**DEVELOPING A FRAMEWORK FOR HORTICULTURE PRODUCTION STATISTICS IN COMESA MEMBER STATES**

# Scope and Methodology

**August 2024**

# 1. Introduction

This paper presents practical recommendations on the design and implementation of horticultural crop production surveys with an aim of understanding horticultural crop production contribution to national income and to the welfare of horticultural crop farmers in COMESA member states. The survey data will also enable additional room for research on the drivers of horticultural production and productivity thereby bringing policies that can guide improvements in horticultural production. The paper is outlined as follows. In Part one, introduces the paper. Part two outlines the motivation for collecting horticultural crop production data. Part three presents design features of the reference questionnaires. Part four presents mechanisms for land area and crop production measurement. Part five presents a sampling approach to the survey. Part six presents fieldwork organization including listing of households, selection of respondent, and unit of analysis. Part seven presents timing of data collection, data collection methods including measurements and recalls or estimates, and data management procedures in computer assisted personal interviewing (CAPI). Lastly, Part eight presents the reference household questionnaires, part nine presents the reference largescale questionnaire, and finally part ten presents the reference household listing form. A few concepts and definitions may help to guide users.

Box 1: Concepts and Definitions

*CAPI: an interviewing tool or technique in which the interviewer uses a computer—instead of paper and pen—to record responses during an interview.*

*Crop-cut: A method used to estimate crop yield by physically harvesting mature crop from a selected plot or Yield-Sub Plot.*

*Mixed cropping: Cultivation of crops that involves planting of two or more plants simultaneously on the same plot and under the same management.*

*Parcel: a piece of land cultivated by one or more persons as a single farming unit. It may be bounded by natural boundaries and may consist of one or more plots/gardens.*

> *Plot or a garden:* *continuous piece of land on which a unique crop or a mixture of crops is grown, under a uniform, consistent crop management system.*
> *Unit of analysis*: *The unit of analysis or unit of observation is defined as the item of interest of a study or survey, such as farms, individuals, households, or enterprises.*
>
> *Yield Sub-Plot:* *A small area of the plot selected for crop cutting and measuring.*
>
> *Area Harvested*: *refers to the area from which a crop is gathered. Area harvested, therefore, excludes the area from which, although sown or planted, there was no harvest due to damage, failure, etc. It is usually net for temporary crops and sometimes gross for permanent crops. Net area differs from gross area insofar as the latter includes uncultivated patches, footpaths, ditches, headlands, shoulders, shelterbelts, etc.*
>
> *Area sown /Area Planted:* *refers to the area on which sowing or planting has been carried out, for the crop under consideration, on the soil prepared for that purpose. The area is usually reported net of uncultivated patches, footpaths, ditches, headlands, shoulders, shelterbelts, etc. For tree crops, the gross concept may be applied. Data are recorded in hectares (ha).*

# 2. Motivation for collecting horticultural crop production.

## 2.1 Motivation

Agriculture is the mainstay of the economy of most COMESA Member States and serves as the main livelihood of most rural as well as those people practicing urban agriculture. However, while data on several agricultural products is relatively available, data on horticultural production remains scanty, and difficult to collect with no standardized data collection tools across member states thereby making it difficult to determine its contribution to the welfare of horticulture farmers, employment, raw material to the manufacturing sector, and to the Gross Domestic Product (GDP) more broadly.

A general definition of horticulture is the production of crops that are used as fruits, vegetables, aromatic/spices, medicinal or ornamental purpose. The fruit sources provide whole fruit e.g. tomatoes, nuts e.g. walnut or seeds e.g. green peas, snow peas. The vegetables are crops with edible leaves e.g. kale, lettuce; edible roots e.g. carrots, edible

stems e.g. asparagus, or edible flower buds e.g. cauliflower. The ornamental crops are used as flowers or plants grown for landscape decorations.

Horticultural crops are cultivated for home consumption, cash crops, feeding livestock or home decoration purposes. For small to medium farmers, horticultural crop cultivation is mainly done in gardens and/or greenhouses while large-scale farmers cultivate on plantations. The choices to cultivate such crops are made at individual or household level as such a household survey is the primary tool through which policy questions are informed. Developing methodological tools for collecting horticultural crop production opens a wide range of policy analysis. National statistical offices are better placed to conduct these surveys being custodians of population and housing census data which forms the basis for sampling households. Additionally, the national statistical offices are also custodians of statistical business registers which also provide the frame for sampling of large-scale horticultural plantations. The NSO should work closely with the Ministry of Agriculture since the statistic officials in the Ministry have the skills for data collection, such as area estimating; mixed cropping area estimation, crop production inputs data, yields estimation data, among others. In some member states,horticultural production is also collected by State Corporations,parastatals and other institutions that have a legal mandate to collect data from producers on production and trade. These agencies should also be included in data collection.

The motivation behind developing methodological tools for collecting horticultural crop production surveys emanates from several reasons. Firstly, either due to changes in eating habits or due to increasing prices of farm input for other crops, or due to erratic weather conditions, the cultivation of horticultural crops is rapidly growing

globally. Unfortunately, most nationally representative household surveys collect very limited information on horticultural crop production or no information at all. There is a strong assumption that accounting for the contribution of horticultural crop production matters for the farmers welfare as well as contributing positively to the national gross domestic product, foreign exchange earnings, employment, and food security. However, collection of data on horticultural crop production brings its own conceptual and practical challenges with very limited literature on best practices.

## 2.2 Accounting for horticultural crop production

To account for small, medium, and large-scale horticultural farmers, two surveys will be deployed. A household survey will capture information at a household level where decisions to cultivate horticultural crops and usage of the crops produced are made. This information is key to monitoring the welfare of horticultural farmers. In addition to household level data, a large-scale horticultural farmers survey will be conducted to provide information on horticulture's contribution to national income and employment. To facilitate the computation of the horticulture value added as part of the gross domestic product calculation, the survey will also collect data relating to horticultural crop production inputs.

# 3. Designing Features of a Reference Questionnaires

This section presents the structure of the reference questionnaires to be used to measure production using yields. It also presents some questionnaire content, their relevance and where need be, how they are defined and/or collected.

## 3.1 Household Questionnaire

The household questionnaire will firstly filter households cultivating horticultural crops from the non-horticultural producing households. For households producing horticultural crops, the questionnaire will

capture other details such as characteristics of the household including location identifiers in Module A, demographics in Module B, crop production in Module C, and finally Inputs in Module D. It is important to note that the questionnaire has been designed to focus on horticultural crop production and relating this information to the household. Plot-Crop level information rather than crop-plot level information is more relevant and more applicable in this study. To avoid missing any cultivated horticultural crop at household level, plot-crop level information will be obtained and listed for the current agricultural season. A question about crop production expectations at crop level shall be included as a check to the data collected through crop-cut. Additionally, the number of times a farmer has planted horticultural crop(s) will be collected to cater for those horticultural crops that are planted more than once during a growing season. Main use of the crop harvest will also be captured to determine whether the harvest is for sale or consumption or input into other productions or for reproduction.

To be able to determine value added, a module has been included to capture the inputs during various stages of cultivation including land preparation, planting, weeding, harvesting, shelling and/or storage. The input module will also gather information relating to the cost of hiring the cultivated gardens, if applicable.

Table 1: Issues that inform household questionnaire design for measuring crop production.

| Questionnaire section | Key design choice | Motivation/Consideration |
|---|---|---|
| Respondent selection | Crop manager | The Crop manager is the most knowledgeable person concerning the crop. In some instances, there may be a crop manager who could also be better placed to give crop area, yield, and report usage.<br>The same crop may have |
| | | different managers on different plots, and these will be recorded accordingly. It is also important that each crop-plot manager responds by him/herself than a proxy. |
| Plantation area | Land area measurement with GPS | Plantation records shall be used to record the crop area. Only when such records or information is not available, GPS shall be used instead. |
| | Use of non-standard units for measuring plot area | The use of GPS will eliminate challenges of farmers reporting in non-standard units. GPS measures will standardize units of measurement across member states. |

| Questionnaire section | Key design choice | Motivation/Consideration |
|---|---|---|
| Crop details | Recording of crop manager details | Respondent selection is key to collect credible data. Of more importance though is the identification of a crop-plot manager who should respond to questions relating to the horticultural crop he/she is incharge of. |
| Crop Roster | Crop-plot is the unit of observation | Allows for detailed accounting of each of the crops planted by the plantation and enables crop-level analysis of production. |
| | Mixed crops on the same plot. | Crops may be mixed on the same plot. Each crop must be measured separately using mechanisms that best suit its measurement. |
| | Reference period for crop harvest is | Agriculture season may vary from country to country. In this |
| | 'Current agriculture season' | survey, the reference period is the current or just ended agriculture season. |

| Questionnaire section | Key design choice | Motivation/Consideration |
|---|---|---|
| Crop harvest | Reporting of harvest quantity in non-standard units | For crop-cutting cases a weighing scale shall be used to have standard units of crop harvest. Where reporting in standard units (e.g., kilograms) poses difficulties for respondents. which can worsen reporting error, country specific nonstandard units should be used. However, this is only applicable to cases where self-reporting is used. |
| | Reporting of harvest quantity in different conditions. | The weight and value of harvest may vary depending on the condition in which it was harvested and/or weighed. |

### 3.2 Large-scale horticulture plantation questionnaire

Unlike the household questionnaire, the large-scale questionnaire shall greatly rely on self-reporting due to the assumption that plantations have well established structures which include a manager who has detailed information and other certified records of the plantation. Land and crop-cutting methods shall only be used if the manager does not have the required details.

Like the household questionnaire above, the large-scale horticulture questionnaire shall firstly capture information relating to the plantation such as location, horticultural crop cultivation filter, and crop production. The structure of the questionnaire shall therefore include identification particulars in module A, Module B will filter horticultural

crops cultivated, while Module C will capture crop yield, and expected use of the crop product. To have a good estimate of the crop production within a year, the number of times the horticultural crop will be planted in a year will be asked. Finally, Module D will capture the inputs during various stages of cultivation including land preparation, planting, weeding, harvesting, shelling and/or storage. The input module will also gather information relating to the cost of hiring the cultivated garden(s), if applicable.

Decisions to plant a specific type of horticultural crop are made annually for annual crops and vary with the type of crop being planted. This makes it difficult to adopt a panel approach to horticultural crop production surveys. As such, this component of the survey will involve a complete face-to-face (F2F) enumeration of large-scale horticultural plantations in the first year. This will be followed by phone interviews for three consecutive years before refreshing the list of plantations for another round of face-to-face interviews. Several sources of data for lists of plantations can be considered. Firstly, the national statistical offices manage the Statistical Business Register (SBR). From this, a list of all large-scale farms can be collected. Secondly, the Ministry of Agriculture maintains a list of large-scale farms from which this survey can benefit. Thirdly, at the lower level, the department of Land Registrar holds title deeds of all large-scale farms, and this shall also provide a list for complete enumeration of plantations.

The survey approach is detailed below: -

Table 1: Timeline for Face-to-Face and phone interviews for the large-scale horticultural plantations surveys

| Year1 | Year2 | Year3 | Year4 | Year5 |
|-------|-------|-------|-------|-------|
| F2F | Phone | Phone | Phone | F2F |

The growing number of new plantations is the main reason for reducing the time between face-to-face interviews. A question on what crops the plantation intends to plant in the following growing season shall also be asked to check those farms moving in and out of the interview list. It is also important that the interview should gather some information on crop production expectations for the current agriculture season in comparison to previous agricultural season as a check to the data collected. Main use of the crop harvest shall also be captured to determine whether the harvest is for local sale or export or feed for animals, or other uses.

Table 2: Issues that inform large-scale horticulture questionnaire design for measuring crop production.

| Questionnaire section | Key design choice | Motivation/Consideration |
|---|---|---|
| Respondent selection | Plantation manager | The plantation manager is the person in-charge of farm activities and custodian of farm records, therefore better placed to provide information relating to the farm such as ownership, land area, employment, usage of the crop harvest etc. The manager should also be able to provide crop harvest estimates based on experience. Efforts should be made that the respondent to this questionnaire is the manager and not a proxy respondent. |

| Plantation area | Reported from the records OR Land area measurement with GPS | The farm manager should be able to provide plantation area measurements. However, if such records are not available, GPS shall be used to measure plantation area. |
| --- | --- | --- |
| | Use of non-standard units for measuring plantation area | It is expected that plantations managers shall be able to report land area in standard units. Additionally, the use of |

| | | GPS will eliminate challenges of managers reporting in nonstandard units. GPS measures will standardize units of measurement across member states. |
|---|---|---|
| Crop details | Recording of crop manager details | Respondent selection is key to collect credible data. Of more importance though is the identification of a crop-plot manager who should respond to questions relating to the horticultural crop he/she is in-charge of within the plantation. |
| Crop Roster | Crop is the unit of observation | Allows for detailed accounting of each of the horticultural crops planted by the plantation and enables croplevel analysis of production. |
| | Mixed crops on the same plot. | Crops may be mixed on the same plot. Each crop must be reported or measured separately using mechanisms that best suit its measurement. |
| | Reference period for crop harvest is the 'Current agriculture season' | Agriculture season may vary from country to country. In this survey, the reference period is the current or just ended agriculture season. |

| Crop harvest | Reporting of harvest quantity in non-standard units | Again, the plantation manager should be able to provide horticulture crop harvest in standard units. However, if self-reporting is not used, weighing scale shall be used to determine crop |
| --- | --- | --- |
| | | harvest in standard units through crop-cutting measurements. |
| | Reporting of harvest quantity in different conditions. | The weight and value of harvest may vary depending on the condition in which it was harvested and/or weighed. |
| | Usage of crop harvest | For plantations, usage of crop harvest is likely to be commercial which may either be sold locally or be sold to external markets or may be used locally by the farm as input into the production of other products including feed to animals. This will better be reported by the plantation manager. |

# 4. Land area and crop production measurement

## 4.1 Plot area measurement

Generally, three methods have been used to measure agricultural land area particularly in this part of Africa, and these include farmers' estimation or self-reporting, use of GPS, and use of compass and rope. The use of remote sensing data has not yet been officially integrated into official data collection mechanisms as capacity is still being developed. Likewise, the use of drones to collect yield data still faces several challenges such as national security concerns, individual privacy, in addition to the fact that no approval has been given by the United Nations Statistics Commission to use this approach for official statistics.

Several research papers have analyzed the accuracy of each one of the above three methods in measuring land area. Carletto et al. (2016 and 2017) summarizes these findings and highlights that the compass and rope measurement is the most accurate land area measurement method. However, the method also brings its own challenges if it is to be implemented properly. Firstly, the method is time consuming and costly as it requires significant training, monitoring, transportation to the plots, and more importantly a lot of effort is needed in implementing the exercise. Carletto et al. (2016 and 2017) also reports that the compass and rope method poses some challenges in reading compasses due to the poor eyesight of many enumerators.

Although the use of GPS device requires the interviewer together with the crop-plot manager to go around the peripheral of the plot, research has found that the use of GPS only requires 28 percent of the time needed to take the same measurements if compass and rope method is used, (Keita and Carfagna, 2009; Schøning et al., 2005). For small plots, which is also of interest in these surveys, Keita and Carfagna (2009) find that on small plots, compass and rope method take up to 17 times longer than GPS. The use of self-reporting has also been associated with large estimation errors resulting from limited

knowledge of farmers, use of nonstandard units, and rounding up of figures. Finally, the use of satellite imagery may pose challenges in the surveys proposed here. Firstly, the plots for the household surveys are generally small to medium in size thereby making it difficult to have high resolution imagery that could facilitate respondent identification of their plots. The whole purpose of a household survey is to relate the plot area to the household being interviewed and the use of satellite imagery does not really respond to this need. Capacity on the use of satellite imagery remains limited in the region. In lie with the same challenge, the use of drones to capture crop yield estimates, while it sounds most modern, it also faces capacity hiccups. It is for these reasons that the survey recommends the use of GPS for taking crop area measurements and ensuring that the same interviewer interviewing a household collects data on farm measurements.

## 4.2 Crop production measurement

The main objective of this survey is to measure horticultural crop production for small, medium, and large-scale farmers. To date, there are three main methods that are used to measure crop production in general. The first method is to use self-reporting by the respondent to the household survey. The respondent may either recall or make an estimate of the harvest if harvest is not yet ready. This approach has several challenges. Firstly, the use of household respondent and not crop manager brings a lot of estimation errors. Secondly, the respondent may use non-standard measurement units that may require conversion into standard measurement units such as kilograms, liters etc. A more pragmatic approach is to use a crop manager who should also be allowed to use non-standard measurement units if conversion factors are available.

The second method of measuring crop production is the use of remotely sensed data. This method is still evolving particularly in this region. The method also faces the challenge of relating the crop production estimation data to the households from which other

sociodemographic characteristics are gathered. While there is a possibility of linking the remotely sensed data to the household when high resolution is used, the cost of such high-resolution data becomes exorbitant. Additionally, in the event of inter-cropping, this method does not perform any better. However, this method is less involving to both the interviewer and the crop manager.

The third method is the crop cutting method. Crop cutting can either be for the entire plot or garden from which the harvest is dried and weighed or a sub-plot is determined, and crop is cut and dried and weighed. The challenge with crop cutting for the entire plot is that it is mostly not practical if the purpose is only statistical. As such, for statistical purposes, a sub-crop, normally referred to as "Yield Sub-Plot" is determined. The size of the Yield-Sub-Plot is mainly determined based on available resources as this may determine the amount of time the interviewer is going to spend harvesting and measuring the yield. Practically, interviewers shall visit gardens and plots of all households reportedly cultivating or planning to cultivate horticultural crops in the current growing season as determined from the listing exercise. Some empirical investigations have found that self-reports over-estimate yield on small plots and underestimate yield on large plots relative to the crop cut measures which they use as their validation measure, Desiere and Joliffe (2018). This study therefore recommends the use of crop cutting as the main approach to crop production measurement.

Considering that most horticultural crops are planted on a relatively smaller area than plantations or food crops, a **Yield Sub-Plot of 2m by 2m** shall be used to measure the crop yield. The Yield Sub-Plot should be selected at the center-most part of the garden. Different mechanisms shall be used to measure the yield.

1. For crops that can be counted, the interviewer should count all the plants/crops in the Yield Sub-Plot and randomly select 3 plants, uproot, and weigh each one or the harvest from them. The weight should be added and then divided by 3 to get the

average yield per plant. The average yield per plant shall then be multiplied by the estimated total number of plants in the Yield Sub-Plot to determine the yield per 4 square meters. To have an estimate for the whole garden or plot, the estimate yield from the Yield Sub-Plot shall be divided by 4 to get yield estimate per square meter and then multiplied by total area in square meters of the garden or plot. This process shall be repeated for each crop type.

2. Example: for cabbages, count the number of heads in the Yield Sub-Plot. Randomly uproot 3 plants from the Yield Subplot and weigh each head. Add the weight from the three heads and divide by three to get the average weight per head. To determine the yield for the Yield Sub-Plot, you multiply the average weight by the number of plants in the Yield Sub-Plot. For the whole garden or plot, multiply the size of the garden by the weight from the Yield Sub-Plot. For data accuracy, the size of the garden should refer to the area planted. For crops that cannot easily be counted, the interviewer should harvest and weigh all the plants in the 2m by 2m Yield Sub-Plot. This weight shall be multiplied by the garden or plot area to determine the total yield.

   a. Example: for carrot, the interviewer should harvest all the plants in the 2m by 2m Yield Sub-Plot, weigh and multiply the weight by the total area of the garden or plot.

3. For crops that are dried before use such as paprika, procedure 1 above shall be followed. However, the farmer shall be responsible to make an estimate of how much cured fruit or leaf weight, or dried crop is expected out of the current fresh crop. That weight is then multiplied by the garden or plot area.

A digital platform electronic weighing scale should be used to measure the crops harvested crops from the Yield Sub-Plot.

To ensure the findings from data collection are in line with the subjective views of the selected households, the farmers will be asked

to ascertain their views of crop yield potential relative to the previous year including reasons for such.

### 4.2.1 Yield Estimates for the enumeration area and province/district

Yield Estimates for the EA and district or province will be calculated during analysis. Firstly, for each crop, a yield per square meter will be determined. The yield per square meter will then be multiplied by the estimated planted area for each horticultural crop for each household which will thebe aggregated at EA, district/province, and national level, as may be required.

### 4.3 Estimating crop production under mixed or intercropping plot

Intercropping is a very common farming practice in most COMESA member states. Horticultural crops are most likely to be intercropped for several reasons which include resource benefits for both plants such as minerals, sunshine, climbers relying on the other crops, etc. and this poses a challenge to gather data not only on crop production but also on land area covered by the plot. Using the crop cutting method above, a land area in an intercropped plot could be estimated by either (a) using the full plot area for each crop, or (b) using the share of plot area under a given crop, or (c) equally allocating crop area to each of the crops planted thereby making the total area cultivated equal to the plot area. Unfortunately, there is no best practice recommendation on which method to be adopted. However, to avoid over estimation on productivity, the use of full plot area for each crop shall be used in this study.

Note:

> To reduce the cost of the survey, a question on the level of education may be added to the household questionnaire. The level of education will be used as a proxy for knowledge of the farmer or their ability to self-report. With higher levels of education, the farmers' responses tend to be more accurate. In such cases, crop cutting will only be done on one-fifth of farmers

with an agreed minimum level of education. This will ensure that crop cutting is not applied to the entire sample, and hence help reduce the cost of data collection associated with crop cutting.

# 5. Sampling

## 5.1 Sampling methodology

The aim of this survey is to have a representative survey of horticultural farmers for the current agricultural season at national level. This sampling methodology allows Member States to have opts for representation at subnational levels e.g. regional, rural/urban, governorates, district, county etc. A stratified multistage random sample design (in short power allocation rule) will be used to draw the sample of households to ensure the selected sample is representative of the horticultural crop farming households. Two stage stratified sampling using the most recent population and housing census or population projections should be used. First, all major administrative strata should be drawn – these may be provinces or districts or governorates etc. Second, within each stratum, stratify into rural or urban strata. The following shall therefore be applied:

All the main selected strata will be selected i.e. provinces or districts or regions as may apply. The distribution of the sample of households will be proportionally distributed with respect to number of households in the stratum. This information shall be collected from the latest Population and Housing Census or Population Projections. Probability proportional to size (pps) will be used to determine sample size for each stratum and for rural and urban sample. To include the power of allocation rule, EAs shall be replaced if no horticultural activity or less than 3% of households are engaged in horticultural activities. This will be determined during listing.

The number of EAs to be picked in each stratum depends on the sample size of each stratum. A total of 14 households will be sampled

in each EA so the sample size of the stratum will be divided by 14 to get the total number of EAs to be sampled. EAs that fall in protected areas such as game parks, defence areas and industrial will be removed before randomly picking the EAs. This avoids picking EAs that the survey cannot be carried which may require replacing.

### 5.2 Size and Sample Allocation

For an optimal allocation of the sample size to the different strata, the population sizes (or number of households) within a stratum are important to consider.

Sample size calculation is done using the formular below:

$$n = \frac{z^2 r(1-r)[1 + \Box(m-1)]k}{e_2}$$

Where *n* is the sample size in terms of number of households to be selected,

z is standardized z-score (normal variate) corresponding to 95% confidence interval.

Estimate of the indicator of interest to be measured by the survey is denoted by *r* and is taken to be 0.5 suggested to achieve minimum margin of error.

the intra-cluster correlation coefficient $\rho$=0.45 selected using knowledge of the characteristics of farming characteristics.

The number of households to be selected per EA, *m*, and 14 households are proposed.

The factor accounting for non-response, $k$, is calculated to be 1.1 considering that in developing countries the non-response rate is typically 10% or less.

The margin error, $e$, is taken to be 0.020 (97% confidence).

Using these values, the recommended sample size is 8,041 which can be adjusted to 8,200.

Hence, with this technique, one can ensure, as far as the overall sample size allows you, that the sample sizes are large enough in each stratum to represent the different regions and geographical areas within the sampling frame.

### 5.3 Listing of households

Listing will only take place in the sampled EAs to determine whether to classify an EA into horticultural EA or non-horticultural EA. EAs with at least 3% of households engaged in horticultural production will be selected while those with less than 3% of horticultural farming households will not be selected.

### 5.4 Selection of Households & Respondent

The best method to draw the predetermined number of households per EA is to draw them systematically from a listing frame. The fieldworkers then visit the preselected households according to the GIS coordinates and/or addresses given to them. In this way, fieldworker bias can be limited, and the visiting points can be better controlled.

At the selected household, interviews should be held with the head of the household before moving to the manager of individual horticultural crops. Interviews will be conducted at both the dwelling unit and at the garden/farm. Interviewers shall be required to collect GPS coordinates for both locations.

### 5.5 Weight determination

The design weights for the realized sample will be calculated to compensate for the design which deviates from a simple random sample. Hereafter the design weights will be compensated for nonresponse, if present. In the final step, the design weights will be benchmarked to resemble the household level horticultural crop production farmers in the country. For countries that have recently conducted Agricultural Census these figures can be crossed checked.

### 5.6 Household Weight Calculation

Sample weights will be calculated based on domains (region, governates, place of residence) etc.

The probability of selecting an $i^{th}$ enumeration area (EA) in the domain is given as follows:

$$P_{iea} = \frac{M_i}{\sum_i^N M_i} * n$$

where
$M_i$ =Total number of households in $i^{th}$ EA
$n$= Total number of EAs selected in the domain
$\sum^{N_i} Mi$= Total number of households in a domain

The probability of selecting households in the $i^{th}$ enumeration area (EA) is given as follows:

where,
$m_i$= Total number of selected households in $i^{th}$ EA
$M_i$ =Total number of households in $i^{th}$ EA

The sampling weight for the households is derived from the two formulae above as the inverse of the probability of selecting an $ith$ enumeration in the domain and the probability of selecting households in the $ith$ enumeration area (EA).

This is given as follows:

$$hh\_wgt = \frac{1}{(P_{ihh} * P_{iea})}$$     Or     $$hh\_wgt = \frac{\sum_i^N M_i}{M_i * n}$$

**Example of Weighted Results**

| Domain | Households | | |
|---|---|---|---|
| | **A** | **B** | **C** |
| | n(Sample) | Weight | No. of Households (AxB) |
| Region A | 504 | 1,141.8970 | **575,516** |
| Region B | 1,232 | 1,574.2840 | **1,939,518** |

# 6.  Fieldwork Organization, Listing of Households, Selection of Respondent, and Unit of Analysis.

It is well known that some of the recommended best practices are not always implemented during surveys due to several factors such as budget constraints, limited capacity, logistical challenges, etc.
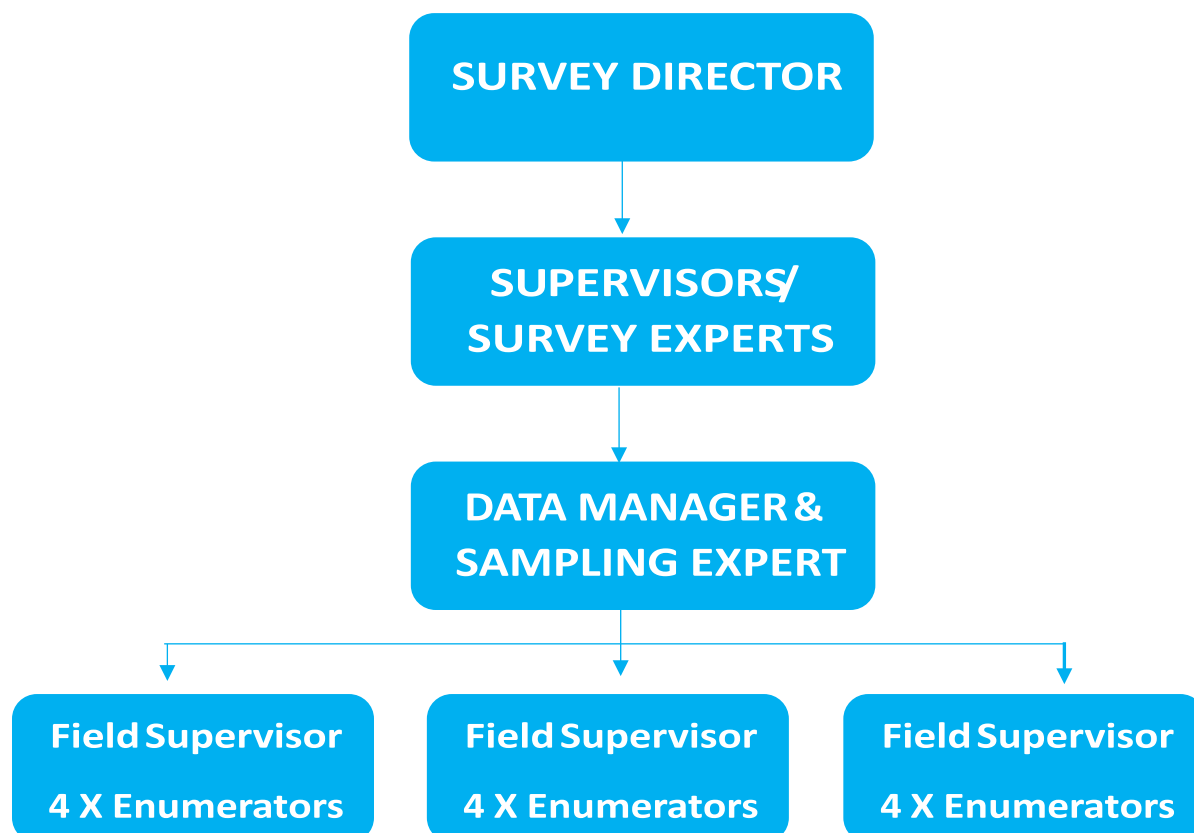
However, to the greatest possible extent, surveys need to follow the recommended best practices for quality data that informs policies.

This section presents practical aspects of implementing horticultural crop production survey from organizing the fieldwork, listing of households, selection of respondents, and data management.

### 6.1 Fieldwork Organization

Sound fieldwork organization has an impact on the quality of data. Some of the important features that will impact fieldwork include a survey organogram that allows good flow of data from the respondent to the database with verified quality while ensuring data confidentiality. The proposed structure includes management at the top level, supervisors, sampling expert, data manager, data quality supervisors, team leaders, and enumerators.

Below is the proposed organogram.

```
            ┌──────────────────────────┐
            │     SURVEY DIRECTOR      │
            └──────────────────────────┘
                         │
                         ▼
            ┌──────────────────────────┐
            │      SUPERVISORS/        │
            │     SURVEY EXPERTS       │
            └──────────────────────────┘
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                         ▼
            ┌──────────────────────────┐
            │    DATA MANAGER &        │
            │   SAMPLING EXPERT        │
            └──────────────────────────┘
          ┌──────────────┼──────────────┐
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│Field Supervisor│ │Field Supervisor│ │Field Supervisor│
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│4 X Enumerators│ │4 X Enumerators│ │4 X Enumerators│
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**Duties of Supervisors or Survey Expert:**

budgeting and resource mobilization

Design the questionnaire; coding, and testing the suitability of data collection tools;

Adapt the survey instruments to local context.

Develop training manuals.

Train field supervisors and enumerators

Manages the whole field staff.

Give daily updates to the survey director.

Review data quality

Clean, validate and analyze the data.

Write survey report.

Prepare data sharing protocols

**Duties of ICT Data Manager:**

Develop questionnaire in CAPI.

Identify a secure data server.

Develop CAPI training manual

Train Data Quality Supervisors on CAPI.

Train interviewers on CAPI.

Develop code for random selection of households from the listing exercise.

Assign work to field supervisors.

Receive and review data from field teams.

compiling datasets from field staff into a unified dataset, ensuring internet availability for data synchronization, and participating in pretesting for data validation

Update CAPI program if need arises.

Assigns selected households to field team members in CAPI.

**Duties of Sampling Expert:**

Developing a sampling strategy

Developing sample weights

Writing a sampling and weighting report

**Duties of Field Supervisors:**

Introduce the survey team to local authorities including police, traditional leaders, and agriculture office.

Provide overall logistical arrangements of the team.

Assign tasks to enumerators.

Supervise enumerators in their interviews.

Attend selected interviews together with the enumerator.

Certify replacements if a household is not available for interviews.

Undertake replacement of enumerator where required

spot checks to verify the accuracy of enumerators' work and monitoring the usage of field motor vehicles and fuel.

Report progress to Headquarter Supervisors daily.

**Duties of Enumerators:**

Introduce the survey to selected households.

Conduct face-to-face interviews with the household respondent(s).

Identify crop managers.

Undertake Yield-Sub-Plot measures together with the crop manager.

Undertake crop production measures.

Key-in data in CAPI.

Review CAPI data before transmitting to the Data server/data manager.

Maintain a presentable appearance during data collection

Seek respondents' consent before conducting interviews

Ensure confidentiality of the data, be responsible for the security of the tablets

Adhere to an appropriate dress code and follow a code of conduct provided during training.

## 6.2 Team mobility

The survey will adopt a semi-mobile approach where teams will spend 4-5 days in an enumeration area before moving on to another enumeration area. The period spent in an enumeration area will allow for interviews with the household, plot visitation, and crop measurements which require ample time.

## 6.3 Survey language

It is a fact that most countries have several local languages which may pose a challenge if only one language is used for the survey. Therefore, the survey questionnaire should be translated into several key local languages. As such, enumerators should be hired taking into consideration languages spoken in the country. This means that CAPI should allow changes to questionnaire language as may be preferred by the interviewer and the respondent.

## 6.4 Composition of interviewers

It has been noted that sex of the interviewer plays an important role in getting good rapport with the respondent, and increases the response rates, in addition to the fact that cultural practices more broadly encourage pairing of interviewer to a respondent of the same sex than of the opposite sex. It is therefore encouraged that sex composition of the enumerators should be balanced.

## 6.5 Listing of Households

A listing exercise shall be done for all the sampled enumeration areas by a separate team of listers. The listing shall include determining whether a household is farming any horticultural crop in the current

farming season. For the households cultivating horticultural crops, the listing will further collect data on the broader groups of the cultivated crops. This will determine the number of horticultural farming households. As indicated earlier, EAs with less than 3% of horticultural farming households will be replaced.

### 6.5.1 Number of households to be interviewed.

The size of enumeration areas in most member states range from 100 to about 300 households. It is in line with this that the number of households to be selected for interviews may range from 12 to 20 per enumeration area and this will vary from country to country depending on resources, EA sizes and other considerations that countries may have. Only horticultural farming households will be sampled in each EA. As such, the sample size of the district/province/County will be divided by the number of households to be selected per EA to get the total number of EAs to be sampled.

### 6.5.2 Selection of households

From the household list, a sample of 12 to 20 horticultural farming households will be randomly selected for interviews. As indicated above, the number of households to be selected for interviews will vary from country to country based on several attributes. Provisional horticultural farming households shall be made available for replacement in case the originally selected household is not available for interviews. The household interview shall firstly interview the household head or any respondent adequately knowledgeable of the household. Upon answering to demographic questions, the next to respond are the crop managers. The crop manager may or may not be the same respondent interviewed in the first part of the questionnaire. For this reason, the household questionnaire will make provision to indicate the crop manager for each crop to be picked from the household roster.

### 6.5.3 Unit of analysis

In this survey, the unit of analysis is the horticultural crops. The data will be collected at household level which will be the primary sampling unit.

# 7. Timing of data collection and data management

## 7.1 Timing of data collection.

There are several issues that make it difficult to determine the right timing to collect horticultural crop production. Firstly, horticultural crops have no specific growing and harvesting season varying from region to region and from crop to crop. Secondly, the same horticultural crop may be harvested at different times within the same locality depending on farming practice being used which can either be rain-fed, irrigation, or green houses.

In any case, aside from these variations, specific horticultural crops have specific seasons in which they flourish. At the same time, different crops flourish differently in different countries. It is against this reasoning that the decision as to when to field a horticultural crop production survey be country specific. Each country should consider fielding the horticultural crop production survey during a period when some crops believed to be of more importance to the country are generally ready for harvesting.

## 7.2 Data Management

To ease some of the challenges that are faced with crop estimation surveys such as conversion of units of measurements, area measurement, crop weight measurement, linking of household data to the plot data, this survey strongly recommends the use of CAPI for data collection and management. There are several CAPI software developed to conduct complex surveys with dynamic structures using tablet devices.

CAPI software are developed to greatly minimize non-sampling errors such as data coding errors, inconsistent responses etc. From a paper questionnaire, a CAPI incorporates skip rules, values ranges, logical checks, and records other features such as GPS coordinates, time stamps, and dates. These elements are critical in providing quality data. CAPI also supports data management as it incorporates data validation procedures which can be checked by a data manager before the questionnaire is accepted as completed.

The para data also provides other quality control checks such as time taken to complete a specific module and/or the entire questionnaire, location where the interview was conducted, and possibly random voice recording of the interview if need be. Other CAPI packages allow for multiple to-and-from exchanges of questionnaires between the interviewer and the supervisor as part of the quality control checks.

Log-in details are provided to specific individuals managing the data to ensure data security. The trails for each action taken is another tool to ensure that the data remains secure.

For data analysis, CAPI makes data available in several statistical packages such as SPSS, Stata, etc. to enable users choose the package they are most familiar with.

# 8 Reference Household Questionnaire

Questionnaire Number

Government of XXX

NAME OF THE STATISTICAL OFFICE

**HORTICULTURAL CROP PRODUCTION SURVEYS**

**HOUSEHOLD QUESTIONNAIRE**

## MODULE A-1: HOUSEHOLD IDENTIFICATION

WRITE CODES FOR REGION, PROVINCE, DISTRICT, COUNTY, AS APPLICABLE.

|  | CODE | NAME |
|---|---|---|
| A01. REGION/PROVINCE: | | ---------------------------------------------- |
| A02. DISTRICT/COUNTY: | | ---------------------------------------------- |
| A03. ENUMERATION AREA: | | |
| A04. PLACE / VILLAGE NAME: | | ---------------------------------------------- |
| A05. HOUSEHOLD ID (FROM LIST): | | |
| A06. NAME OF HOUSEHOLD HEAD: | | ---------------------------------------------- |
| A07. DWELLING STRUCTURE NO. (FROM LIST): | CODE | |

A08. WHAT ARE THE GPS COORDINATES OF THE DWELLING?

**LATITUDE (S)**

| | | | O | | | | . | | | |

**LONGITUDE (E)**

| | | | O | | | | . | | | |

A09. CONTACT PHONE NUMBER :

## MODULE A-2: SURVEY STAFF DETAILS

A10. ENUMERATOR NAME: _____

A11. ENUMERATOR CODE: [ ][ ][ ]

A12. SUPERVISOR NAME: _____

A13. SUPERVISOR CODE: [ ][ ][ ]

A14. DATE OF INSPECTION: [ ][ ][ ]
                                      DD    MM    YYYY

## INTRODUCTION TO THE HOUSEHOLD TO BE INTERVIEWED

**CONVEY THE FOLLOWING INFORMATION TO THE RESPONDENT:**

To help the Government better understand the contribution of horticular crops to households welfare and their contribution to the national income, the NATIONAL STATISTICAL OFFICE is conducting a horticultural crop production survey. Some households have randomly been selected in each district/county/province of the country to ask them questions about their family and crops they have cultivated in the current or just ended agricultural season. It is within the legal mandate of the NSO to collect this information and contribute to the Government's decision making process.

Your household has been selected as one of those to to be interviewed. You were not selected for any specific reason. Simply your name was on a list of all of the households in this area, and your name was chosen randomly.

I would like to ask you some questions as head of household or spouse of the head. Depending on some answers you will provide, I may also need to ask questions to other members of your household, as well as visit your gardens and weigh some of the crops. These questions will take about 30 minutes and a visit to the gardens may take an hour plus, depending on the number of crops and distances to the gardens. All of your answers are confidential and will be used for statistical purposes only.

Before I start, do you have any questions or is there anything which I have said on which you would like any further clarification? May I proceed with interviewing you and members of

## TABLE OF CONTENTS

**MODULE B: HOUSEHOLD ROSTER**

ENUMERATOR: RECORD START DATE & TIME FOR MODULE B:

| | | | |
|---|---|---|---|
| DAYS | MONTHS | HOURS | MINUTES |

IN ORDER TO MAKE A COMPREHENSIVE LIST OF INDIVIDUALS CONNECTED TO THE HOUSEHOLD, USE THE FOLLOWING PROBE QUESTIONS:

First, give me the names of all the members of your immediate family who normally live and eat their meals together here.

WRITE DOWN NAMES, SEX, AND RELATIONSHIP TO HH HEAD (B02 to B04). LIST HOUSEHOLD HEAD ON LINE 1.

Then, give me the names of any other persons related to you or other household members who normally live and eat their meals together here.
FILL IN B02 to B04.

Are there any other persons not here now who normally live and eat their meals here? For example, household members studying elsewhere or traveling.
FILL IN B02 to B04.

Then, give me the names of any other persons not related to you or other household members, but who normally live and eat their meals together here, such as servants, lodgers, or other who are not relatives.
FILL IN B02 to B04.

DO NOT LIST SERVANTS WHO HAVE A HOUSEHOLD ELSEWHERE, AND GUESTS WHO ARE VISITING TEMPORARILY AND HAVE A HOUSEHOLD ELSEWHERE.

| B01 ID CODE | B02 NAME — MAKE A COMPLETE LIST OF ALL INDIVIDUALS WHO NORMALLY LIVE AND EAT THEIR MEALS TOGETHER IN THIS HOUSEHOLD, STARTING WITH THE HEAD OF HOUSEHOLD. (CONFIRM THAT HOUSEHOLD HEAD HERE IS SAME AS HOUSEHOLD HEAD LISTED ON COVER.) FILL IN B02 TO B04 BEFORE COMPLETING QUESTIONS THE OTHER QUESTIONS | B03 SEX — MALE....1 FEMALE..2 | B04 RELATIONSHIP TO HEAD: HEAD. . . . . .1 WIFE/HUSBAND. . . .2 CHILD/ADOPTED CHILD . .3 GRANDCHILD. . . . .4 NIECE/NEPHEW. . . . .5 FATHER/MOTHER . . . .6 SISTER/BROTHER. . . .7 OTHER RELATIVE. . . .8 SERVANT OR SERVANT'S RELATIVE . . . .9 LODGER/LODGER'S RELATIVE . . 10 OTHER NON-RELATIVE. . 11 OTHER (SPECIFY) . . . 95 | B05 How old is [NAME]? IF 5 YEARS AND OVER, GIVE YEARS ONLY. IF LESS THAN 5 YEARS IN AGE, GIVE YEARS AND MONTHS. — YEARS | MONTHS | B06 What is [NAME]'s present marital status? MONOGAMOUS MARRIED..1 POLYGAMOUS MARRIED..2 SEPARATED...........3 DIVORCED............4 WIDOW OR WIDOWER....5 NEVER MARRIED.......6 |
|---|---|---|---|---|---|---|
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| 15 | | | | | | |

## MODULE X: FILTER QUESTIONS FOR HORTICULTURAL CROP FARMERS

ENUMERATOR: RECORD START DATE & TIME FOR MODULE X:

| | | | | |
|---|---|---|---|---|
| | | DAY | MONTH | |
| | | HOURS | MINUTES | |

### VEGETABLES

**X00**
Did you or anyone in your household curtivate [CROP] in the last agricultural season or are you or any member of your household currently cultivating [CROP]?

YES..1
NO...2 >>
NEXT CROP

| ITEM | VEGETABLES | |
|---|---|---|
| 601 | BEETROOT | |
| 602 | BRINJAL | |
| 603 | CABBAGE | |
| 604 | CARROT | |
| 605 | CAULIFLOWER | |
| 606 | GREEN BEANS | |
| 607 | GREEN PEPPER | |
| 608 | MUSHROOMS | |
| 609 | OKRA | |
| 610 | POTATO | |
| 611 | PUMPKINS | |
| 612 | RADISH | |
| 613 | SWEET POTATO | |
| 614 | TOMATO | |
| 615 | TURNIP | |
| 695 | OTHER VEGETABLES (SPECIFY) | |

### FRUITS

**X00**
Did you or anyone in your household curtivate [CROP] in the last agricultural season or are you or any member of your household currently cultivating [CROP]?

YES..1
NO...2 >>
NEXT CROP

| ITEM | FRUITS | |
|---|---|---|
| 701 | ALMOND | |
| 702 | APPLE | |
| 703 | ARECA/BETEL NUT | |
| 704 | BANANA | |
| 705 | CITRUS | |
| 706 | COCOA | |
| 707 | COFFEE | |
| 708 | FIG | |
| 709 | GRAPES | |
| 710 | GUAVA | |
| 711 | MANGO | |
| 712 | MELONS | |
| 713 | PASSION FRUIT | |
| 714 | PAPAYA | |
| 715 | PEAR | |
| 716 | PHALSA | |
| 717 | PINEAPPLE | |
| 718 | POMEGRANATE | |
| 719 | SAPOTA | |
| 720 | STRAWBERRY | |
| 721 | WALNUT | |
| 795 | OTHER FRUITS, SPECIFY | |

### SPICES

**X00**
Did you or anyone in your household curtivate [CROP] in the last agricultural season or are you or any member of your household currently cultivating [CROP]?

YES..1
NO...2 >>
NEXT CROP

| ITEM | SPICES | |
|---|---|---|
| 801 | ASAFOETIDA | |
| 802 | BELL PEPPER | |
| 803 | CHILLI | |
| 804 | CINNAMON | |
| 805 | CLOVES | |
| 806 | GARLIC | |
| 807 | GINGER | |
| 809 | KALAJIRA | |
| 810 | ONION | |
| 811 | SAFFRON | |
| 812 | TUMERIC | |
| 895 | HER SPICES SPECIFY | |

### ORNAMENTAL/ FLOWERS

**X00**
Did you or anyone in your household curtivate [CROP] in the last agricultural season or are you or any member of your household currently cultivating [CROP]?

YES..1
NO...2 >>
NEXT CROP

| ITEM | ORNAMENTAL/ FLOWERS | |
|---|---|---|
| 901 | ACALYPHA | |
| 902 | ALLAMANDA | |
| 903 | ANTIGNON | |
| 995 | OTHER ORNAMENTAL/FLOWERS. SPECIF | |

**MODULE C: CROP YIELD MEASURE**

ENUMERATOR: FOR EACH CROP, INTERVIEW THE CROP MANAGER. IF CROP MANAGER HAS SAME CROP IN DIFFERENT PLOTS, INTERVIEWS SHOULD BE HELD FOR EACH OF THE CROP AND AT THE CROP PLOT AND THIS IS TRUE IF CROP MANAGER HAS DIFFERENT CROPS.

NOTE: ONLY CULTIVATED CROPS REPORTED IN FILTER MODULE WILL APPEAR IN THIS MODULE

| ITEM | | C01 Which household member [MEMBER ID] is the manager for [CROP]? | C02 Is the manager for [CROP] available for interview? YES..1 >> C04 NO...2 | C03 Who is responding to the interview? [Member ID] | INTERVIEWER AND RESPONDENT SHOULD NOW VISIT THE FARM TO GET FARM MEASUREMENTS / RM TO | C03a INTERVIEWER: COLLECT GPS COORDINATES FOR THE CENTER OF THE PLOT | C04a What is the total area planted for [CROP]? CODES FOR UNIT: ACRE............1 HECTARE...........2 SQUARE METERS....3 OTHER (SPECIFY)..4 SCATTERED .....999 >>C06 NUMBER | C04b UNIT | C05 How has the [C04] area measurement been provided? FROM LISTING GPS MEASUREMENT..1 CROP MANAGER WITH PLOT RECORDS ....2 CROP MANAGER ESTIMATION ......3 | C06 How has the [CROP] been cultivated? PURE STAND..1 MIXED/INTERCROPPING ....2 | C07 Under what system was the [CROP] cultivated? RAINFED..1 IRRIGATION SYSTEM (OPEN) ....2 IRRIGATION SYSTEM (GREEN HOUSE) ..3 | C08 Is the crop manager able to provide total [CROP] production figures? YES.....1 >>C12 NO.....2 >> C09 IF C04 == 999 & C08 == 2 >>C09A | C09A What is the estimated yield per plant of [CROP]? >>C11 REPORT IN KGS IF C04 == 999 & C08 == 2 NUMBER | C09 What are the measurements of Yield Sub-Plot? 1m X 1m.....1 2m X 2m.....2 5m X 5m...3 | C10 What is the weight of the [CROP] yield from Yield-Sub-Plot? REPORT IN KGS NUMBER | C11 What is the method used for crop production measurement? CROP CUT.....1 CROP COUNTING.....2 CROP ESTIMATION .3 | C12 What is the total weight of [CROP] production from the Plot? REPORT IN KGS NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **VEGETABLES** | | | | | | | | | | | | | | | | | |
| 601 | BEETROOT | | | | | | | | | | | | | | | | |
| 602 | BRINJAL | | | | | | | | | | | | | | | | |
| 603 | CABBAGE | | | | | | | | | | | | | | | | |
| 604 | CARROT | | | | | | | | | | | | | | | | |
| 605 | CAULIFLOWER | | | | | | | | | | | | | | | | |
| 606 | GREEN BEANS | | | | | | | | | | | | | | | | |
| 607 | GREEN PEPPER | | | | | | | | | | | | | | | | |
| 608 | MUSHROOMS | | | | | | | | | | | | | | | | |
| 609 | OKRA | | | | | | | | | | | | | | | | |
| 610 | POTATO | | | | | | | | | | | | | | | | |
| 611 | PUMPKINS | | | | | | | | | | | | | | | | |
| 612 | RADISH | | | | | | | | | | | | | | | | |
| 613 | SWEET POTATO | | | | | | | | | | | | | | | | |
| 614 | TOMATO | | | | | | | | | | | | | | | | |
| 615 | TURNIP | | | | | | | | | | | | | | | | |
| 695 | OTHER VEGETABLES (SPECIFY) | | | | | | | | | | | | | | | | |
| **FRUITS** | | | | | | | | | | | | | | | | | |
| 701 | ALMOND | | | | | | | | | | | | | | | | |
| 702 | APPLE | | | | | | | | | | | | | | | | |
| 703 | ARECA/BETEL NUT | | | | | | | | | | | | | | | | |
| 704 | BANANA | | | | | | | | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| DAY | MONTH | HOURS | MINUTES | |

| C13 | C14 | C15a | C15b | C16a | C16b | C17 | C18 |
|---|---|---|---|---|---|---|---|
| In what state is the [CROP] being weighed?<br><br><br><br><br>FRESH.....1<br>DRIED.....2 | What is the use of the [CROP] yield? Multi-select<br><br>OWN CONSUMPTION.....1<br>OWN CONSUMPTION AND SALE.....2<br>SALE LOCALLY..3<br>SALE INTERNATIONAL MARKETS.....4<br>FEED FOR ANIMALS .......5<br>OTHER...999 | How many household members were involved in crop production activities from land preparation to harvesting or to the current status of this [CROP]? | | How many non-household members were involved in crop production activities from land preparation to harvesting or to the current status of this [CROP]? | | From your own assessment, how do you rate this year's [CROP] yield compared to last year?<br><br>AN INCREASE...1<br>SAME ........2<br>DECREASE.....3<br>DON'T KNOW..99 | How many times did you grow [CROP] in a the current growing season?<br><br><br>NUMBER |
| | | No. MALE | No. FEMALE | No. MALE | No. FEMALE | | |
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ENUMERATOR: FOR EACH CROP, INTERVIEW THE CROP MANAGER. IF CROP MANAGER HAS SAME CROP IN DIFFERENT PLOTS, INTERVIEWS SHOULD BE HELD FOR EACH OF THE CROP AND AT THE CROP PLOT AND THIS IS TRUE IF CROP MANAGER HAS DIFFERENT CROPS.

NOTE: ONLY CULTIVATED CROPS REPORTED IN FILTER MODULE WILL APPEAR IN THIS MODULE

ENUMERATOR: RECORD START DATE & TIME FOR MODULE D:

| | DAY | MONTH |
|---|---|---|
| | | |

| ITEM | 1. HIRED LAND | 2. LAND PREPARATION | | | 3. PLANTING | | | 4. FERTILIZERS & MANURE | | 5. WEEDING | | | 6. HARVESTING | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D01 | D02A | D02B | D02C | D03A | D03B | D03C | D04A | D04B | D05A | D05B | D05C | D06A | D06B |
| | During the last growing season, how much did you pay for **hire of the land** you planted [CROP]?  AMOUNT IN LOCAL CURRENCY  ENTER 0 IF NOT | Durig land prepration, how much did you spend on **hired labour** for [CROP]? | During lad preparation, how much did you spend on **hired machinery** for [CROP]? | During land preparation, how much did you spend on **herbicide or pestcide** for [CROP]? | During planting, how much did you spend on **seeds and/or seedlings** for [CROP]?  AMOUNT IN LOCAL CURRENCY  ENTER 0 IF NOT APPLICABLE | During planting, how much did you spend on **hired labour** for [CROP]? | During planting, how much did you spend on **hired machinery** for [CROP]? | During the entire growing season, how much did you spend on **fertilizers** for [CROP]? | During the entire growing season, how much did you spend on **manure** for [CROP]? | During weeding, how much did you spend on **hired labour** for [CROP]?  AMOUNT IN LOCAL CURRENCY  ENTER 0 IF NOT APPLICABLE | During weeding, how much did you spend on **hired machinery** for [CROP]? | During weeding, how much did you spend on **herbicides or pesrcides** for [CROP]? | During harvesting, how much did you spend on **hired labour** for [CROP]?  AMOUNT IN LOCAL CURRENCY  ENTER 0 IF NOT APPLICABLE | During weeding how much did you spend on **hired machier** for [CROP]? |

**VEGETABLES**

| | ITEM | D01 | D02A | D02B | D02C | D03A | D03B | D03C | D04A | D04B | D05A | D05B | D05C | D06A | D06B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 601 | BEETROOT | | | | | | | | | | | | | | |
| 602 | BRINJAL | | | | | | | | | | | | | | |
| 603 | CABBAGE | | | | | | | | | | | | | | |
| 604 | CARROT | | | | | | | | | | | | | | |
| 605 | CAULIFLOWER | | | | | | | | | | | | | | |
| 606 | GREEN BEANS | | | | | | | | | | | | | | |
| 607 | GREEN PEPPER | | | | | | | | | | | | | | |
| 608 | MUSHROOMS | | | | | | | | | | | | | | |
| 609 | OKRA | | | | | | | | | | | | | | |
| 610 | POTATO | | | | | | | | | | | | | | |
| 611 | PUMPKINS | | | | | | | | | | | | | | |
| 612 | RADISH | | | | | | | | | | | | | | |
| 613 | SWEET POTATO | | | | | | | | | | | | | | |
| 614 | TOMATO | | | | | | | | | | | | | | |
| 615 | TURNIP | | | | | | | | | | | | | | |
| 695 | OTHER VEGETABLES (SPECIFY) | | | | | | | | | | | | | | |

**FRUITS**

| | ITEM | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 701 | ALMOND | | | | | | | | | | | | | | |
| 702 | APPLE | | | | | | | | | | | | | | |

|  HOURS | MINUTES |
|---|---|
|  |  |

| 7. SHELLING AND STORAGE | | |
|---|---|---|
| D07A | D07B | D07C |
| During shelling and storage, how much did you spend on **hired labour** for [CROP]? | During shelling and storage, how much did you spend on **hired machinery** for [CROP]? | During shelling and storage, how much did you spend on **storage space or items** for |
| AMOUNT IN LOCAL CURRENCY<br><br>**ENTER 0 IF NOT APPLICABLE** | | |
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# 9 Reference Large-Scale Farm Questionnaire

<u>**STRICTLY CONFIDENTIAL**</u>

Questionnaire Number

Government of XXX

NAME OF THE STATISTICAL OFFICE

**HORTICULTURAL CROP PRODUCTION SURVEYS**

<u>**PLANTATION QUESTIONNAIRE**</u>

## MODULE A-1: PLANTATION IDENTIFICATION

WRITE CODES FOR REGION, PROVINCE, DISTRICT, COUNTY, AS APPLICABLE.

CODE                                             NAME

A01. REGION/PROVINCE: .................................................................

A02. DISTRICT/COUNTY: .................................................................

A03. TOWN/VILLAGE/PLACE NAME: .................................................................

A04. NAME OF FARM/ PLANTATION: .................................................................

A05. NAME OF RESPONDENT: .................................................................

A05. ADDRESS:

A06. TELEPHONE: .................................................................

A07. EMAIL ADDRESS: .................................................................

A08. CONTACT PHONE NUMBER :

## MODULE A-2: SURVEY STAFF DETAILS

A09. ENUMERATOR NAME: _____

A10. ENUMERATOR CODE: ☐ ☐ ☐

A11. SUPERVISOR NAME: _____

A12. SUPERVISOR CODE: ☐ ☐ ☐

A13. DATE OF INSPECTION: ☐ ☐ ☐
                        DD  MM  YYYY

## INTRODUCTION TO THE HOUSEHOLD TO BE INTERVIEWED

**CONVEY THE FOLLOWING INFORMATION TO THE RESPONDENT:**

To help the Government better understand the contribution of horticular crops to the national income, the NATIONAL STATISTICAL OFFICE is conducting a horticultural crop production survey. Horticultural crop farms have randomly been selected in the country to ask them questions about crop production in the current or just ended agricultural season. It is within the legal mandate of the NSO to collect this information and contribute to the Government's decision making process.

Your farm /plantation has been selected as one of those to to be interviewed. You were not selected for any specific reason. Simply the name was on a list of all of the horticultural farms /plantations in country, and your name was chosen randomly.

I would like to ask you some questions as the manager of the plantation. Depending on some answers you will provide, I may also need to ask questions to other members of staff of your plantation, as well as visit your plantation and weigh some of the crops. These questions will take about 30 minutes and a visit to the gardens may take an hour plus, depending on the number of crops and distances to the gardens. All of your answers are confidential and will be used for statistical purposes only.

Before I start, do you have any questions or is there anything which I have said on which you would like any further clarification? May I proceed with the interview?

## TABLE OF CONTENTS

## MODULE B: FILTER QUESTIONS FOR HORTICULTURAL CROP PLANTATIONS

**ENUMERATOR:** RECORD START DATE & TIME FOR <u>MODULE X</u>:

| | | |
|---|---|---|
| DAY | MONTH | |

| | |
|---|---|
| HOURS | MINUTES |

| | ITEM | | B00 Did you curtivate any [CROP] in the last agricultural season or are you currently cultivating any [CROP]? YES..1 NO...2 >> NEXT CROP |
|---|---|---|---|
| | **VEGETABLES** | | |
| | 601 | BEETROOT | |
| | 602 | BRINJAL | |
| | 603 | CABBAGE | |
| | 604 | CARROT | |
| | 605 | CAULIFLOWER | |
| | 606 | GREEN BEANS | |
| | 607 | GREEN PEPPER | |
| | 608 | MUSHROOMS | |
| | 609 | OKRA | |
| | 610 | POTATO | |
| | 611 | PUMPKINS | |
| | 612 | RADISH | |
| | 613 | SWEET POTATO | |
| | 614 | TOMATO | |
| | 615 | TURNIP | |
| | 695 | OTHER VEGETABLES (SPECIFY) | |

| | ITEM | | B00 Did you curtivate any [CROP] in the last agricultural season or are you currently cultivating any [CROP]? YES..1 NO...2 >> NEXT CROP |
|---|---|---|---|
| | **FRUITS** | | |
| | 701 | ALMOND | |
| | 702 | APPLE | |
| | 703 | ARECA/BETEL NUT | |
| | 704 | BANANA | |
| | 705 | CITRUS | |
| | 706 | COCOA | |
| | 707 | COFFEE | |
| | 708 | FIG | |
| | 709 | GRAPES | |
| | 710 | GUAVA | |
| | 711 | MANGO | |
| | 712 | MELONS | |
| | 713 | PASSION FRUIT | |
| | 714 | PAPAYA | |
| | 715 | PEAR | |
| | 716 | PHALSA | |
| | 717 | PINEAPPLE | |
| | 718 | POMEGRANATE | |
| | 719 | SAPOTA | |
| | 720 | STRAWBERRY | |
| | 721 | WALNUT | |
| | 795 | OTHER FRUITS, SPECIFY .. | |

| | ITEM | | B00 Did you curtivate any [CROP] in the last agricultural season or are you currently cultivating any [CROP]? YES..1 NO...2 >> NEXT CROP |
|---|---|---|---|
| | **SPICES** | | |
| | 801 | ASAFOETIDA | |
| | 802 | BELL PEPPER | |
| | 803 | CHILLI | |
| | 804 | CINNAMON | |
| | 805 | CLOVES | |
| | 806 | GARLIC | |
| | 807 | GINGER | |
| | 809 | KALAJIRA | |
| | 810 | ONION | |
| | 811 | SAFFRON | |
| | 812 | TUMERIC | |
| | 895 | OTHER SPICES SPECIFY | |

| | ITEM | | B00 Did you curtivate any [CROP] in the last agricultural season or are you currently cultivating any [CROP]? YES..1 NO...2 >> NEXT CROP |
|---|---|---|---|
| | **ORNAMENTAL/ FLOWERS** | | |
| | 901 | ACALYPHA | |
| | 902 | ALLAMANDA | |
| | 903 | ANTIGNON | |
| | 995 | OTHER ORNAMENTAL/FLOWERS, SPECIFY | |

## MODULE C: CROP YIELD MEASURE

ENUMERATOR: FOR EACH CROP, INTERVIEW THE CROP MANAGER. IF CROP MANAGER HAS SAME CROP IN DIFFERENT PLOTS, INTERVIEWS SHOULD BE HELD FOR EACH OF THE CROP AND AT THE CROP PLOT AND THIS IS TRUE IF CROP MANAGER HAS DIFFERENT CROPS.

DAY

| ITEM | | C01a What is the total area planted for [CROP] in the current growing season? CODES FOR UNIT: ACRE............1 HECTARE.........2 SQUARE METERS....3 SCATTERED......999 >>C03 OTHER (SPECIFY)..4 | C01b | C02 How has the [C01a] area measurement been provided? GPS MEASUREMENT..1 CROP MANAGER WITH PLOT RECORDS ....2 CROP MANAGER ESTIMATION ......3 | C03 How is the [CROP] cultivated? PURE STAND..1 MIXED/INTERCROPPING ....2 | C04 Is the plantation manager able to provide total production figures [CROP] for this agricultural season? YES.....1 >> C08 NO.....2 >>C05 IF C01==999 & C04 == 2 >> C05A | INTERVIEWER AND RESPONDENT SHOULD NOW VISIT THE FARM TO GET FARM MEASUREMENTS | C05A What is the estimated yield per plant of [CROP]? >>C08 REPORT IN KGS | C05 What are the measurements of Yield Sub-Plot? 1m X 1m.....1 2m X 2m.....2 5m X 5m.. ..3 | C06 What is the weight of the [CROP] yield from Yield-Sub-Plot? REPORT IN KGS | C07 What is the method used for crop production measurement? CROP CUT.....1 CROP COUNTING.....2 CROP ESTIMATION .3 | C08 What is the total weight of [CROP] production from the Plot/ Plantation? REPORT IN KGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NUMBER | UNIT | | | | | NUMBER | | NUMBER | | NUMBER |
| **VEGETABLES** | | | | | | | | | | | | |
| 601 | BEETROOT | | | | | | | | | | | |
| 602 | BRINJAL | | | | | | | | | | | |
| 603 | CABBAGE | | | | | | | | | | | |
| 604 | CARROT | | | | | | | | | | | |
| 605 | CAULIFLOWER | | | | | | | | | | | |
| 606 | GREEN BEANS | | | | | | | | | | | |
| 607 | GREEN PEPPER | | | | | | | | | | | |
| 608 | MUSHROOMS | | | | | | | | | | | |
| 609 | OKRA | | | | | | | | | | | |
| 610 | POTATO | | | | | | | | | | | |
| 611 | PUMPKINS | | | | | | | | | | | |
| 612 | RADISH | | | | | | | | | | | |
| 613 | SWEET POTATO | | | | | | | | | | | |
| 614 | TOMATO | | | | | | | | | | | |
| 615 | TURNIP | | | | | | | | | | | |
| 616 | LUTTECE | | | | | | | | | | | |
| 695 | OTHER VEGETABLES (SPECIFY) | | | | | | | | | | | |
| **FRUITS** | | | | | | | | | | | | |
| 701 | ALMOND | | | | | | O | | | | | |

| | | |
|---|---|---|
| MONTH | HOURS | MINUTES |

| C09 In what state is the [CROP] being weighed? | C10 What is the main use of the [CROP] yield? | C11a          C11b How many employees are working on this crop on this plantation this farming season? | | C12 From your own assessment, how do you rate this year's [CROP] yield compared to last year? | C13 Do you expect to cultivate [CROP] again in the coming agricultural growing season? | C14 How many times did you grow [CROP] in a the current growing season? |
|---|---|---|---|---|---|---|
| FRESH.....1 DRIED.....2 FRESH.....1 DRIED.....2 | OWN CONSUMPTION.....1 OWN CONSUMPTION AND SALE.....2 SALE LOCALLY..3 SALE INTERNATIONAL MARKETS.....4 FEED FOR ANIMALS .......5 OTHER...999 | No. MALE | No. FEMALE | AN INCREASE..1 SAME ........2 DECREASE.....3 DON'T KNOW..99 | YES........1 NO ........2 DON'T KNOW..99 | NUMBER |
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## MODULE D: INPUTS

**ENUMERATOR:** FOR EACH CROP, INTERVIEW THE CROP MANAGER. IF CROP MANAGER HAS SAME CROP IN DIFFERENT PLOTS, INTERVIEWS SHOULD BE HELD FOR EACH OF THE CROP AND AT THE CROP PLOT AND THIS IS TRUE IF CROP MANAGER HAS DIFFERENT CROPS.

**NOTE:** ONLY CULTIVATED CROPS REPORTED IN FILTER MODULE WILL APPEAR IN THIS MODULE

| ITEM | | 1. HIRED LAND | 2. LAND PREPARATION | | | 3. PLANTING | | | 4. FERTILIZERS & MANURE | | 5. WEEDING | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | D01 | D02A | D02B | D02C | D03A | D03B | D03C | D04A | D04B | D05A | D05B | D05C |
| | | During the last growing season, how much did you spend on **hire of the land** you planted [CROP]? AMOUNT IN LOCAL CURRENCY ENTER 0 IF NOT APPLICABLE | Durig land prepration, how much did you spend on **hired labour** for [CROP]? | During lad preparation, how much did you spend on **hired machinery** for [CROP]? | During lad preparation, how much did you spend on **herbicide or pestcide** for [CROP]? | During planting, how much did you spend on **seeds and/or seedlings** for [CROP]? AMOUNT IN LOCAL CURRENCY ENTER 0 IF NOT APPLICABLE | During planting, how much did you spend on **hired labour** for [CROP]? | During planting, how much did you spend on **hired machinery** for [CROP]? | During the entire growing season, how much did you spend on **fertilizers** for [CROP]? AMOUNT IN LOCAL CURRENCY | During the entire growing season, how much did you spend on **manure** for [CROP]? | During weeding, how much did you spend on **hired labour** for [CROP]? AMOUNT IN LOCAL CURRENCY ENTER 0 IF NOT APPLICABLE | During weeding, how much did you spend on **hired machinery** for [CROP]? | During weeding, how much did you spend on **herbicides or pesrcides** for [CROP]? |
| **VEGETABLES** | | | | | | | | | | | | | |
| 601 | BEETROOT | | | | | | | | | | | | |
| 602 | BRINJAL | | | | | | | | | | | | |
| 603 | CABBAGE | | | | | | | | | | | | |
| 604 | CARROT | | | | | | | | | | | | |
| 605 | CAULIFLOWER | | | | | | | | | | | | |
| 606 | GREEN BEANS | | | | | | | | | | | | |
| 607 | GREEN PEPPER | | | | | | | | | | | | |
| 608 | MUSHROOMS | | | | | | | | | | | | |
| 609 | OKRA | | | | | | | | | | | | |
| 610 | POTATO | | | | | | | | | | | | |
| 611 | PUMPKINS | | | | | | | | | | | | |
| 612 | RADISH | | | | | | | | | | | | |
| 613 | SWEET POTATO | | | | | | | | | | | | |
| 614 | TOMATO | | | | | | | | | | | | |
| 616 | LUTTECE | | | | | | | | | | | | |
| 615 | TURNIP | | | | | | | | | | | | |
| 695 | OTHER VEGETABLES (SPECIFY) | | | | | | | | | | | | |
| **FRUITS** | | | | | | | | | | | | | |
| 701 | ALMOND | | | | | | | | | | | | |
| 702 | APPLE | | | | | | | | | | | | |

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┌──┬──┐ ┌──┬──┐    ┌──┬──┐ ┌──┬──┐
│  │  │ │  │  │    │  │  │ │  │  │
DAY      MONTH        HOURS     MINUTES
```

| 6. HARVESTING | | 7. SHELLING AND STORAGE | | |
|---|---|---|---|---|
| D06A | D06B | D07A | D07B | D07C |
| During harvesting, how much did you spend on **hired labour** for [CROP]? | During weeding, how much did you spend on **hired machiery** for [CROP]? | During shelling and storage, how much did you spend on **hired labour** for [CROP]? | During shelling and storage, how much did you spend on **hired machinery** for [CROP]? | During shelling and storage, how much did you spend on **storage space or items** for |
| AMOUNT IN LOCAL CURRENCY | | AMOUNT IN LOCAL CURRENCY | | |
| **ENTER 0** IF NOT APPLICABLE | | **ENTER 0** IF NOT APPLICABLE | | |
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# 10 Reference Household Listing Form

COMESA

Questionnaire
Number

Government of XXX
NAME OF THE STATISTICAL OFFICE
**HORTICULTURAL CROP PRODUCTION SURVEYS**

**HOUSEHOLD LISTING FORM**

## MODULE A-1: HOUSEHOLD IDENTIFICATION

WRITE CODES FOR REGION, PROVINCE, DISTRICT, COUNTY, AS APPLICABLE.

|  | CODE | | | NAME |
|---|---|---|---|---|
| A01. REGION/PROVINCE: | | | | ................................................................................................. |
| A02. DISTRICT/COUNTY: | | | | ................................................................................................. |
| A03. ENUMERATION AREA: | | | | |

A04. PLACE / VILLAGE NAME:
................................................................................................
................................................................................................

A05. HOUSEHOLD ID:

A06. NAME OF HOUSEHOLD HEAD:
................................................................................................

A07. DWELLING STRUCTURE NO.:     CODE

A08. WHAT ARE THE GPS COORDINATES OF THE DWELLING?

| LATITUDE (S) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | O | | | | . | | |

| LONGITUDE (E) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | O | | | | . | | |

A09. CONTACT PHONE NUMBER :

## MODULE A-2: SURVEY STAFF DETAILS

A10. LISTER NAME: _____

A11. LISTER CODE: ▢▢▢

A12. SUPERVISOR NAME: _____

A13. SUPERVISOR CODE: ▢▢▢

A14. DATE OF LISTING: ▢▢▢▢
DD   MM   YYYY

## INTRODUCTION TO THE HOUSEHOLD TO LISTED

CONVEY THE FOLLOWING INFORMATION TO THE RESPONDENT:

To help the Government better understand the contribution of horticular crops to households welfare and their contribution to the national income, the NATIONAL STATISTICAL OFFICE is conducting a horticultural crop production survey. We are listing all households in this area that have cultivated any horticultural crop. This area has randomly been selected within the district/county/province of the country to ask questions horticultural crops they have cultivated in the current or just ended agricultural season. It is within the legal mandate of the NSO to collect this information and contribute to the Government's decision making process.

We are only collecting your details and the crops you have cultivated in the current or the just ended cultivation season.

LISTER: PLEASE PROVIDE DESCRIPTION OR ANY PHYSICAL FEATURES OF THE HOUSEHOLD, LOCATION, HOUSE PAINT, ETC THAT CAN HELP TO EASILY IDENTIFY THE HOUSEHOLD

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## MODULE F: FILTER QUESTIONS FOR HORTICULTURAL CROP FARMERS

ENUMERATOR: RECORD START DATE &

| | | DAY | MONTH | | HOURS | MINUTE |
|---|---|---|---|---|---|---|

| No. | ITEM | | X00 Did you or anyone in your household curtivate [CROP] in the last agricultural season or are you or any member of your household currently cultivating any [CROP]?  YES..1 NO...2 >> NEXT CROP |
|---|---|---|---|
| 001 | VEGETABLES | | |
| 002 | FRUITS | | |
| 003 | SPICES | | |
| 004 | ORNAMENTAL FLOWERS | | |
| 999 | OTHER, SPECIFY | | |

EXAMPLES OF HORTICULTURAL CROPS

**VEGETABLES**

| | | | | |
|---|---|---|---|---|
| 601 | BEETROOT | | 714 | PAPAYA |
| 602 | BRINJAL | | 715 | PEAR |
| 603 | CABBAGE | | 716 | PHALSA |
| 604 | CARROT | | 717 | PINEAPPLE |
| 605 | CAULIFLOWER | | 718 | POMEGRANATE |
| 606 | GREEN BEANS | | 719 | SAPOTA |
| 607 | GREEN PEPPER | | 720 | STRAWBERRY |
| 608 | MUSHROOMS | | 721 | WALNUT |
| 609 | OKRA | | 795 | OTHER FRUITS, SPECIFY .. |
| 610 | POTATO | | **SPICES** | |
| 611 | PUMPKINS | | 801 | ASAFOETIDA |
| 612 | RADISH | | 802 | BELL PEPPER |
| 613 | SWEET POTATO | | 803 | CHILLI |
| 614 | TOMATO | | 804 | CINNAMON |
| 615 | TURNIP | | 805 | CLOVES |
| 695 | OTHER VEGETABLES (SPECIFY) | | 806 | GARLIC |
| **FRUITS** | | | 807 | GINGER |
| | | | 809 | KALAJIRA |
| 701 | ALMOND | | 810 | ONION |
| 702 | APPLE | | 811 | SAFFRON |
| 703 | ARECA/BETEL NUT | | 812 | TUMERIC |
| 704 | BANANA | | 895 | OTHER SPICES SPECIFY |
| 705 | CITRUS | | **ORNAMENTAL/ FLOVERS** | |
| 706 | COCOA | | 901 | ACALYPHA |
| 707 | COFFEE | | 902 | ALLAMANDA |
| 708 | FIG | | 903 | ANTIGNON |
| 709 | GRAPES | | 995 | OTHER ORNAMENTAL/FLOWERS, SPECIFY |
| 710 | GUAVA | | | |
| 711 | MANGO | | | |
| 712 | MELONS | | | |
| 713 | PASSION FRUIT | | | |

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