

**Fig. 1:**

The FAO lists several commodities that derive from one crop species. We pooled these commodities by species, for example pop corn, green corn, and maize all derive from *Zea mays*. Some crops are listed in more than one commodity, pooled with commodity crops. We could not separate the production of these crops and therefore a few species are listed twice such as, *Phaseolus* spp. in 'bean dry' with several other species, all with insect-mediated increased production, and 'bean green' which includes only *Phaseolus* spp. Data available at <http://faostat.fao.org/> (FAOSTAT 2005). Literature listed in Appendix 2.

**Animal pollination** = evidence of increased fruit set, fruit weight and/or quality, seed set and/or seed quality, and/or increased pollen deposition (an indirect measure) when visited by animals, mainly insects, for at least one variety per crop. Crops are classified into the following categories:

- (i) **increase** = pollinators increase production of plant parts that we consume
- (ii) **increase - seed production** = pollinators increase seed production necessary to produce the vegetative parts that we consume
- (iii) **increase - breeding** = pollinators increase in seed production in plant breeding and plants reproduce vegetatively
- (iv) **no increase** = no production increase with pollinators
- (v) **mixed response** = this category is only used for commodities; most species showed an increase in production with pollinators while other species did not

| Crop species   | Commodity                     | World production (Mt) | Animal pollination  | References   |
|--|-------------------------------|-----------------------|---------------------|--|
| <i>Saccharum officinarum</i>   | Sugar cane                    | 1 328 216 730         | no increase         | James 1980   |
| <i>Zea mays</i>  | Maize, Green corn, Sweet corn | 733 084 158           | no increase         | Russell & Hallauer 1980  |
| <i>Triticum</i> spp. (mainly <i>T. aestivum</i> , <i>T. durum</i> , <i>T. spelta</i> ) | Wheat                         | 629 561 977           | no increase         | Allan 1980   |
| <i>Oryza</i> ssp. (mainly <i>O. sativa</i> )   | Rice, Paddy                   | 606 648 911           | no increase         | Ronnie Coffman & Herrera 1980  |
| <i>Solanum tuberosum</i>   | Potato                        | 330 518 791           | increase - breeding | Plaisted 1980; Free 1993   |
| <i>Beta vulgaris</i>   | Sugar beet                    | 248 611 386           | no increase         | Smith 1980   |
|  | Fresh vegetables NES          | 247 176 759           | mixed response      |  |
| <i>Glycine max</i> , <i>G. soja</i>  | Soybean                       | 204 429 429           | increase            | Koelling <i>et al.</i> 1981; in Free 1993; Moreti <i>et al.</i> 1998; Nogueira-Couto <i>et al.</i> 1998 for <i>G. wightii</i> ; Chiari <i>et al.</i> 2005a,b |
| <i>Manihot esculenta</i> , syn. <i>M. utilissima</i> , <i>M. palmata</i>               | Cassava                       | 203 618 052           | increase - breeding | Kawano 1980  |
| <i>Elaeis guineensis</i>   | Oil palm                      | 163 141 697           | increase            | in Free 1993; Dhileepan 1994; in Westerkamp & Gottsberger 2000; Tandon <i>et al.</i> 2001; Krantz & Poinar 2004; Mayfield 2005                               |
| <i>Hordeum disticum</i>  | Barley                        | 153 948 740           | no increase         | Starling 1980  |

|  |  |             |                            |  |  |
|--|--|-------------|----------------------------|--|--|
| <i>H. hexasticum</i> , <i>H. vulgare</i>   |  |             |                            |  |  |
| <i>Ipomoea batatas</i>   | Sweet potato   | 127 169 113 | increase - breeding        | Jones 1980   |  |
| <i>Lycopersicon esculentum</i>   | Tomato   | 124 111 781 | increase                   | in Free 1993; du Toit 1994; Asada & Ono 1996; in Delaplane & Mayer 2000; Hogendoorn <i>et al.</i> 2000; in Westerkamp & Gottsberger 2000; Morandin <i>et al.</i> 2001; Cauich <i>et al.</i> 2004; Higo <i>et al.</i> 2004; Greenleaf 2005; Bell <i>et al.</i> 2006; Greenleaf & Kremen 2006a; in Slaa <i>et al.</i> 2006 |  |
| <i>Citrus aurantifolia</i> ,<br><i>C. aurantium</i> ,<br><i>C. bergamia</i> ,<br><i>C. grandis</i> ,<br><i>C. limetta</i> ,<br><i>C. limon</i> ,<br><i>C. maxima</i> ,<br><i>C. medica</i> (var. <i>cedrata</i> ),<br><i>C. myrtifolia</i> ,<br><i>C. paradisi</i> ,<br><i>C. reticulata</i> ,<br><i>C. sinensis</i> ,<br><i>C. unshiu</i> ,<br><i>Fortunella japonica</i> | Bergamot, Chinotto, Citron, Clementine, Grapefruit, Kumquat, Lemmon, Lime, Manderine, Orange, Pomelo Tangerine | 110 965 382 | increase                   | in Crane 1991; in Free 1993; Bhatia <i>et al.</i> 1995; in Sharma & Jindal 1997; Wallace & Lee 1999; Sanford 2003; Chacoff 2006; Chacoff & Aizen 2006  |  |
| <i>Musa sapientum</i> ,<br><i>M. cavendishii</i> , <i>M. nana</i> , <i>M. paradisiaca</i>  | Banana, Plantain   | 105 294 510 | increase - breeding        | in Free 1993; Mutsaers 1993  |  |
| <i>Citrullus lanatus</i>   | Watermelon   | 94 525 177  | increase                   | in Free 1993; Stanghellini <i>et al.</i> 1997; Stanghellini <i>et al.</i> 1998; in Delaplane & Mayer 2000; Kremen <i>et al.</i> 2002; Stanghellini <i>et al.</i> 2002; Kremen <i>et al.</i> 2004; Njoroge <i>et al.</i> 2004   |  |
| <i>Brassica chinensis</i> ,<br><i>B. oleracea</i>  | Cabbage, Cauliflower   | 84 703 926  | increase - seed production | in Free 1993   |  |
| <i>Gossypium hirsutum</i> , <i>G. barbadense</i> , <i>G. arboreum</i> , <i>G. herbaceum</i>  | Seedcotton   | 69 849 042  | increase                   | in Free 1993; Rhodes 2002  |  |
| <i>Vitis vinifera</i>  | Table Grape, Vine Grape  | 67 070 746  | no increase                | in Free 1993; Rhodes 2002  |  |
| <i>Malus domestica</i> * <sup>1</sup>  | Apple  | 63 205 385  | increase                   | in Crane 1991; in Free 1993; Sekita & Amada 1993; Fourez 1995; Batra 1998; in Delaplane  |  |

|  |                                      |            |                            |  |
|--|--------------------------------------|------------|----------------------------|--|
|  |                                      |            |                            | & Mayer 2000; in Westerkamp & Gottsberger 2000; Vicens & Bosch 2000; Kron <i>et al.</i> 2001; Sekita 2001; Stern <i>et al.</i> 2001; Thomson & Goodell 2001; Wei <i>et al.</i> 2002; in Soltész 2003; Ladurner <i>et al.</i> 2004; Sharma <i>et al.</i> 2004 |
| <i>Allium cepa</i> , <i>A. ascalonicum</i> , <i>A. fistulosum</i>  | Onion, Shallots, Welsh onion (green) | 61 328 750 | increase - seed production | in Crane 1991; in Free 1993; Schittenhelm <i>et al.</i> 1997; Witter & Blochtein 2003  |
| <i>Sorghum guineense</i> , <i>S. vulgare</i> , <i>S. dura</i>  | Sorghum                              | 57 871 754 | no increase                | Schertz & Dalton 1980  |
| <i>Cocos nucifera</i>  | Coconut                              | 54 708 169 | increase                   | in Free 1993; Da Conceicao <i>et al.</i> 2004; Meléndez-Ramírez <i>et al.</i> 2004   |
| <i>Brassica napus</i>  | Rapeseed, Oilseed rape               | 46 770 903 | increase                   | in Free 1993; Adegas & Noqueira Couto 1992; Abel & Wilson 1999; Bürger 2004; Manning & Boland 2000; Abel <i>et al.</i> 2003; Morandin & Winston 2005   |
| <i>Cucumis sativus</i>   | Cucumber, Gherkin                    | 40 953 372 | increase                   | in Free 1993; Stanghellini <i>et al.</i> 1997; Gingras <i>et al.</i> 1999; Stanghellini <i>et al.</i> 2002   |
| <i>Dioscorea</i> spp.  | Yam                                  | 39 901 384 | increase - breeding        | Akoroda 1983; Abraham & Gopinathan Nair 1990; Segnou <i>et al.</i> 1992; in Free 1993  |
| <i>Arachis hypogaea</i>  | Peanut, Groundnut                    | 35 894 864 | increase                   | in Crane 1991; in Free 1993  |
| <i>Solanum melongena</i>   | Eggplant, Aubergine                  | 30 144 463 | increase                   | in Free 1993   |
| <i>Echinochloa frumentacea</i> , <i>Eleusine coracana</i> , <i>Eragrostis abyssinica</i> , <i>Panicum miliaceum</i> , <i>Paspalum scrobiculatum</i> , <i>Pennisetum glaucum</i> , <i>Setaria italica</i> | Millet                               | 27 763 700 | no increase                | Burton 1980  |
| <i>Cucumis melo</i>  | Cantaloupe, Melon                    | 27 332 753 | increase                   | in Free 1993; Norden 1985; Kato & Nogueira-Couto 2002; Elzen <i>et al.</i> 2004; Valantin-Morison <i>et al.</i> 2006   |

|  |   |            |  |  |
|--|---|------------|--|--|
| <i>Mangifera indica</i>  | Mango   | 27 043 155 | increase   | in Free 1993; du Toit 1994; Bhatia <i>et al.</i> 1995; Dag <i>et al.</i> 2001  |
| <i>Helianthus annuus</i>   | Sunflower   | 26 460 824 | increase   | Bichee & Sharma 1988; in Crane 1991; in Free 1993; DeGrandi-Hoffman & Martin 1993; Moreti <i>et al.</i> 1996; in Heard 1999; DeGrandi-Hoffman & Watkins 2000; Dag <i>et al.</i> 2002; Greenleaf & Kremen 2006b |
| <i>Avena</i> spp., mainly <i>Avena sativa</i>  | Oat   | 25 843 813 | no increase  | Brown 1980;  |
|  | Fresh fruits NES  | 25 374 992 | mixed response   |  |
| <i>Capsicum annuum</i> , <i>C. frutescens</i> , <i>Pimenta dioica</i> (syn. <i>P. officinalis</i> , <i>P. dioica</i> )   | Chile pepper, Red pepper, Bell pepper, Green pepper, Allspice, Pimento                  | 24 678 810 | increase   | Jarlan <i>et al.</i> 1997a,b; Meisels & Chiasson 1997; Raw 2000; Dag & Kammer 2001; Ercan & Onus 2003; De Oliveira Cruz <i>et al.</i> 2005   |
| <i>Daucus carota</i>   | Carrot  | 24 405 409 | increase - seed production   | in Free 1993; Schittenhelm <i>et al.</i> 1997; in Slaa <i>et al.</i> 2006  |
| <i>Lactuca sativa</i> , <i>Cichorium intybus</i> , <i>C. endivia</i>   | Lettuce, Chicory  | 22 001 381 | increase - seed production for <i>Cichorium</i> , no increase for <i>Lactuca</i> | in Pouvreau 1984; in Free 1993; Goubara & Takasaki 2004  |
| <i>Cucurbita maxima</i> , <i>C. mixta</i> , <i>C. moschata</i> , <i>C. pepo</i>  | Pumpkin, Squash, Gourd, Marrow, Zucchini  | 18 803 468 | increase   | Norden 1985; in Free 1993; Nepi & Paccini 1993; in Delaplane & Mayer 2000; Canto-Aguilar & Parra-Tabla 2000; Ashworth & Galetto 2001; Cardoso 2003; Fuchs & Müller 2004  |
| <i>Pyrus communis</i>  | Pear  | 18 693 165 | increase   | in Free 1993; in Delaplane & Mayer 2000; in Westerkamp & Gottsberger 2000; Maccagnani <i>et al.</i> 2003; in Nyéki & Soltész 2003; Monzón <i>et al.</i> 2004; Stern <i>et al.</i> 2004                         |
| <i>Phaseolus</i> spp. ( <i>P. vulgaris</i> , <i>P. lunatus</i> , <i>P. angularis</i> , <i>P. aureus</i> , <i>P. mungo</i> , <i>P. coccineus</i> , <i>P. calcaratus</i> , <i>P. aconitifolius</i> , <i>P. acutifolius</i> ) | Bean dry like Kidney bean, Haricot bean, Lima bean, Azuki bean, Mungo bean, String bean | 18 368 480 | increase   | Du Toit 1990; in Crane 1991; in Roubik 1995; in Carrek & Williams 1998; Ibarra-Perez <i>et al.</i> 1999  |
| <i>Secale cereale</i>  | Rye   | 17 674 901 | no increase  | Morey & Barnett 1980   |

|  |   |            |                                     |  |
|--|---|------------|-------------------------------------|--|
|  | Fresh tropical fruits<br>NES                  | 16 344 385 | mixed<br>response                   |  |
| <i>Olea europea</i>  | Olive   | 17 176 231 | no increase                         | in Free 1993; Singh 1997   |
| <i>Ananas comosus</i>  | Pineapple                                     | 15 698 667 | increase -<br>breeding              | in Free 1993   |
| <i>Prunus persica</i> ,<br><i>Persica laevis</i>                 | Peach, Nectarine                              | 15 300 003 | increase                            | in Free 1993; in Delaplane & Mayer 2000; in Westerkamp & Gottsberger 2000; da Mota & Nogueira-Couto 2002; in Szábo <i>et al.</i> 2003b                   |
| <i>Allium sativum</i><br>(syn. <i>Alliaria sativum</i> )         | Garlic  | 14 087 991 | increase -<br>breeding              | Etoh & Hong 2001; Kamenetsky & Rabinowitch 2001  |
| <i>Triticale sp.</i>   | Triticale                                     | 13 837 072 | no increase                         | Larter & Gustafson 1980  |
| <i>Spinacia olearacea</i>  | Spinach                                       | 12 767 172 | no increase                         | in Free 1993   |
| <i>Pisum sativum</i> , <i>P. arvense</i>                         | Pea, dry and green like Garden pea, Field pea | 21 248 340 | no increase                         | Gritton 1980; in Free 1993; Franklin <i>et al.</i> 2000; Mcphee 2003   |
| <i>Colocasia esculenta</i>                                       | Taro (Coco Yam)                               | 10 687 728 | increase -<br>seed<br>production    | Ivancic 2004   |
| <i>Prunus domestica</i> ,<br><i>P. spinosa</i>                   | Plum, Greengage, Mirabelle, Sloe              | 9 628 708  | increase                            | in Free 1993; Calzoni & Speranza 1998; in Delaplane & Mayer 2000; in Westerkamp & Gottsberger 2000; Frève <i>et al.</i> 2001; in Szábo 2003              |
| <i>Cicer arietinum</i>   | Chick pea, Bengal gram, Garbanzo bean         | 8 625 894  | no increase                         | in Free 1993; Abbo <i>et al.</i> 2003  |
| <i>Coffea arabica</i> , <i>C. canephora</i> , <i>C. liberica</i> | Coffee, green                                 | 7 786 909  | increase                            | in Free 1993; Manrique & Thimann 2002; Roubik 2002a,b; Klein <i>et al.</i> 2003a,b,c; De Marco & Coelho 2004; Ricketts <i>et al.</i> 2004; Ricketts 2004 |
| <i>Phoenix dactylifera</i>                                       | Date palm                                     | 6 907 093  | no increase                         | Crossa-Raynaud 1984  |
|  | Roots and Tubers<br>NES                       | 6 873 021  | mixed<br>response                   |  |
| <i>Carica papaya</i>   | Papaya  | 6 786 794  | increase                            | in Free 1993; Jindal & Sharma 1997; in Westerkamp & Gottsberger 2000   |
| <i>Asparagus officinalis</i>                                     | Asparagus                                     | 6 547 137  | increase -<br>in seed<br>production | in Free 1993; in Delaplane & Mayer 2000  |
| <i>Vigna spp.</i> , <i>V.</i>                                    | Bean, green                                   | 6 383 990  | increase                            | Vaz <i>et al.</i> 1998   |

|   |   |           |                |   |
|---|---|-----------|----------------|---|
| <i>unguiculata</i> , <i>V. subterranean</i> (syn. <i>Voandzeia subterranea</i> ), <i>Phaseolus</i> spp. |   |           |                |   |
| *2  | Mixed Grain   | 5 407 982 | no increase    |   |
| <i>Abelmoschus esculentus</i>   | Okra, Gumbo   | 4 989 804 | increase       | in Crane 1991; Hamon 1991; in Free 1993   |
| <i>Vicia faba</i>   | Broad Bean, dry (Broad bean, Faba bean, Field bean, Horse bean) | 4 434 072 | increase       | in Free 1993; Le Guen <i>et al.</i> 1993; Suso <i>et al.</i> 1996; Bond & Kirby 1999; Pierre <i>et al.</i> 1999 |
|   | Pulses NES  | 4 173 895 | mixed response |   |

\*1 FAO lists for apples the following species: *Malus pumila*, *M. sylvestris*, *M. communis*, *Pyrus malus*. We changed this to *M. domestica* according to Routley *et al.* 2004

\*2 mixed response of cereal species that are sown and harvested together

## Main components (crop species) of the commodities:

### Fresh vegetables NES (comprises 21 crops; 12 increase, 7 no increase, 2 unknown)

Bamboo shoots, *Bambusa* spp. <sup>no increase - wind-pollination</sup> (Nadgauda *et al.* 1997)  
Beets, Chards, *Beta vulgaris* <sup>no increase - wind-pollination</sup> (Smith 1980)  
Capers, *Capparis spinosa* <sup>increase - seed production</sup> (Eisikowitch *et al.* 1986)  
Cardoons, *Cynara cardunculus* <sup>increase - seed production</sup> (Racua *et al.* 2004)  
Celery, *Apium graveolens* <sup>increase - seed production</sup> (Free 1993)  
Chervil, *Anthriscus cerefolium* <sup>increase - seed production</sup> (Spalik 1996)  
Cress, *Lepidium sativum* <sup>no increase - wind-pollination</sup> (Robertson 1923)  
Fennel, *Foeniculum vulgare* <sup>increase - seed production</sup> (in McGregor 1976; in Free 1993; Koul *et al.* 1993; Németh *et al.* 1999; Falzari *et al.* 2005)  
Horseradish, *Cochlearia armoracia* <sup>increase - seed production</sup> (in Free 1993)  
Sweet marjoram, *Majorana hortensis* <sup>unknown</sup>  
Oyster plant, *Tragopogon porrifolius* <sup>increase - seed production</sup> (Petanidou & Vokou 1990)  
Parsley, *Petroselinum crispum* <sup>increase - seed production</sup> (in Free 1993)  
Parsnips, *Pastinaca sativa* <sup>increase - seed production</sup> (in Free 1993)  
Radish, *Raphanus sativus* <sup>increase - seed production</sup> (in Free 1993)  
Rhubarb, *Rheum* spp. <sup>no increase - wind-pollination</sup> (Wodehouse 1931)  
Rutabagas, swedes, *Brassica napus napobrassica* <sup>increase - seed production</sup> (in Free 1993)  
Savory, *Satureja hortensis* <sup>unknown</sup>  
Scorzonera, *Scorzonera hispanica* <sup>increase - seed production</sup> (Banga 1961)  
Sorrel, *Rumex acetosa* <sup>no increase - wind-pollination</sup> (Wodehouse 1931; Cavers & Harper 1964)  
Tarragon, *Artemisia dracunculoides* <sup>no increase - wind-pollination</sup> (Watson 2002)  
Watercress, *Nasturtium officinale* <sup>no increase - passive self-pollination</sup> (Howard & Lyon 1952)

### Fresh fruits NES (comprises 15 crops; 12 increase, 1 no increase, 2 unknown)

Azarole, *Crataegus azarolus* (syn. *C. ruscionensis*) <sup>increase</sup> (Phipps 2003; Dönmez 2004)  
Babaco, *Carica pentagona* <sup>no increase - parthenocarp</sup> (Kempner & Kabaluk 1996)  
Elderberry, *Sambucus nigra* <sup>increase</sup> (Bolli 1994)  
Jujube, *Zizyphus jujuba* <sup>increase</sup> (in Free 1993; Sharma & Jindal 1997)  
Litchi, Lychee, *Litchi chinensis* <sup>increase</sup> (in Free 1993; Bhatia *et al.* 1995; Stern & Gazit 1996; Sharma & Jindal 1997)  
Loquat, *Eriobotrya japonica* <sup>increase</sup> (in Khan *et al.* 1986; Morton 1987; in Crane 1991; in Free 1993; Sharma & Jindal 1997)  
Medlar, *Mespilus germanica* <sup>unknown</sup> (Reiter 1947; Phipps 2003)  
Pawpaw, *Asimina triloba* <sup>increase</sup> (Willson & Schemske 1980; Gottsberger 1999; Pomper *et al.* 2003)  
Pomegranate, *Punica granatum* <sup>increase</sup> (in Free 1993; in Knuth 1908; Rana & Dwivedi 1997; Melgarejo *et al.* 2000; Derin & Eti 2001; Mars & Marrakchi 2004)  
Prickly pear, *Opuntia ficus-indica* <sup>increase</sup> (Grant & Hurt 1979; Weiss *et al.* 1993; in DeFelice 2004)  
Rose hips *Rosa* spp. (*Rosa* section *Caninae*) <sup>increase</sup> (Jicinska 1976; Stougaard 1983; Kevan *et al.* 1990; Ueda & Akimoto 2001; in Kevan 2003)  
Rowanberry, *Sorbus aucuparia* <sup>increase</sup> (Campbell *et al.* 1991; Bixby & Levin 1996; Sperens 1996; Raspé 1998; Pías & Guitián 2006)  
Service-apple, *Sorbus domestica* <sup>increase</sup> (Rohrer *et al.* 1994)  
Tamarind, *Tamarindus indica* <sup>increase</sup> (in Free 1993)  
Tree-strawberry, *Arbutus unedo* <sup>unknown</sup> (Sealy 1949; Hagerup 1957; Herrera *et al.* 1984; Rasmont *et al.* 2005)

### Fresh tropical fruits NES (comprises 17 crops; 13 increase, 1 no increase, 3 unknown)

Atemoya, Cherimoya, Custard apple, *Annona* spp., mainly *Annona squamosa* <sup>increase</sup> (Galon *et al.* 1982; Gazit *et al.* 1982; George *et al.* 1989; George *et al.* 1992; in Free 1993; Nadel & Pena 1994; Peña *et al.* 1999; Kill & da Costa 2003; Blanche & Cunningham 2005)

Breadfruit, *Artocarpus altalis* (syns. *A. incisus*, *A. incircus*, *A. incise*, *A. communis*)<sup>unknown</sup> (Morton 1987; Hasan & Razak 1992; in Free 1993; Ragone 1997; in Heard 1999)

Carambola, *Averrhoa carambola*<sup>increase</sup> (in Free 1993; in Heard 1999; Richards 2001)

Durian (*Durio zibethinus*)<sup>increase</sup> (Morton 1987; Salakpetch *et al.* 1992; George *et al.* 1994; Yaacob & Subhadrabandhu 1995; Husin & Abidin 1998; Lim & Luders 1998; in Westercamp & Gottsberger 2000)

Feijoa, *Feijoa sellowiana*<sup>increase</sup> (Schroeder 1953; Stewart 1984, 1989; Patterson 1990; in Free 1993; Ducroquet & Hickel 1997; Degenhard *et al.* 2001)

Guava, *Psidium guajava*<sup>increase</sup> (Hedström 1988; in Sharma & Jindal 1997; Lakshmi & Mohana Rao 1998; in Heard 1999)

Hog plum, Mombin, *Spondias* spp., mainly *S. mombin*, *S. tuberosa*<sup>increase</sup> (Dominguez Sanchez *et al.* 2002)

Jackfruit, *Artocarpus heterophyllus* (syns. *A. integrifolius*, *A. integrifolia*)<sup>unknown</sup> (Moncur 1985; Morton 1987; in Heard 1999; Sakai & Kato 2000; Devy & Davidar 2003)

Longan, *Dimocarpus longan* (syn. *Euphoria longan*, *E. longana*, *Nephelium longan*)<sup>increase</sup> (in Heard 1999; Blanche *et al.* in press)

Mammee, *Mammea americana* (syn. *Mamea americana*)<sup>increase</sup> (Morton 1987; Roubik 1995; Dunthorn 2004)

Mangosteen, *Garcinia mangostana*<sup>no increase - parthenocarpy</sup> (Morton 1987; Kanchanapoom & Kanchanapoom 1998; Richards 1990; Wieble *et al.* 1992)

Naranjillo, *Solanum quitoense*<sup>increase</sup> (Heiser *et al.* 1972; Roubik 1995; Almanza *et al.* 2006)

Passion fruit, Maracuja, *Passiflora edulis*<sup>increase</sup> (Corbert & Willmer 1980; in Free 1993; Brancher 1999; Da Silva 1999; in Delaplane & Mayer 2000; in Westerkamp & Gottsberger 2000; Almeida Lima 2002; Freitas & De Oliveira 2003)

Rambutan, *Nephelium lappaceum*<sup>increase</sup> (in Roubik 1995; in Heard 1999)

Sapote, Mamey colorado, *Pouteria sapota* (syns. *Calocarpum sapota*, *Calocarpum mammosum*, *Pouteria mammosa*)<sup>unknown</sup> (Morton 1987; Davenport & O'Neal 2000)

Sapodilla, *Manikara zapotilla* (syn. *Manikara zapota*, *Achras sapota*)<sup>increase</sup> (Piatos & Knight 1975; Reddi 1989; Mickelbart 1996)

Star apple, Cainito, *Chrysophyllum* spp., mainly *C. cainito* (syn. *Achras cainito*)<sup>increase</sup> (Morton 1987; Degen *et al.* 2001)

### **Roots and Tubers NES (comprises 8 crops; 6 increase, 1 no increase, 1 unknown)**

Arracacha (Peruvian parsnip), *Arracacia xanthorrhiza*<sup>increase - seed production</sup> (Hermann 1997)

Arrowroot, *Maranta arundinacea*<sup>increase - breeding</sup> (Ramirez 2004)

Chufa, *Cyperus esculentus*<sup>no increase - wind-pollination</sup> (Tayyar *et al.* 2003)

Sago palm, *Metroxylon* spp.<sup>increase - breeding</sup> (in Free 1993)

Oca and ullucu, *Oxalis tuberosa*, *Ullucus tuberosus*<sup>increase - breeding</sup> (Trognitz *et al.* 1998, 2000; Trognitz & Hermann 2001)

Yam bean, jicama, *Pachyrhizus erosus*, *P. angulatus*<sup>unknown</sup> (in Free 1993)

Mashua, *Tropaeolum tuberosum*<sup>increase - seed production</sup> (Grau *et al.* 2003)

Jerusalem artichoke, topinambur, *Helianthus tuberosus*<sup>increase - breeding</sup> (Westley 1993)

### **Pulses NES (comprises 6 crops; 3 increase, 3 unknown)**

Lablab or hyacinth bean, *Dolichos* spp.<sup>increase</sup> (Garcia Neto *et al.* 1988; in Free 1993)

Jack or sword bean, *Canavalia* spp.<sup>increase</sup> (in Free 1993; Gross 1993)

Winged bean, *Psophocarpus tetragonolobus*<sup>unknown</sup> (in Free 1993)

Guar bean, Goa bean, *Cyamopsis tetragonoloba*<sup>increase</sup> (in Free 1993)

Velvet bean, *Mucuna pruriens* (syn. *Stizolobium* spp.)<sup>unknown</sup> (in Free 1993; Hennessy 1991)

Yam bean, *Pachyrhizus erosus*<sup>unknown</sup> (in Free 1993)