

## Significance of Certification in Quality Seed Production of Sesame

**Akanksha Tiwari<sup>1</sup>, Piyusha Singh<sup>2</sup> and Dhirendra Kumar Singh<sup>3</sup>**  
 Acharya Narendra Dev University of Agriculture and Technology, College of  
 Agriculture, Azamgarh, Uttar Pradesh, India-276001

**ARTICLE ID: 092**

### Introduction

*Sesame* (*Sesamum indicum* L.), belongs to the family of Pedaliaceae, commonly known internationally as sesame, is one of the oldest oilseed crops. Worldwide, it is used for its nutritional, medicinal, and industrial purposes. Quality seed production which follows efficient certification procedures plays a major role in the increase of food production of our country. To ensure this, the Government has prescribed standards and has brought in seed production techniques, testing, certification and marketing procedures for almost all the crops through the Seeds Act, 1966

### Origin and distribution:

Sesame is the most ancient oil crop. Tropical Africa is considered to be primary centre of origin and spread to West Asia, India, China and Japan. India is considered to be secondary origin. Most of the wild species are found in Africa. It is grown in tropics and subtropics (Africa, Middle east, Pakistan, India, Afghanistan, China, Bangladesh, Myanmar and south east countries)

### Importance

- Sesame oil is yellow in color and used in shortenings, salad oil, margarine and other food products.
- 40-60% oil can be obtained.
- Sesame seed is rich in calcium oxalate and fatty acids; high in Vitamin A, B, & E, K, P, Mg.
- Sesame oil is a stable product because of a natural antioxidants sesamin and sesamol that reduce the rate of oxidation; Preferable vegetable oil.

### Nutritional content of sesame

Parameter	Value
-----------	-------

Protein	22-25 %
Oil content	43-52 %
Carbohydrates	13 -14 %
Fibre	6.3 (g)
Ash	5 %

### Climate and Soil:

- Sesame requires hot conditions; 25-37°C throughout the cycle; and 25-27°C encourages rapid germination.
- Below 20°C temperature delays germination; Low temperature results in sterile pollens; and over 40°C seriously affects fertilization
- Sesame is adapted to many soil types, but thrives best on.
- Drained and medium textured fertile soils.
- pH: 5-8; does not grow on heavy clay, salty and waterlogged soils.

### Pollination system

- Sesame is a self-pollinated crop with an average cross-pollination of about 5%.
- The amount of out-crossing ranges from 0 to 50% depending upon the pollinating insects and weather conditions.
- The insects are the only agents whereas; wind plays no part for natural cross-pollination.
- The seed quality deteriorates proportionate to the amount of out-crossing and can be minimized by maintaining proper isolation distance.

**Isolation:** The seed crop should be essentially raised on an isolated plot to maintain seed purity. Isolation from other plots/field of the same crop is essential and more important than other crops.

- An isolation distance of 100 m is recommended for foundation stages and 50 m for certified or other commercial stages.
- Grow five border rows of the same variety around the seed plot to serve as barrier. Time isolation should be avoided.

**Rouging:** Strict rouging procedures should be done at vegetative, flowering and maturity stages by the team of experts.

### Seed Certification Standards

Seed standards	Foundation Seed	Certified Seed
Physical purity (%)	97	97
Inert matter (%)	3	3
Other crop seeds (No./kg)	10	20
Other variety seeds (No./kg)	10	20
Weed seeds (No./kg)	10	20
Minimum Germination (%)	80	80
Moisture (a) Ordinary pack	9 %	9 %
(b) Water proof pack	5 %	5 %

### Field Standards

Field standards	Foundation Seed	Certified Seed
Minimum inspections	3	3
Isolation distance (m)	100	50
Different plants (%)	0.1	0.2
Seed borne diseases (Cercospora)	0.5	1.0

### Varietal Development

- Eighty varieties have been developed for different agro-ecological situations.
- Seed yield of these varieties range from 800-1000 kg/ha, days to maturity 80-95 and oil content 48-52%.

Varieties	Reasons for preference by farmers
TKG-21	White seed, medium maturity
TKG-22	White seed with high oil content, medium maturity, suitable for export purpose, higher market price
TKG-55	White seed, medium maturity, suitable for summer season
JTS-8	White seed, high seed yield
TKG-306	White seed, high seed yield good for export purpose, suitable for summer season
TKG-	White seed, escapes drought, high seed yield

308	
PKDS-11	Dark brown seed, suitable for summer season
PKDS-12	White bold seed with high oil content, high seed yield, good for export, medium maturing, higher market price, suitable for summer season
PKDS-8	Bold black seeded with high oil content, medicinal use, higher market price
Guj-Til-1	White seed, higher market price
Guj-Til-2	White seed, High seed yield, export quality, medium maturing, higher market price
Guj-Til-10	Black seed, high seed yield
Guj-Til-3	White and bold seed, high seed yield, higher market price, suitable for export purpose
RT-54	Light brown seed, high seed yield,
RT-346	White seed with high oil content, suitable for export purpose, higher market price
RT-351	White seed with high oil content, suitable for export purpose, higher market price

### Maintenance of genetic and physical purity in seed

- Sesame highly prone to mechanical mixture due to its very light, small seed and shattering habit which is the most important factor to affect genetic purity. Great care taken to avoid mixture at all the stages of seed.
- The reproduction behavior plays role in affecting the genetic purity in the seed production plots.

### Precautions are to be taken to maintain the genetic purity

- Select the field with no preceding crop of Sesame.
- Use source seed from authenticated source after ascertaining genetic purity through grow out test.
- Restrict selection of only true to the type plants, as any kind of selection will change the original population and the identity of a variety.

- Renewal of seed should be done at least once in three years.
- Follow strict rouging at vegetative, flowering and maturity stages by the team of experts.
- Apply Phorate @ 10 kg/ha in and around the seed plot to control seed removal and/or mechanical mixture by the ants, a serious problem at sowing time.
- Harvesting should be done at proper stage. Threshing should be done on a clean floor.

### Problems in seed production

- **Asynchronous maturity:** In most of the varieties, the maturity of the capsules is not synchronous, as a result the earlier capsules start shattering while others are still green. Shattering is main problem to adversely effectthe seed yield and source of mechanical mixture.
- **High multiplication ratio with very low conversion:** The production of seed ranges from 1 to 15 q/ha. As a result, inspite of very low seed rate and very high multiplication ratio, the conversion from one to other stage of seed multiplication is very low.
- **Frequent crop failures:** Mainly grown in *kharif* crop. Prolonged exposure to variations in temperature and relative humidity lead to shrinkage and attack of pathogens.
- Sensitive to excessive moisture and highly susceptible to *Phytophthora* and *Macrophomina* at early stage. Crop failure due to these reasons is quite frequent.
- **Mechanical mixture:** Very small, light seeds and shattering of capsules make the crop prone to mechanical mixture at harvesting, threshing and processing stages.
- **Lack of protective measures:** To protect the seed from seed borne pathogens and storage fungi, a protective spray of systemic fungicide like Bavistin is recommended but not actually practiced.
- **Non-lifting:** As also in other crops, nonlifting and delayed lifting of seed is a common problem of breeder seed production process.

### Grow-out test

- Conducted in the area where crop can express the maximum characters without any variation due to environment.

- Take a sample of 100 g from the seed lot to estimate the genetic purity of the seed on the basis of morphological characters of the plants.
- Grow 800 plants of the submitted sample vis-a-vis the same population of authentic sample under recommended practices.
- The submitted sample for grow out test is drawn simultaneously with the samples for other tests.
- The permissible limit of off types in sesame is 0.5%.
- Make a comparison at all the stages from seedling to maturity according to the expression of the characters.
- Examine each and every plant throughout the growing season with emphasis on the marker characters and time of their expression.
- Tag the off types and count the total population along with off types. Reject or accept the samples as per the prescribed standards.

