Study on the Technique of Seed Sampling

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Introduction

In a laboratory, only a small portion (quantity) of a seed lot can be examined. It is therefore important that this small portion is representative of the seed lot. Drawing of a representative sample is fundamental in order to obtain uniform, accurate and reproducible results.

Definitions

Seed lot

A seed lot is a specific, identified quantity of seed whose purity and quality is homogenous throughout entire lot. The maximum size of seed lot prescribed for agricultural and horticultural seed is 20,000 kg.
Seed sampling: The process of obtaining a seed sample of a size suitable for test in which the same constituents are present as in the seed lot and in the same proportions.

Types of sample

1. **Primary sample:** A primary sample is a small portion taken from one point in the lot or container or bag.
2. **Composite sample:** The composite sample is formed by combination and mixing all the primary samples taken from the lot or container or bag.
3. **Submitted sample:** A submitted sample is a sample submitted to testing station. It must be of at least the size specified in the International Seed testing Association (ISTA) rule for submitted sample and may comprise either the whole or a sub-sample of the composite sample.
4. **Working sample:** The working sample is a sub-sample taken from the submitted sample in the laboratory, on which one of the seed qualities is done.
5. **Sub-sample:** A sub-sample is the portion of a sample obtained by reducing the sample using one of the sampling methods for sampling in the laboratory.

Objectives of sampling

The objective of sampling is to obtain a sample of a size suitable for tests, in which the probability of a constituent being present is determined only by its level of occurrence in the seed lot.

Methods of sampling and required instruments

1. Hand sampling

This is followed for sampling the non free flowing seeds or chaffy and fuzzy seeds such as cotton, tomato, grass seeds etc. In this method, it is very difficult to take samples from the deeper layers of bag. To overcome this, bags are emptied completely or partly and then seed samples are taken. While removing the samples from the containers, care should be taken to close the fingers tightly so that no seeds escape.

2. Sampling with triers/Probe

By using appropriate triers, samples can be taken from bags or from bulk. The triers are used for taking free flowing seed samples.

a) Bin samplers

Used for drawing samples from the lots stored in the bins.

b) Nobbe Trier

The name was given after the father of seed testing Fredrick Nobbe. This trier is made in different dimensions to suit various kinds of seeds. It has a pointed tube long enough to reach the centre of the bag with an oval slot near the pointed end. The length is very small. This is suitable for sampling seeds in bag not in bulk.

Figure: Nobbe type trier

c) Sleeve type trier or stick trier

It is the most commonly used trier for sampling: There are two types *viz.,* 1. With compartments 2. Without compartments. When the inner tube is turned, the slots in the tube and the sleeve are in line. The inner tube may or may not have partitions. This trier may be used horizontally or vertically. This is diagonally inserted at an angle of 30° in the closed position till it reaches the centre of the bag.

Figure: Sleeve or stick type trier

Sampling intensity:

Sampling intensity in bulk lots

When sampling seed lots are in bulk the following number of primary samples to be taken-

Lot size (kg)	Minimum number of primary samples
Up to 50	3
51-500	5
501-3000	One primary sample for each 300 kg but not less than a total number of five
3001-20000	One primary sample for each 500 kg but not less than a total number of ten
20001 and above	One primary sample for each 700 kg but not less than a total number of forty

Sampling intensity for seed lots in bag or container

For seed lots in bag (or other containers of similar capacity that are of uniform size) the following numbers of primary sample are the minimum requirement. Usually a 100 kg weight is taken as the basic unit and small containers are combined to form sampling units not exceeding this weight, e.g. 20 containers of 5 kg each.

No. of containers in the seed lot	Number of primary samples
1- 4 containers	3 primary samples from each container
5- 8 containers	2 primary samples from each container
9- 15 containers	1 primary samples from each container
16- 30 containers	15 primary samples in total from the seed lot
31- 59 containers	20 primary samples in total from the seed lot
60 or more containers	30 primary samples in total from the seed lot

To obtain a composite sample of a lot of seed kept in bag:

- For lots of six bags or less each bag should be sampled.
- For lots of more than six bags, sample five bags plus at least 10% of the number of bags in the lot. (Round off numbers with decimals to the nearest whole number)
- Regardless of the lot size it is not necessary that more than 30 bags be sampled.

No. of bags in lot	No. of bags to sample
7	6
10	6
23	7
50	10
100	15
200	25
300	30
400	30

Sampling intensity for small containers

If the seed is in small containers such as tin, cartons or packets as used in retail trade, the following procedure is recommended by ISTA.

Basic unit	Seeds in small containers
100 kg	20 containers, 5 kg each
100 kg	25 containers, 4 kg each
100 kg	100 cartons, 1 kg each

A 100 kg weight of seed is taken as the basic unit, and the small containers are combined to form sampling units not exceeding this weight (100 kg) e.g. 20 containers of 5 kg, 33 containers of 3 kg or 100 containers of 1 kg. For sampling purposes each unit is regarded as "one container" and the sampling intensity is as prescribed for seed in containers.

Methods of obtaining working samples in the laboratory

The primary samples are drawn from a number of places of the seed lot with the help of trier or hand. The individual primary samples are mixed together to form composite sample. The composite sample is mixed thoroughly by hand and it is divided into two equal parts. One half is discarded and the second half is again mixed thoroughly and divided in the same way. The process of mixing and dividing is repeated until the desired size of the submitted sample is obtained.

Working samples can be obtained by two methods described in the ISTA rule. One is the submitted sample is divided using mechanical dividers and the other types where the division is done manually.

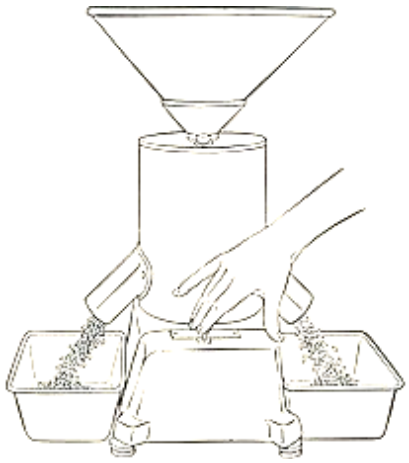


Figure. Seed divider

Weight of submitted sample

1. Moisture test

100 g for those species that have to be ground and 50 g for all other species.

2. For verification of species and cultivar

Crop	Lab only (g)	Field plot & Lab (g)
Peas, beans, maize, soybean and crop seeds of similar size	1000	2000
Barley, oats, wheat and crop seeds of similar size	500	1000
Beet root and seeds of similar size	200	500
All other genera	100	250

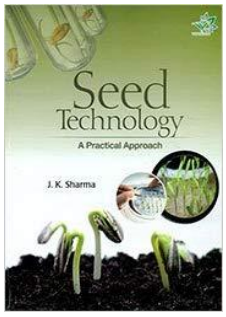
According to ISTA, for purity test the submitted and working seed sample sizes are as follows:

Seed	Submitted sample (g)	Working sample(g)
Rice	700	70
Wheat	1000	120
Maize	1000	900
Barley	1000	120
Pigeon pea	1000	300
Chick pea	1000	1000
Black gram	1000	700
Lentil	600	60
Field pea	1000	900
Cowpea	1000	400
Soybean	1000	500
Groundnut	1000	1000
Mustard	40	4
Linseed	150	15
Cotton	1000	350
Jute	150	15
Chilli	150	15
Tobacco	25	0.5

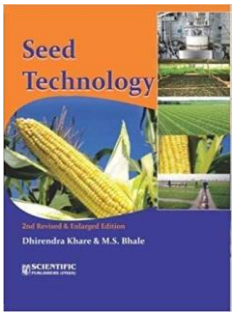
Precautions of sampling

1. Sampling should be done by technical persons.
2. Samples should be of appropriate size and taken from different depth and layer of the seed lot.
3. Sampling should be unbiased.
4. Sampled seeds from each lot should be maintained separately.
5. Composite samples should be splitted carefully to produce two similar portions.

Suggested reading:



Seed Technology: A Practical Approach
By J.K. Sharma
Westville Publishing House (2012)



Seed Technology
By D Khare
Scientific Publishers India (2014)