

# 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 Rules of ISTA (1993) 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 prescribed in the International Rules of ISTA (International Seed Testing Association) for sampling in the laboratory.

## Objectives

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.

### Instruments for primary sampling and techniques of sampling

- Sleeve type trier
- Thief type trier
- Nobbe trier
- Bin sampler
- In some cases by hand (for chaffy, non-free flowing species)

### Methods of obtaining primary sample

Primary samples can be drawn from containers and bags of various sizes, and bulk seed lots by suitable sampling instruments. Samples may also be drawn directly from seed streams during the



cleaning or bagging operations by hand or automatic devices. In the case of chaffy seed, it is sometimes necessary to draw sample by hand. Two types of sampling instruments such as the **Stick trier** or Sleeve-type trier, and the **Nobbe trier** are described in the International Rules for Seed Testing (1993).

#### The Stick trier or Sleeve-type trier

It consists of hollow brass tube inside a closely fitting outer sleeve which has a solid pointed end. Both the sleeve and the inner tube have open slots in their walls so that when tube is turned until the open slots on the sleeve are in line with that of tube, seeds can flow into the cavity of tube. When the tube is given half turn the slots are closed.

The tube length and diameter vary for use with different kinds of seed and various sizes of containers. Trier of 762 mm size with outside diameter of 25.4 mm and six slots is used for cereals held in bags and ranging up to 1600 mm in length and 38 mm in diameter with 6 or 9 slots in sampling bins.



Figure: Sleeve or stick type trier

#### Sampling seed in bulk lots

Using sleeve trier either vertically or horizontally, one should insert the trier diagonally into the bag or container. For seed in bulk, vertical insertion is more practical. The trier is thrust into the bag in a closed position, then opened and turned a couple of times or gently agitated to allow it to fill completely. Thereafter it is closed again, withdrawn and emptied into a suitable seed pan, or into a piece of waxed paper or similar material. Care should be exercised in closing the trier so that seeds are not damaged. When the trier is removed the point should be run across the hole in opposite directions to pull the threads together and close the hole.

#### Nobbe trier

The Nobbe trier is a pointed tube, long enough to reach the centre of the bag, with an oval hole near the pointed end. It is made in different dimensions to suit various kinds of seeds. The total length of the instrument should be approximately 500 mm. including a handle of about 100 mm and a point of about 60 mm. For cereals the internal diameter of the tube should be about 14 mm. but for clover and similar seeds 10 mm is sufficient.

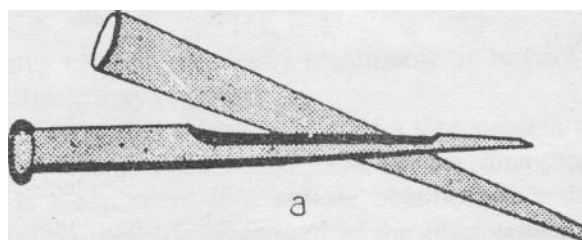


Figure: Nobbe type trier

#### Sampling seeds in bags

The Nobbe trier is suitable for sampling seed in **bags but not in bulk**. It should be inserted gently into the bag, pointing upwards at an angle of about **30 degree** to the horizontal, with the hole facing downwards until it reaches the centre of the bag. The trier is then revolved through **180 degree**, bringing the hole to face upwards, and is withdrawn with decreasing speed so that the quantity of seed obtained from successive locations increases progressively from centre to side of the bag.

The sampling should be varied from top, middle and bottom of bags. To sample the bottom of standing bags they may be raised off the floor and placed on top of other bags. The holes made in bags by the trier to be closed.



**Sampling by hand**

In this method the primary samples are drawn with the help of hand. Handfuls of seed are taken from random positions. This method is usually used for **chaffy, non-free flowing** species.

**Sampling from seed stream**

Sampling can be done while seed is **cleaned during seed processing** or when large quantities of seed are off-loaded, eg from ships or boats. It must be made sure that the sampling container is of such construction that the entire cross-section of the seed stream is uniformly sampled and the seeds entering it cannot bounce out again. The container may be moved through the seed stream either by hand or automatically.

**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 raising 0.5 to the next 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 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.

Sometimes it is said that if the bag or container size is less than 15 kg, a 100 kg weight of seed is taken as the basic unit and the small bags or containers are combined to form the sampling units not exceeding this weight (100 kg). But if the bag or container size is 15 kg to 100 kg then every bag or container will be considered as a basic unit and the sampling intensity will be 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 International Rules of ISTA (1993). One is the submitted sample is divided using **mechanical dividers** and the other types where the division is done manually.

The minimum sizes of working samples for purity analysis prescribed under the International Rules of ISTA (1993) are calculated to contain at **least 2500 seeds**. Usually, the sample size of **400 seeds** is used in different **seed health** tests, but for some seed-borne fungi a bigger number of seeds may be required e.g., *Phoma lingam* in seeds of *Brassica spp.*, loose smut infection in wheat and barley and downy mildew fungi in different crops.

### Mechanical methods

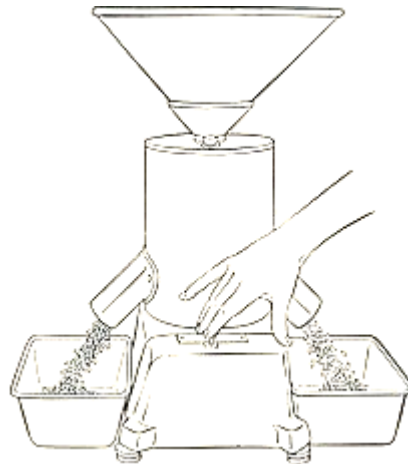
The methods are suitable for all kinds of seeds except the extremely chaffy types. In principle the apparatus divides a sample into two approximately equal parts. The submitted sample can be mixed by passing it through the divider, recombining the two parts and passing the whole sample through a second time, and similarly, a third time, if necessary. The sample is reduced by passing the seed through repeatedly and removing one half on each occasion. This process of successive halving is continued until a working sample of approximately, but not less than the required size is obtained. The dividers described below are example of suitable equipment. Specially two types of seed divider are used to divide the seed into two equal portions.

### Conical divider

The conical divider, Boerner type is produced in two sizes- the smaller and the bigger one. The smaller is suitable for small-seeded species (less than the size of *Triticum spp.*) and the bigger for larger-seeded species (the size of *Triticum* or larger). However, in case of grasses the big divider is used. It consists of a hopper, cone and series of baffles directing the seed into two spouts. The baffles form alternate channels and spaces of equal width. They are arranged in a circle at the



summit and are directed inwards and downwards, the channels leading to one spout and the spaces to a second spout. The flow of seed from the hopper is controlled by a valve. When the valve is opened, the seed falls by gravity over the cone where it is evenly distributed to the channels and spaces, then passes through the seed spouts into the seed collection containers. The width and number of the channels and spaces are important. For the larger divider, 19 channels and 19 spaces each 25.4 mm wide, and for the small divider 22 channels and 22 spaces each 7.9 mm wide have been found satisfactory.



**Figure. Seed divider**

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

Seed	Submitted sample (gm)	Working sample(gm)
Rice	700	70
Wheat	1000	120
Maize	1000	900
Barley	1000	120
Pigeon pea	1000	300
(Thick 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
Shanpat	600	60
Chilli	150	15
Tobacco	25	0.50

### 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.

