Appendix II

SAMPLING SEED FOR ANALYSIS

Object

The object of seed sampling is to obtain a representative sample of each lot of seed under inspection. No matter how accurate the technical work is done, the result will be no better than the sample submitted for testing. Therefore, drawing, mixing, dividing and preparation of samples should be so done as to ensure that the sample is representative of the entire seed lot.

Description of terms

Seed lot

The term seed lot is used for represent the following quantities of agricultural and horticultural seeds:

for seeds the size of which is equal to or more than that of wheat the

maximum quantity in a lot can be 20,000 Kg.

for seeds the size of which is less than that of wheat the maximum quantity in a lot can be 10,000 Kg.

Each quantity represented to be a seed lot must be of reasonably uniform quality and identified by a single lot designation. Stocks of seeds in excess of the quantities specified above must be sub-divided into lots not larger than these quantities and each sub-divided lot must be identified by a separate lot designation.

Primary sample

When a seed lot is sampled either from container or in bulk several individual samples are drawn from different containers or different places in the bulk. Each trierful or probeful or handful of seed so drawn is called a primary sample.

Composite sample

All the primary samples drawn for one lot are combined to form a composite sample of the lot. This sample is generally much larger than required for analysis.

Submitted sample

This is the sample derived from the composite sample and is submitted to the Seed Testing Laboratory. The size of this sample is specific to each crop as given in Table-VIII.

Working sample

This is the sample derived in the laboratory from the submitted sample and is used for analysis. The size of this sample is specific to each crop as given in Table-VIII. Minimum weights of working samples are based on the principle that a working sample for purity analysis should be of such weight as will normally contain at least 2500 seeds and that working sample for count of weed seeds and other crop seeds should be about ten times the weight of sample for verifying purity by weight, subject in both the cases to a maximum weight of 1000 grams.

Sampling process

1. Ensure that the total quantity of seed to be sampled belongs to one lot.

2. Ensure that the containers are so arranged that they are conveniently accessable.

3. Check the name of the kind and variety and the lot number of each bag.

4. Determine the number of containers in the lot and the number of containers to be sampled for the lot.

5. Draw samples as per the sampling intensity given below:

Up to 5 containers	Sample each container and always take at least five primary samples.
6 to 30 containers	Sample at least one in every three containers but draw at least five primary samples.
More than 30 containers	Sample at least one in every five containers but take at least ten primary samples.

For seed lots in small containers such as tin cans, cartons, etc., containers sufficient to make 100 Kg. weight of seed is taken as the basic unit for sampling intensity. Small containers are combined to form sampling units weighing a maximum of 100 Kg. For example, two containers of 40 Kg. each form one sampling unit, ten containers of 40 Kg. each form five units, 20 containers of 5 Kg. each form one unit, 100 containers of 1 Kg. each form one unit, etc. For sampling, each unit is regarded as one container and the sampling intensity mentioned above is used.

Seed in packets can be sampled by selecting at random the required number of packets to provide the amount of seed needed.

- For seed in bulk the sampling intensity is :

Less than 50 Kg	at least three primary samples
50 to 500 Kg.	at least five primary samples
above 500 Kg. up to 3000 Kg.	one primary sample for each 300Kg. but the number of primary samples should not be less than five.
above 3000 Kg. up to 20000 Kg.	one primary sample for each 500Kg. but the number of primary samples should not be less than ten.

6. When drawing samples as per sampling intensity, draw approximately equal amounts of primary samples from each location sampled.

7. For sampling seed in containers such as coarsely woven jute or burlap bags and cloth bags triers can be used. For cloth bags open

- *Under the act samples are to be drawn from unopened containers. Sampling intensity for bulk is given only for information.*

the few stitches at one of the top corners, simple by hand or trier and close by re-stitching or with a hand stapling device. For plastic or polyethylene bags sample by trier, probe or hand by opening the bags. If sampled by trier re-seal the hole by heat sealer or close it with sealing tape. For seed in sealed tin cans where the hole made by the trier cannot be closed conveniently, open the lid, sample by hand and reseal the can or re-can the seed.

8. For sampling by hand, insert hand into the seed in tightly closed position, open it after reaching any location inside the seed mass, collect seed and take out hand in tightly closed position so that no seed escapes.

9. For sampling by triers, insert the trier into the bag in an inverted position i.e. cavity or slot in the trier facing downwards, reverse the trier after it has gone sufficiently in to the seed mass and draw out steadily with decreasing speed so that the quantity of seed obtained from successive locations increases progressively from center to the side of the bag. While withdrawing the trier, gently agitate it so that an even flow of seed is maintained. If the trier is

slotted see that no seed is damaged when closing the slots. After withdrawing the trier from the bag examine the primary sample and if it is similar to the previous primary sample(s) empty it in to the bucket, pan or can which holds all such primary samples. Then turn the sharp end of the trier a couple of times across the hole on the bag in opposite directions to pull the threads together and to close the holes.

Preparing submitted sample

1. The primary samples collected in the bucket, pan or can when mixed from the composite sample. Divide this sample into three identical parts. Ensure that all the three samples are equal and comparable. To achieve such homogeneity adopt the following procedure:

   a. Thoroughly mix the sample in the bucket and reduce it by passing the seed repeatedly through a divider and removing one half on each occasion. This process of successively halving is continued until a sample of the required size is obtained.

   b. Spread a one meter by one meter piece of canvas, cloth, sheet or paper. Empty the composite sample on the canvas. Mix the seed well and spread it evenly. Using a straight edge divide the seed to two halves and further to four quarters. Mix the opposite quarters and both the mixed quarters. Repeat this three or four times. Spread seed again, divide it into three identical parts. The size of the three parts should be the size of the submitted sample. Collect these three parts and bag them separately in clean, dry containers.

2. The inspector may add a preservative to the sample as may be specified from time to time for maintaining it in a condition suitable for analysis and to prevent deterioration.

3. Carefully bag the three parts of the sample in separate clean, dry containers; fasten and seal the containers to prevent deterioration and leakage. Insert in each container a label indicating:

   Serial number

   Date of sampling

   Kind

   Variety

   Lot number

   Name and address of the Inspector

   Name and address of the person from whose lots sample was drawn

   Nature and quantity of preservative, if any added to the sample

4. Designate one sample as sample for analysis by the Analyst, another sample as sample for the person from whose lot sample was drawn and retain the third sample as Inspector’s sample.

Despatch of sample

1. Hand over the designated sample to the person from whose lots sample was drawn. Despatch the sample for analysis to the Analyst by registered post or deliver the same by hand. Samples meant for analysis should be packed, fastened, and sealed as follows:

   a. Securely fasten the container to prevent leakage in transit.

   b. Wrap the container in fairly strong thick paper; neatly fold in the ends of the paper and affix by gum or adhesive or pack and seal securely to protect from tampering and to ensure proper transit.

c. Secure the paper cover by strong twine or thread both above and across the container; fasten the twine or thread on the cover by sealing wax; stamp at least four distinct impressions of the seal of the Inspector on the wax; one of the impressions shall be at the top; one at the bottom and the other two on the body of the packet; cover the knots of the twine or thread by sealing wax bearing distinct impression of the seal of the Inspector.

Significance of sampling in analysis

The accuracy of results of analysis depends on the quality of sample submitted which in turn depends on the accuracy in sampling. Causes of variation in results of analysis of the same sample or samples of the same lot either tested in the same laboratory or in two different laboratories are given below:

a. Genetic variation

Seed is a living organism having numerous possibilities of genetic heterogeneity between seeds of the same lot.

b. Background history

Variability in the seed of the same lot can be caused by varying conditions of soil, weather, insects, diseases, weeds etc., during their development and maturation.

c. Handling impacts

Defective handling during harvesting, threshing, drying and processing results in differences in the quality of individual seed within a lot.

d. Heterogeneity.

Unless a seed lot is homogenous, no single sample can truly represent it. Heterogeneity in a lot may also be due to

i. constitution from sub-lots of different qualities,

ii. improper blending of sub-lots,

iii. segregation or stratification of the lot components within containers during cleaning, filling, transport and storage.

e. Sampling

Difference in the methods of sampling, i.e. whether by hand, by sampling instruments or automatic sampling can cause variation according to whether the seed is stationary or in motion.

f. Differential mobility

Differences in size, specific gravity and shape of individual seeds in a seed lot result in differential mobility of seed through a sampler of a trier type.

g. Sampling instruments

Variations in the size and shape of the triers or sampling instruments affect proper representation.

h. Sampling techniques

Differences in the methods of sampling can be a major cause of variation.

i. Inexperience

Lack of skill and competence in the use of sampling instruments can be a significant factor.

j. Sampling procedure

Lack of random selectivity and failure to eliminate bias in selection of bags or containers for sampling is of considerable importance in drawing representative samples.

k. Lot size

Unduly large size of a seed lot makes it more heterogeneous than one of a smaller size, and reduces the probability of obtaining a representative sample.

l. Number of primary samples

Failure to draw the minimum prescribed number of primary samples for certain size of lot reduces chances of proper representation.

m. Blending of primary samples

Proper blending of primary samples into a composite sample is very necessary.

n. Sample dividings

Lack of efficient sample-splitting equipment or procedures to get a submitted sample out of a composite sample is also a significant factor.

o. Differential rate of deterioration

Differential changes in moisture content within a seed bag can cause varied rate of deterioration of seed located in different parts of the bag.