PHYSICAL PROPERTIES OF SOYABEAN

KIRAN A. KHADE
Research Scholar
Shri Jagdishprasad Jhabarmal Tibarewala University, Rajasthan.

ABSTRACT:
This study was investigate the physical properties of soyabean i.e. density coefficient of fraction, size of grain, volume of grain, bulk density. The moisture content of soyabean seed is 7.57, 10.92 & 15.80% from this experiment it is investigated that the grain size of soyabean seed increases from 5.412 to 5.524 mm the grain volume increased from 79 to 82.74 mm^3 whereas the sphericity increased from 0.81923 to 0.8412 which is change in moisture content i…e from 7.32 to 15.72 % (db) The bulk and true density were observed from 748.2 to 622.1 kg/m^3 and from 1243 to 1110 the static coefficient of friction increased linearly against all the tested surfaces as the moisture content increased.
Keywords: *Bulk porosity, Coefficient of friction, Sphericity.*

INTRODUCTION:

Glycine max which is commonly known as soybean and is native from East Asia it is the fat free and cheapest source of protein it grows widely for its edible use it is also known for oil seed.

It belongs to family leguminosae. It ranks very high among the legunious crop in the world in both protein content and general nutritional quality. It has different variaty due to different shape, size, color, physical properties and chemical compositions, physical properties & chemical compositions soyabean production in the world is 180 million tons per year.

Soyabean contains 41% protein 23% carbohydrates, 20% Cholesterol free oil and reasonable amount of dietary Minerals, Vitamins, Significant amount of phytic acid and Soy Vegetable oil. Which is used in food unlike cereal grains soyabean seeds have two cotyledons between which a gap may be formed? If the water content is low which leads to an increase. The mature soybean seed has three major components the outer part is seed coat the middle part is cotyledon and the innermost part is hypocotyledon which constituting 8%, 90% & 2% of the seed respectively.

Generally Soyabean grows in moderately sloppy soil with moderately drainage but the successful cultivation of soyabean is in optimum growing condition i.e. In mean temperature 20 to 30^0C the temperature below 20^0C & over 40^0C stunt growth significantly. They can grow in wide range of soil with optimum growth in moist alluvial soils with good organic content. The Human sewage sludge can be used as fertilizers to grow soyabean. It is also

grows in elevated concentrations of metals. This plant is vulnerable to bacterial fungal & viral diseases.

But the soyabean cultivation in India was negligible until 1970 it grows rapidly in 2003 which crossing over 6 million tons by making India 5th largest producer of Soyabean in the world. The first systematic attempts to develop improve varity of soyabean is in Bihar state but considerable work was also done in west Bengal resulting in the three improve Varity due to continuous increasing soyabean production most of the countries are adopted (NOPA) National oilseed Processor Association specification for their domastic soyabeans.

In India from the total production of soyabean less than 10% is directly used for consumption soyabean produces 2-3 times more protein per-hectare than any other legume pulse.

Thus the objectives of this study was to investigable the physical properties of soyabean i..e. dimension, size, sphericity, bulk density true density. Angle and repose grain vol^{m} coefficient of friction. This Information of soyabean crop is not only valuable for engineers but also to food scientists & processors.

MATERIAL AND METHOD

The dried soyabean test samples are taken for this study in which moisture is reduce about 90% the grain sample are taken are about 25 gram.

Methodology

The dried soyabean test sample moistened with some amount of water and then these wetted grain lots were sealed in high density polyethylene bags. Which were kept for 24 hrs at room temperature.

Physical Properties

1) Grain Size : Three major principle are of the grain were measured with the help of vernier caliper generally the geometric mean diameter was considered as the size by giving three treatment overage reading are taken by following formula.

Size = (length x width x thickness)$^{1/3}$

2) Sphericity: The Degree of sphericity can be expressed are as follows.

$$\text{Spericity} \quad (\phi) = \frac{\text{Geometric mean diameter}}{\text{Major diameter}}$$

i.e.

$$\phi = \frac{(ABC)^{1/3}}{A}$$

Where A, B, C are the Principle axes of grain.

3) Grain Volume:

The grain vol^{m} was determined by toluene method. In this method grain sample are dipped into toluene the vol^{m} displace by grain are noted. The true vol^{m} of grain was divided by no of gains vol^{m}

4) Grain Mass:

In this 1000 randomly selected grains of soyabean are collected and weighed into an electronic top pan & take reading. Average of three replications is considered as grain mass.

5) Bulk Density:

It is the ratio of mass to bulk volume of sample it is determined by filling a 1000 ml container with kernels from ht of 15 cm striking the top & then weighing the content.

6) True Density:

It is the ratio of mass & sample to the true volume. It is determined by toluene method in this the sample are submerge in toluene in a measuring cylinder with accuracy 0.1 ml, the increasing vol^{m} was noted as true vol^{m} & then true density.

7) Angle of repose:

For measuring Angle of repose cylindrical cone method is used with dimension 9 cm in height & 5 cm in diameter. The cone is filled with grain & placed on the floar. Discharge quickly by allowing the grains to slide, down imagine their natural slope & calculate the angle of repose by following formula.

e = tan (2h/d)

e = angle of repose

h = height of cylinder

d = diameter of disc

8) Coefficient of friction:

It is the ratio between the force of friction and the force normal to the surface of contact. It is determined by two different materials which is glass and wood for this we take the tilting platform of 350 x 120 mm used for experimentation and a topless & bottomless plastic box of dimension 45mm x 100 mm was filled with grain & place on tilting surface.

The box was raised slightly so as not to touch the surface the structural surface with the box inclined gradually with screw device until the box is just started to slide and the angle of till was read from a scale.

RESULT AND DISCUSSION:

The result of the present study is as followers.

The grain size grain vol^{m} and the sphericity were found to increases from 5.412 to 5.524 mm, 79 to 82.74 mm^3, 0.81923 to 0.8912. The value of thousand grain increases from 102.55 to 108.87 gm. as Moisture content increases. Also it is seen that the bulk density of 622.1 kg/m^3 soyabean is 748.2 to and the true density is observe that it is decreases which is 1243 to 1110 kg/m^3 but the static coefficient of friction increases linearly against all the tested surface as the moisture content increased. Also angle of repose increases by increase in moisture.

CONCLUSION

All the physical properties of soyabean are dependent on their moisture content. At the moisture content 7.36% (db) the average length, width & thickness of soyabean are, 6.52, 5.57, 4.49 mm resp & if moisture content 15.82% (db) then it 6.69, 5.62, 4.61 mm also in this moisture content the grain weight & soyabean was 102.61 & to 109.53 gm. resp grain size, sphecicity & grain vol^{m} increases with increase in moisture content but the bulk density & true density decreases also angle of repose are increase with increases in static coefficient of friction.

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