453113	452857	470236	477199	489504	480841	493278
Cherries	347997	355241	337699	338519	340043	346673	354864	362853	347624	362360	379814
Peaches and nectarines	1267566	1245622	1343205	1418526	1464106	1478402	1465860	1498369	1504985	1512849	1537400
Plums and sloes	2182521	2086177	2053685	2198467	2322084	2287334	2342005	2417920	2480995	2501982	2489194
Sour cherries	236253	244844	237808	246677	264406	236002	247280	256053	224135	231669	220518

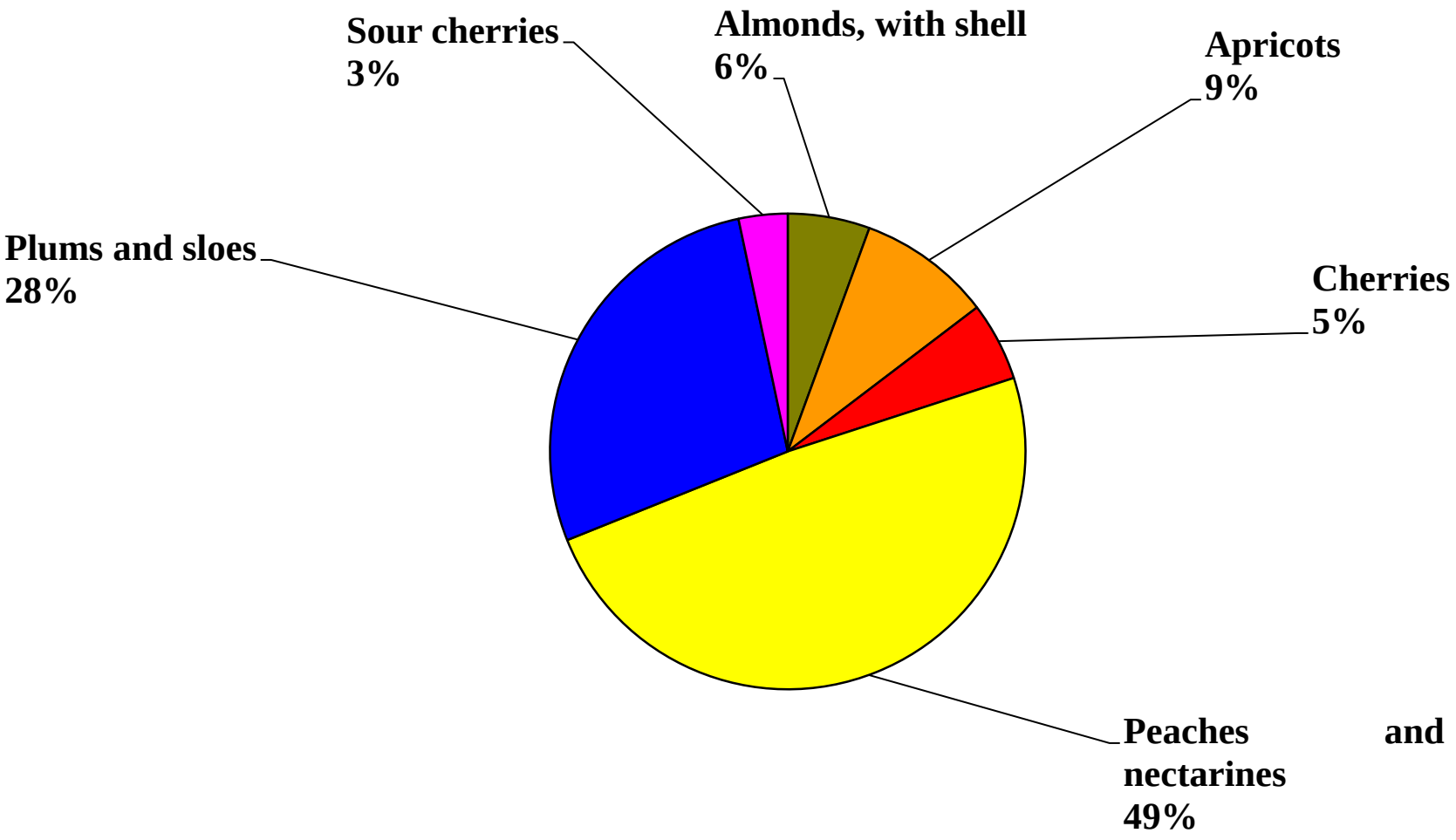
Share of stone fruit crops area harvested during 2000-2010 period
(source: FAO Stat Database, 2012)





	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Almonds, with shell	1468692	1549668	1864630	1700772	1596739	1838155	1999373	2215065	2445505	2394804	2531722
Apricots	2922086	2680565	2663766	2890306	2876708	3548188	3290986	3374552	3748013	3684795	3442450
Cherries	1901558	1824677	1678820	1723662	1721423	1863157	1871466	1965565	1830512	2217288	2130851
Peaches and nectarines	13370878	14038020	14827423	14869474	16788193	17790564	18110911	19091150	19890599	20389575	20278439
Plums and sloes	8532011	8610614	8473770	9897164	9628022	9954635	10487444	9637974	10338754	10945579	11002301
Sour cherries	1123953	1124172	984683	1136495	1248433	1156514	1081728	1207691	1263257	1380892	1172915

Share of stone fruit crops production during 2000-2010 period
(source: FAO Stat Database, 2012)



EUROPEAN PLUM

Prunus domestica, P. spinosa, P. cerasifera

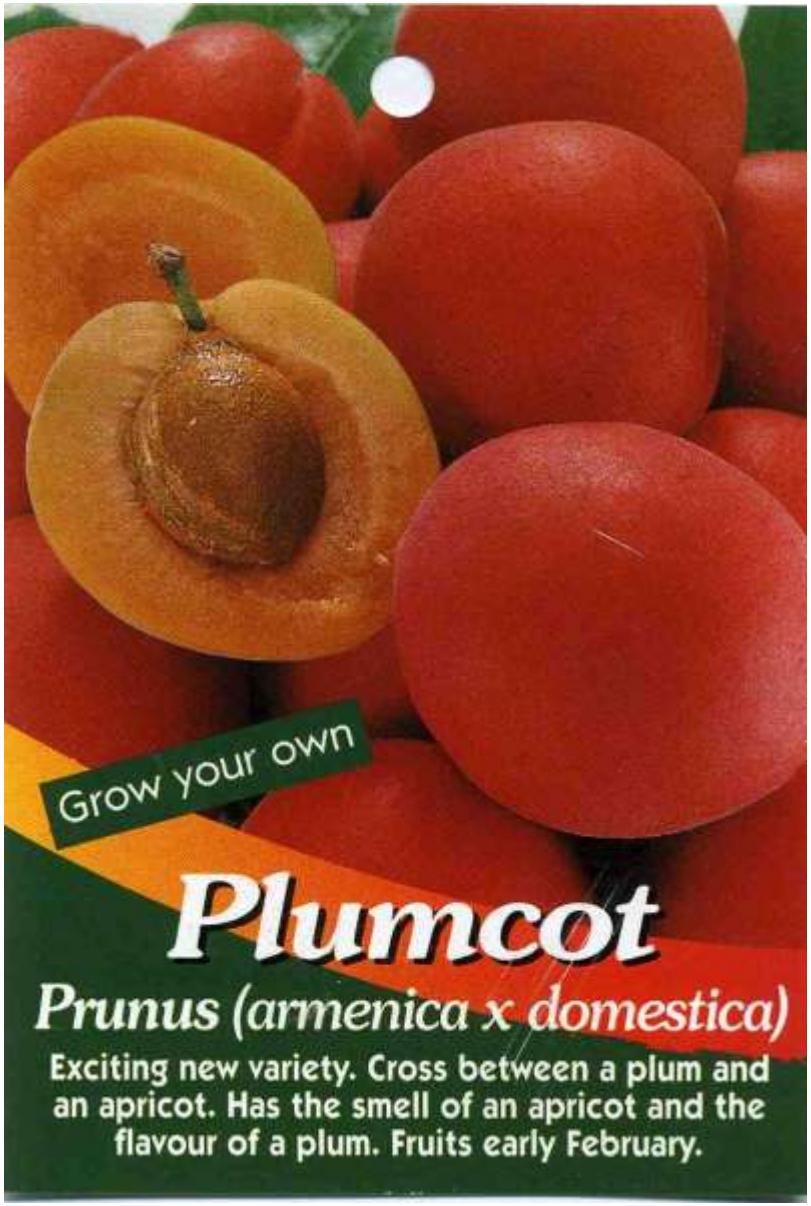
JAPANESE PLUM

Prunus salicina & hybrids

- **PLUMCOT** = apricot x plum
  (*Prunus armeniaca* x *Prunus domestica*)

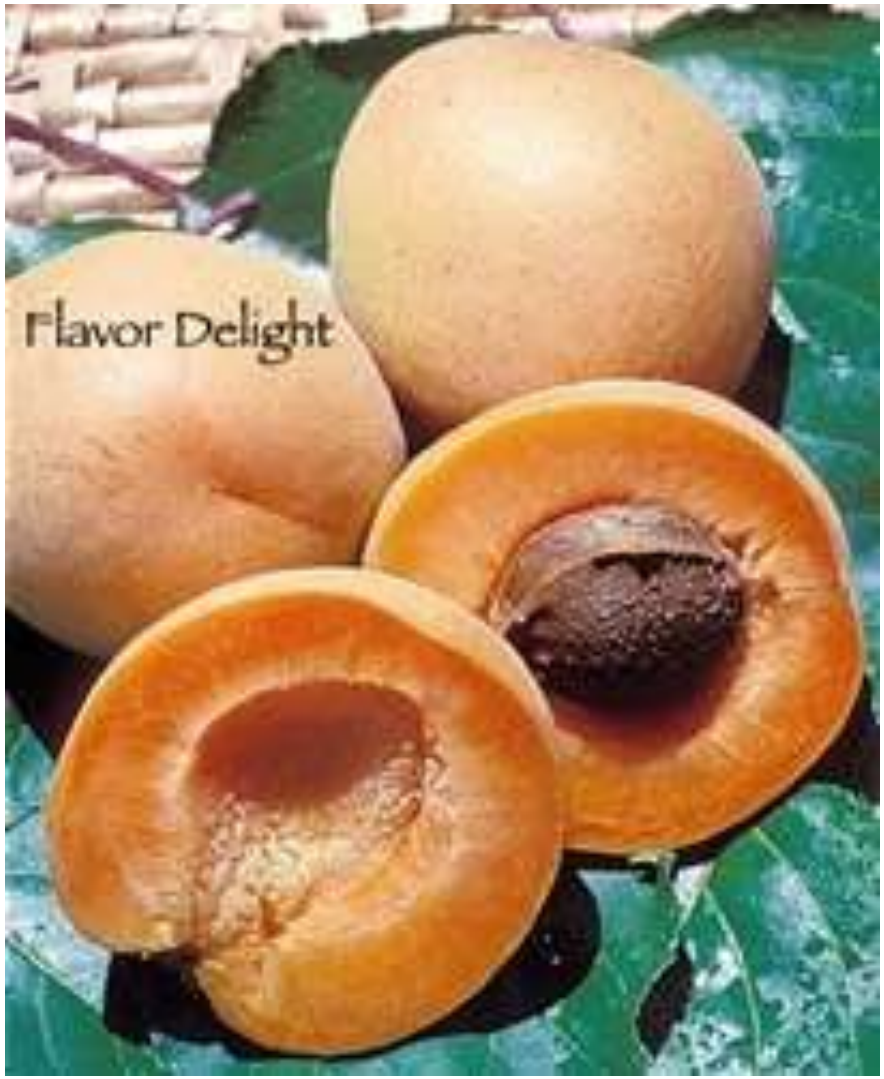
- **APRIUM** = plumcot x apricot
  [(*P. armeniaca* x *P. domestica)* x *P. armeniaca*)]

- **PLUOT** = plumcot x plum
  [(*P. armeniaca* x *P. domestica)* x *P. domestica*)]



PLUMCOT (*Prunus armeniaca x Prunus domestica*)

Honey Rich Aprium®



APRIUM [(*P. armeniaca x P. domestica) x P. armeniaca*)]

Stone fruit germplasm and ECPGR

Most of the European fruit producer countries also maintain extensive *Prunus* collections, gathering either original national genetic resources and introduced material. Since 1980, European countries can rely on the European Cooperative Programme on Plant Genetic Resources (ECPGR), a network based on the concept that a better cooperation and coordination among genebanks and governments in Europe would make conservation and use of plant genetic resources more effective (Maggioni et al., 2010 cited by Benediková and Giovannini, 2011).

ECPGR operates through nine Networks, dealing with groups of crops or general themes related to plant genetic resources. The *Prunus* Working Group (WG), in the Fruit Network, was established in 1983. Currently, 39 countries take part in the WG activities through their representatives, carrying out agreed workplans on GRs ((Benediková and Giovannini, 2011).

A survey questionnaire was sent to the National Delegates of the *Prunus* Working Group member countries prior to the 8th Meeting of the ECPGR *Prunus* WG, which was held from 7th - 9th of September 2010 in Forlì (Italy).

The questions were divided into sections and finalized to update the status of the *Prunus* collections maintained in European countries ((Benediková and Giovannini, 2011).

Table 1. Number of *Prunus* accessions maintained at the 20 countries participating to the survey
(Source: Benediková and Giovannini, 2011)

Country	Almond	Apricot	Cherry (sweet)	Cherry (sour)	Peach and nectarines	European Plum	Japanese Plum	Other *Prunus spp.*	Total per country
Albania	9	20	20	0	21	21	0	0	91
Austria	0	342	242	95	125	182	0	0	986
Belgium	0	0	466	56	70	419	0	287	1,298
Bosnia & Herz.	0	0	0	0	0	51	0	0	51
CzechRepublic	9	321	347	108	189	258	2	0	1,234
Denmark	0	0	46	35	0	110	0	0	191
Germany	0	0	215	103	0	165	0	0	483
Hungary	256	506	336	227	280	321	0	0	**1,926**
Finland	0	0	0	28	0	21	0	0	49
France	232	538	548	124	453	324	30	408	**2,657**
Italy	761	604	1,363	176	1,860	447	431	115	**5,757**
Latvia	0	42	33	21	2	29	15	0	142
Norway	0	0	29	23	0	91	2	4	149
Romania	0	617	345	167	896	842	8	0	**2,875**
Slovakia	35	172	184	58	125	53	0	0	627
Slovenia	3	15	84	60	43	27	0	0	232
Sweden	0	0	12	70	0	26	0	0	108
Switzerland	0	9	659	0	2	420	0	0	1090
Turkey	404	334	303	180	70	590	0	155	**2,036**
UK	0	10	308	53	0	256	3	167	797
Total per species	***1,700***	***3,510***	***5,520***	***1,584***	***4,115***	***4,632***	***491***	***1,136***	***22,779***

Figure 1. Number of 'original' *Prunus* accessions maintained at the 20 countries compiling the survey questionnaire. (Source: Benediková and Giovannini, 2011)

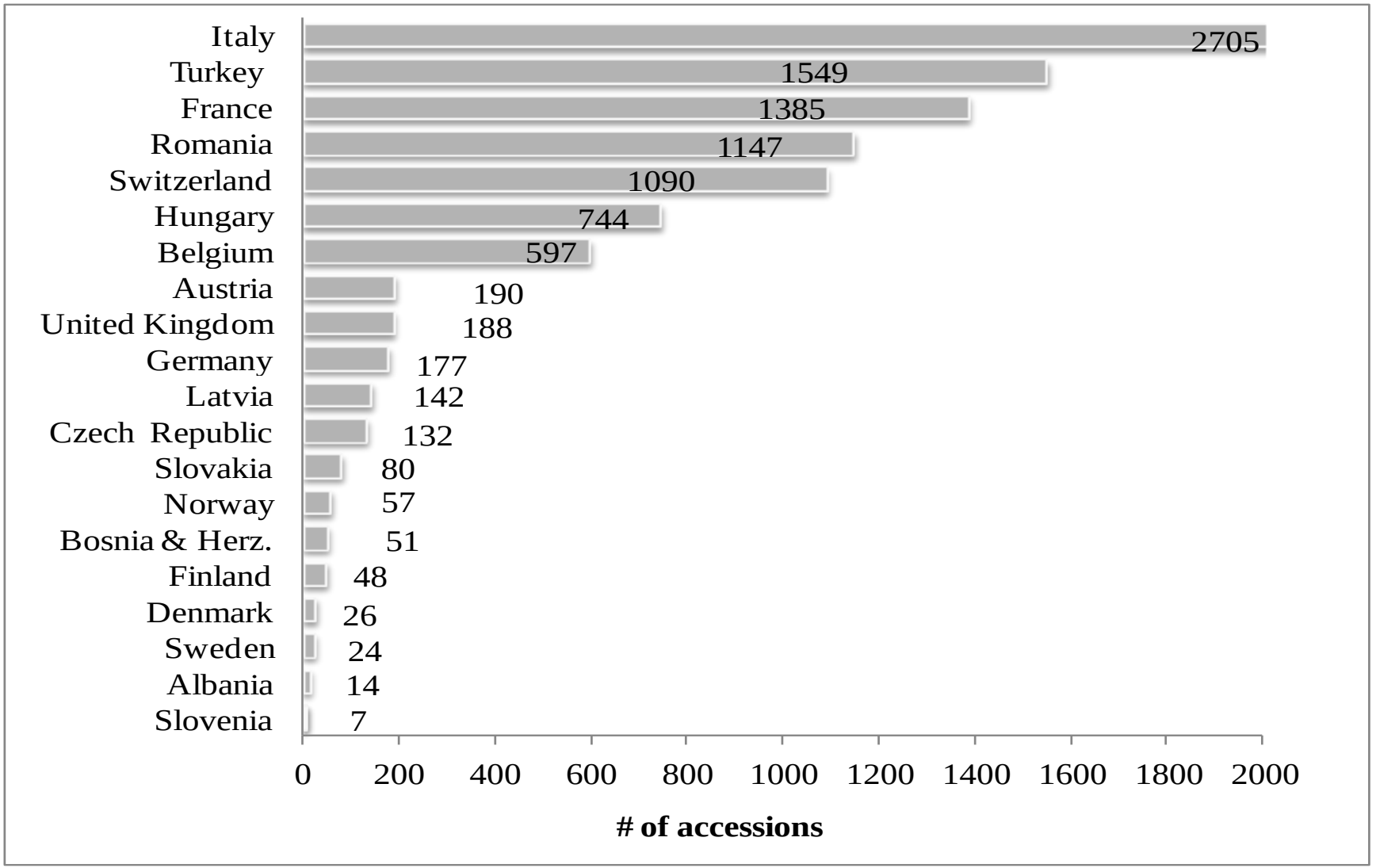
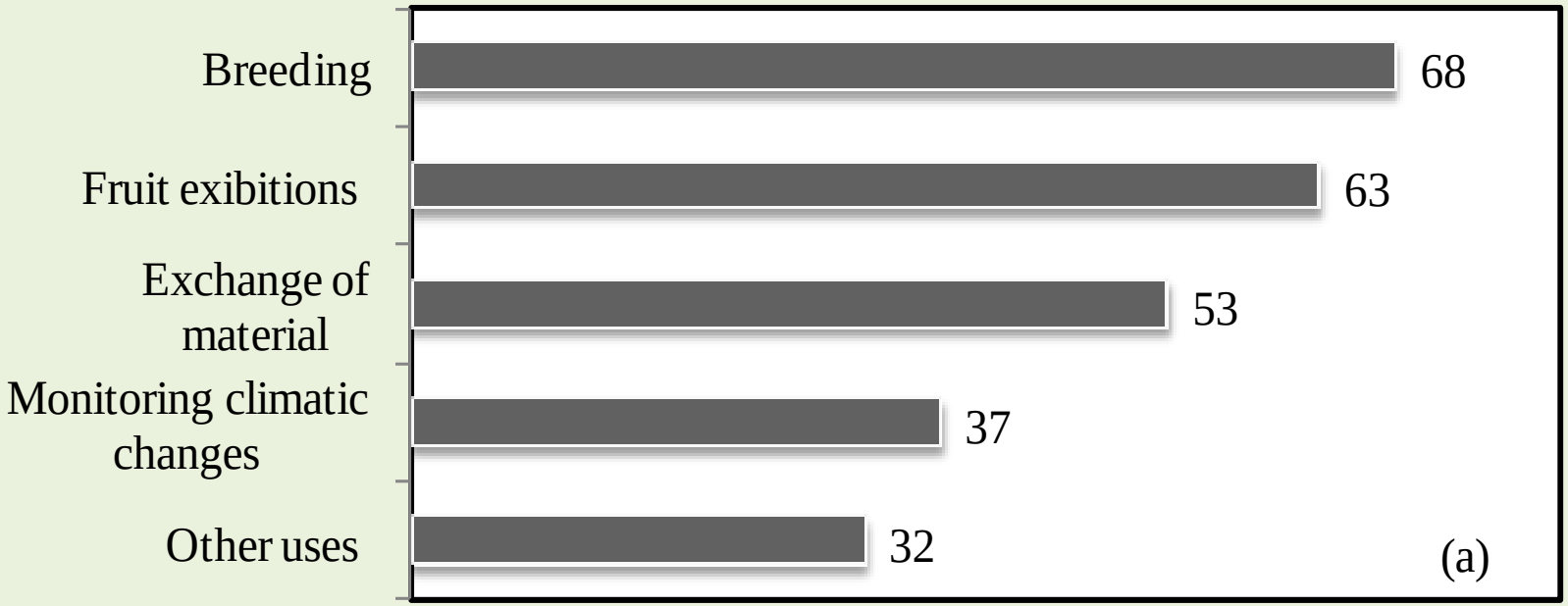


Table 2. Number of cherry and plum accessions already uploaded in the European *Prunus* Database
(Source: Maggioni et al., 2011 cited by Benediková and Giovannini, 2011)

Country	Institutes	Cherry[1]	Plum[2]	Total per country
Belgium	3	485	153	638
CzechRepublic	2	328	128	456
France	3	183	70	253
Germany	1	338	188	526
Greece	2	30	0	30
Hungary	1	209	421	630
Israel	1	49	102	151
Italy	16	1063	87	1150
Norway	1	0	21	21
Poland	1	123	127	250
Portugal	1	24	0	24
Romania	8	103	292	395
Slovakia	5	43	49	92
Spain	2	121	93	214
Switzerland	1	0	371	371
Turkey	1	203	276	479
Ukraine	8	1321	890	2211
United Kingdom	1	464	32	496
Total	*58*	*5,087*	*3,300*	*8,387*

[1]includes *P.avium*, *P.cerasus*, hybrids and other related species;
[2]includes *P.domestica*, *P.cerasifera*, *P.salicina*, *P.insititia* and other related species.

Figure 2a. Most common uses of *Prunus* genetic resources in the European countries replying to the questionnaire*.
(Source: Benediková and Giovannini, 2011)



*Percentages are calculated on a total of 19 countries.

2,768 new peach cultivars were released in the two decades from 1980 to 2008, but also for apricot (617), Japanese plum (509) and sweet cherry (445) (Della Strada and Fideghelli, 2011; cited by Benediková and Giovannini, 2011).

The Community Plant Variety Office registered between 1998 and 2010 a number of 219 peach and nectarine cultivars, 70 apricot cultivars, 38 sweet cherry cultivars, 29 European plum cultivars, 29 Japanese plum cultivars, 3 sour cherry cultivars, 3 Myrobalan cultivars and 10 interspecific hybrid cultivars.
(www.cpvo.europa.eu)

Stone fruit cultivar breeding objectives

Common peach breeding goals (Hancock et al., 2008):

- Extending the harvest season
- Improving flavor and aroma
- Lengthening self life
- Controlling tree size
- Broadening the adaptative range
- Develop resistance to Sharka (PPV), powdery mildew, brown rot, leaf curl, *Xanthomonas* spp. and the green aphid.

Apricot breeding objectives (Bassi and Audergon, 2006, cited by Zhebentyayeva et al., 2012; Ledbetter, 2008):

- Fruit quality for fresh consumption and for processing
- Environmental adaptation (temperature requirements, water deficit)
- Resistance to biotic stresses (Sharka, brown rot, bacterial diseases – *Pseudomonas* spp. and *Xanthomonas arboricola* pv. *pruni*, Chlorotic Leaf Roll Phytoplasma and Apricot Decline Syndrome)
- Extension of fruit ripening season
- Productivity
- Adequate tree size and structure

Sweet cherry breeding objectives (Iezzoni, 2008; Kappel et al., 2012):

- High yielding, self fertile cultivars
- Precocity
- Resistance to fruit cracking
- Large fruits with good shipping quality
- Resistance to diseases
- Resistance to low temperatures
- Early to late ripening

Sour cherry breeding objectives (Iezzoni, 2008; Kappel et al., 2012):

- Suitability for mechanical harvesting and processing
- Late flowering
- Round pit
- Resistance to diseases and pests (cherry leaf spot)
- Self fertility
- High yielding
- Different ripening times

Almond breeding objectives (R. Socias i Company et al., 2012):

- Fruit quality
- Self-compatibility
- Late blooming
- Frost tolerance
- Resistance to diseases
- Tree architecture

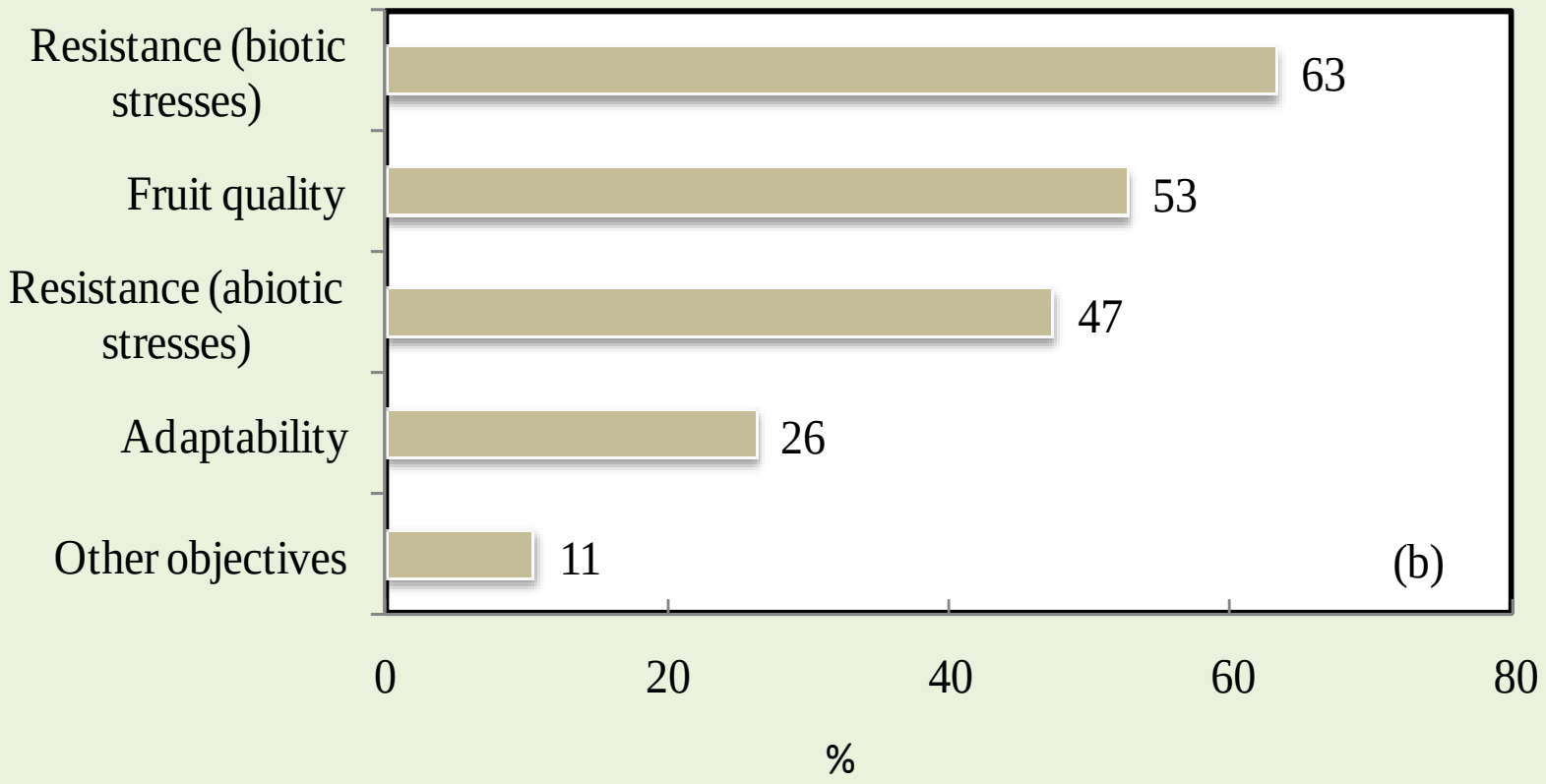
European plum breeding objectives (Okie W.R. and Weinberger J.H., 1996):

- Productivity
- Fruit quality for fresh consumption, drying and for processing
- Environmental adaptation
- Resistance to diseases (Sharka, red leaf blotch – *Polystigma rubrum*, *Monilinia* rot, rust – *Transzchelia pruni-spinosae*, bacterial canker – *Pseudomonas syringae* pv. *morsprunorum*, etc)
- Different ripening times
- Self fertility

Japanese plum breeding objectives (Okie W.R. and Weinberger J.H., 1996):

- Productivity
- Better fruit quality
- Storage ability
- Environmental adaptation
- Resistance to diseases (bacterial leaf and fruit spot – *Xanthomonas campestis* pv. *pruni*, bacterial canker – *Pseudomonas syringae* pv. *morsprunorum*, plum leaf scorch, Sharka, etc)
- Self-fertility
- Different ripening times

Figure 2b. Most frequent breeding objectives in the European countries replying to the questionnaire*.
(Source: Benediková and Giovannini, 2011)



*Percentages are calculated on a total of 19 countries.

Stone fruit germplasm in Romania

The activity of conservation of *Prunus* genetic resources in Romania is located mainly at ICDP Pitesti - Maracineni, University of Craiova - SCDP Valcea, SCDP Iasi, SCDP Baneasa and SCDP Constanta.

Conservation of plum accessions in classical germplasm field collections in Romania

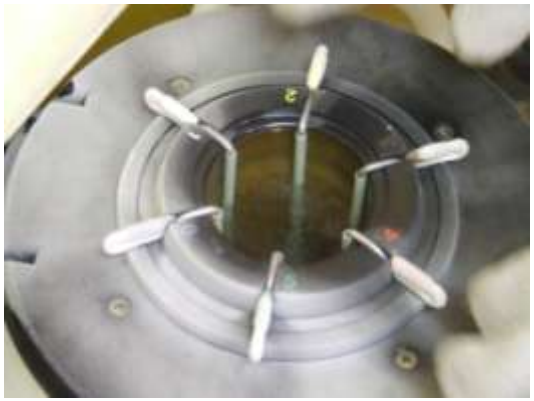
Accessions are grafted or budded trees on Myrobalan rootstock planted at 5 by 4 m, each accession being represented by 2 to 5 trees.

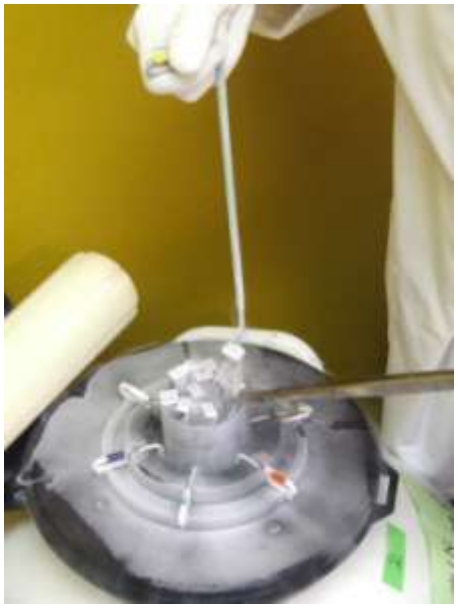
Conservation of *Prunus* accessions in containers in the field at University of Craiova – SCDP Valcea

Conservation of *Prunus* accessions in containers in the field at University of Craiova – SCDP Valcea

Cryoconservation of PGR

Cryoconservation of plant accessions is done in DEWAR tanks filled with liquid nitrogen (LN_2) at -196°C .





Aurii de Bistrița

Budești 1

Călugărești T2

Goldane Negre

Gogoșele Călimănești

Grase de Pesceana

Troianu 8

Sâmbăta 4

Tuleu de Sinești

Breeding fields at SCDP Constanta – Romania

(Source: Indreiaș, 2011)

Main results obtained at SCDP Constanta – Romania (Indreias, 2011)

- **43 cultivars**

  15 of apricot : *Mamaia,Traian, Tudor, Cristal, Danubiu, Auraş, Amiral, Fortuna, Orizont, Augustin, Histria, Euxin, Ceres, Ovidius, Elmar*.

  12 of nectarine: - 4 standard: *Romamer 2, Cora, Delta,Costin*
  - 3 dwarf: Liviu, Melania, Năică
  - 1 semidwarf: Valerica
  - 3 flat fruit: Marina, Creola, Liana
  - 1 brugnone: Anemona

  9 of peach:
  - 1 standard: Raluca
  - 4 dwarf: Cecilia, Puiu,Vasilică, Crăiţa
  - 3 flat fruit: Florin, Filip, Monica
  - 1 clingstone: Catherine sel.1

  7 of ornamental peach - 4 standard: *Zefir, Alizeu,Giuvaer, Purpuriu*
  - 2 dwarf: *Dan, Paul*
  - 1 semidwarf: *Livia*

- **8 rootstocks**
  - 5 for peach : *T16, Tomis 1, Tomis 79, Tomis 28, Tomis 39*
  - 3 for apricot: *Constanţa14, Constanţa16, Apricor*
- over 10 000 hybrids of peach and apricot (cultivars and rootstocks)
- one of the richest germplasm of peach and apricot in the world.

Peach cultivars obtained at SCDP Constanta - Romania

(Source: Indreiaș, 2011)

(Source: Indreiaș, 2011)

FLORIN

(Source: Indreiaș, 2011)

Apricot cultivars obtained at SCDP Constanta

TRAIAN

(Source: Indreias, 2011)

TUDOR

DANUBIU

Field susceptibility of peach and nectarine cultivars to bacterial diseases observed at SCDP Constanta - Romania
(Trandafirescu, 2009)

Cultivar s	Susceptibility class		
	Very susceptible (V.S.)	**Susceptible (S)**	**Tolerant (T)**
Peaches with yellow flesh	Favorita Moretini Cardinal Fairhaven I.H. Halle Suncrest Blake	Collins Early Elberta Early Hale Early Red Loring Pekin Redtop Southland Merril 49 Merril Gem	Dixired Redhaven Redskin Sunhaven Velvet Whynot Biscoe
Peaches with white flesh	Arnaud Guilloux elegant Mme Girerd Redwin Reine des vergers	Springtime Fantasia Flavortop Genadix 4 Genadix 6	Amsden Michelini Ribet Robin
Nectarines with yellow flesh	Nectared 8 Early Sungrand	Crimsongold Red June Nectared 2 Nectared 9 Fuzzless Berta	Nectared 4 Nectared 6 Nectagold Nectagrand 4
Nectarines with white flesh	Morton September Queen	Silver Star Fuzalode Silverlode Red Silver	Silverking Nectarose Nectaheart
Peaches for canning	Shasta Fortuna Vivian Dixon Babygold 9	Vesuvio Babygold 7 Babygold 8 Babygold 5 Sudanel	Babygold 6

European Fruit Research Institutes Network

http://www.eufrin.obstpage.de/

Eufrin Working Groups:

1. Apple and pear variety testing
2. Fruit quality
3. Fruit thinning
4. Improvement of fruit by biotechnology
5. Plum and prune
6. Rootstocks for fruit trees
7. Soft fruit
8. Spray application technique (WG-SAT)
9. Stone fruit variety evaluation
10. Sustainable fruit production to minimize residues
11. Water relations

Eufrin European Fruit Institutes Network

2nd edition of

Plum and Prune Working Group Meeting

"Present Constraints of Plum Growing in Europe"

Craiova, Romania

July 20th – 22nd, 2010

Papers will be published soon in an special issue of
ISHS *Acta Horticulturae*

Next EUFRIN Plum and Prune WG Meeting:

LATVIA – 2013 or 2014

Convener: Edite Kaufmane

SEEDNet

South East European Development Network on Plant Genetic Resources

http://seednet.geminova.net/

SEEDNet

Collection and field evaluation of local plum (*Prunus domestica*) genetic resources from South East European network

2009-2011

Project objectives:

- Collection of passport and pomological data along with propagation material of accessions *in situ*.
- Clonal propagation of the collected genetic resources
- Inventory (including passport and pomological data) of already existing collections
- Elimination of potential duplicates in the region via accession names and pomological characterization
- Introducing data into a data base format agreed with SEEDNet
- Dissemination of the result through publishing and preparation of a plum pomology book.

Material collected:

A total number of 179 plum accessions were identified, collected or evaluated in 2009 and 2010 using IBPGRI descriptors:

- 29 in Romania
- 23 in Bosnia & Herzegovina
- 44 in Montenegro
- 18 in Macedonia
- 14 in Albania
- 10 in Republika Srpska
- 21 in Serbia
- 10 in Republic of Moldova

- **80 accessions were collected in order to be introduced into the *ex situ* collections.**

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THANK YOU VERY MUCH FOR ATTENTION!