Tree crops

Guidelines for estimating area data

1. DEFINITIONS

1.1 Temporary versus Permanent Crops:

Temporary crops are sown and harvested during the same agricultural year - Permanent crops are sown or planted once and then , they occupy the land for some years and need not to be replanted after each annual harvest. Permanent crops are mainly trees (e.g., apples) but also bushes and shrubs (e.g., berries), palms (e.g., dates), vines (e.g., grapes), herbaceous stems (e.g., bananas) and stemless plants (e.g., pineapples).

1.2 Area:

Crop area is a surface of land on which a crop is grown. In general, the area measured for cadastral purposes includes, in addition to the area cultivated, headlands, ditches, shelters, paths and other non-cultivated areas. Such an area can be called **gross** area as against the **net** area which includes only the portion of the gross area actually cultivated.

It happens, that for various reasons, e.g. natural calamities or economic considerations, certain areas planted or sown with a given crop are not harvested. Hence the need for the concept of area to be subdivided into **sown** or **planted** area and **harvested** area.

A peculiarity of permanent crops is that many countries report number of trees or plants in addition to, or instead of area planted. This is particularly so with regard to plants

growing outside compact or regular plantations, interplanted with other crops or scattered. Both area and number of trees are also divided into **productive** or **bearing** and **non-productive** or **non-bearing** areas or trees. In most cases, non-bearing means not yet bearing (young plants) but also not anymore bearing (old and damaged plants).

Compact plantations are those areas where plants or trees are planted in a regular or systematic manner or are dense enough to permit the collection of reliable area data.

Scattered trees can be found in many places, in and outside agricultural holdings, e.g.:
- in home and kitchen gardens;
- in arable land, grassland and fallow land;
- lining public roads and ways;
- in borders of agricultural holdings;
- in demarcation lines of plots.

1.3 Coverage of area:

In many countries, the unit of enumeration is the *holding*; in other countries, administrative units (commune, village, etc.). When the enumeration unit is the holding, a criterion of the minimum size is generally introduced for the inclusion in the enumeration, e.g., a minimum size of area, for example, 0.1, 0.2, 0.3 hectares, 50, 80, 100 plants, or economic criteria, for example, selling for a certain amount of money.

In such cases, the small holdings' area risks being completely disregarded. This is particularly so with regard to horticultural crops, which are cultivated outside agricultural holdings, i.e. in family gardens and other similar small plots. Also, production from scattered trees risks to be completely neglected.

1.4 Mixed cropping:

Mixed cropping, also called *associated and interplanted cropping*, refers to the situation when two or more different temporary or permanent crops are grown simultaneously on the same field or plot. This way of cultivation is widely used, particularly in developing countries, not only for temporary crops such as beans and maize but also for permanent crops, e.g., apples/pasture, grapes/beans, bananas/citrus, coconuts/pasture, bananas/cocoa/nutmeg.

2. FAO RECOMMENDATIONS

2.1 Concept of area.

Countries should primarily report the **area actually harvested** or, at least, the **number of bearing trees**; secondarily, they should report the total planted area or total number of trees. Countries reporting differently should indicate to which sort of concept the published figures refer.

Harvested area figures are necessary to provide reliable and accurate yield and production data; planted area, for land use statistics.

2.2 Coverage of area. Countries figures should cover the **entire area devoted to each crop** including, when necessary, estimates for small areas, family gardens and scattered trees not covered in the current annual surveys. This can be made by conducting special inquiries at appropriate intervals, for example, in the agricultural census years. Like vegetables, fruit trees are grown outside agricultural holdings and commercial orchards much more than other crops.

2.3 Mixed cropping. It is recommended that the area for each of the mixed crops be estimated in such a way that figures relate to that part of the area which a particular crop would have covered if it had been grown alone; in other words, to estimate the "pure stand" crop equivalent area for each constituent crop in the mixture, assuming generally that the sum of the pure crop equivalent areas is equal to the total area of the plot. The criteria for area allocation to specific crops in mixed cropping area are, inter alia, quantities of seed used (for temporary crop only), plant density, production obtained and, ultimately, eye estimates of the proportions of the field occupied by different crops. This is a highly subjective method but, in certain cases, it is the only practicable one.

When such allocation is not possible, it is suggested that countries report separately for crops grown alone in compact plantations, for crops grown mixed with others, and for scattered trees. All this, of course, when such particularities have a certain importance and the "game is worth the candle".

3. HOW COUNTRIES REPORT DATA ON FRUIT CROPS

Countries (when they do) report their annual crops in different ways, many of them being unable to conform with FAO. This can be seen in the sample of countries presented below. Information was gathered from annual country publications of recent years, available in the Statistics Division Library at FAO.

a) **United States**. Bearing area and production of fruit crops, by kinds. Commercial crops only.

b) **China**. All fruit crops area (presumably planted) and corresponding production in one single figure. Both area and production data also available for the most important individual crops.

c) **Russian Federation**. Planted and bearing area of fruit crops (all together) and grapes, and related production.

d) **Brazil**. Bearing area and production of fruit crops, by kind. Production reported in number of fruits rather than weight.

e) **Indonesia**. Bearing area and occasionally number of bearing trees for most individual fruit crops and related production.

f) **India**. Irregularly, production of main fruit crops and total fruit production. Occasionally, unspecified area figures for some of them.

g) **Morocco**. Unspecified area and production of fruit crops, by kind.

h) **Philippines**. Unspecified area and production of fruit crops. Separate figures for some kinds of fruits; all other together.

i) **Germany**. Commercial production of fruits, by kind, and related area (for apples and grapes only), or number of bearing trees (for all other crops). Estimates of non-commercial production (very important), are also shown, as well as related yields per tree for the former Federal Republic of Germany.

j) **Spain**. Planted and bearing area for fruit crops, by kind, grown in regular plantations. Number of scattered trees. Total production, including that from scattered trees.

k) **France**. Non-bearing and bearing area of fruit crops , by kind, including pure and interplanted stands in compact plantations. Total production, including production of scattered trees.

l) **Italy**. Planted and bearing area of fruit crops, by kind, and related production (both biological and harvested).

m) **Poland**. Number of bearing trees and corresponding production of fruit crops, by kind. For some berries, area and production.

n) **Greece**. Unspecified area and number of trees in compact plantations. Number of scattered trees. Production from both. All by kind of fruit.

o) **Turkey**. Number of non-bearing and bearing fruit trees and related production. By kind.

p) **Syria**. Planted area and production of fruit crops. Number of trees; bearing and total. All by kinds.

q) **Paraguay**. Planted area and total number of trees in compact plantations. Number of bearing trees including scattered trees and related production. All by kinds.

r) **Algeria**. Planted and bearing area of fruit crops, by kinds, and corresponding production. Mixed cropping included.

s) **Austria**. Intensive cultivation: Bearing area and production. Extensive cultivation: Number of bearing trees and production. Total production. All by kinds.

t) **Switzerland**. For important fruit crops, area and production in compact plantations and number of scattered trees and related production. For all other fruit crops, area and production by kinds. Family gardens production, excluded.

u) **Czech Republic**. Number of trees, presumably bearing, and production, by kinds.

v) **Romania**. Planted area and production of fruit crops in one figure. Only production available by kinds.

w) **Yugoslavia (Federal Republic)**. Planted area of fruit crops all together. By kinds: bearing and total trees and related production.

x) **Hungary**. Planted and productive area of fruit crops, all together. Production shown by kinds. Occasionally, yields per hectare shown.

y) **Norway**. Harvested area and production of various kinds of fruits in commercial orchards. Very low coverage.

z) **Non-reporting countries**. Quite a long list. Mainly developing countries.

4. HOW TO HANDLE THE FIGURES SHOWN BY COUNTRIES IN THEIR PUBLICATIONS

One should be carefully to avoid releasing area and production figures of fruit crops with different coverage for area and production, otherwise, we risk to show misleading yields per hectare (for example, 88 tons per hectare of apples and 270 tons per hectare of pears, in Germany. These figures appear in the 1995 Report of the agricultural situation in the European Union).

5. FAO'S IN-HOUSE GUIDELINES

A. For countries reporting commercial crops only
Production figures should be matched with those used by countries in their food balance sheets (FBS) or in other reliable sources. If these figures are higher, we can put the difference either distributed among various fruit crops, when possible, or the whole amount in ICS codes 619 "Fruit fresh nes" or 603 "Fruit tropical nes", as applicable. Corresponding area to be estimated.

If historically countries used to report total area and production , and now they report for commercial crops only, the estimates of total area and production can be made taking into account that, probably, the non-commercial production grows at a lower rate than the commercial one and, perhaps, it is even declining. And also, that yields per hectare (if not per tree) of non-commercial crops are generally lower than those of commercial crops.

B. For countries reporting planted area or, presumably planted area only
Countries should be contacted to ascertain whether the figures refer really to planted area, and if so, they could be asked to supply information on the portion of the planted area which is actually bearing; all this, in order to have reliable yield per hectare.

C. For countries reporting area and production figures for all fruit crops together or reporting for only a few kinds of fruit individually, and all others in "other"
Countries are generally in a position to provide the information required to distribute among individual crops a substantial portion of total production, say 70 percent.

D. For countries reporting area and production partly in hectares and partly in number of trees
The area covered by trees is to be estimated and then, both categories should to be added up. This implies assumptions of how many trees are in one hectare. This, of course, varies widely from country to country, and for various kinds, species and varieties of fruit trees, depending primarily on the size of the trees: tall standard, half

standard, short standard, etc. For example, the average number per hectare of apple trees, in compact plantations in European countries, varies between as low as 350 and as high as 2000. In the Europe -12 country group, 28 percent of the total area under apples contain more than 1600 trees per hectare, 22 percent, less than 400 trees. The average could be about 1100 trees per hectare. This, in commercial orchards. However, it should be remembered that the plant density is much higher in compact plantations than elsewhere.

E. For countries reporting only number of trees, no area
Number of trees are to be converted into hectares (see remarks in D above), but in this case as in other cases too, the task is not easy. The best alternative is to convince countries to do the conversion themselves. No doubt they are in a better position to do this.

F. For countries reporting lower coverage for area than for production
Estimates are to be made of the portion of the missing area, at least when production "without" area covers more than 2 or 3 percent of the total production.

G. For countries reporting planted area only and number of trees, both bearing and total
Estimates of harvested area can be established on the basis of the proportion of bearing trees on total number of trees.

H. For non-reporting countries
Use the production estimates already available, based on the information taken from a number of sources, (e.g. , food balance sheets - FBS), or on the assumptions of an apparent per caput consumption. Yields per hectare can be estimated on the basis of the yields observed in neighbouring countries with similar agro-climatic conditions.

Every effort should be made to get more reliable figures from the countries themselves as well as from FAO staff and other international officers residing in the countries or visiting those countries.

Census reports, if available, can be also usefully consulted. In various developing countries, census data on permanent crops are reported in "pure" and "interplanted" stands, separately for area and production, and for the number of scattered trees and related production. Sometimes, density of selected crops, used in the estimation of single crop equivalent, is also shown.