

Studies on Physical Properties of Some Selected Varieties of Groundnut Pods

In Karnataka, groundnut (*Arachis hypogaea*) is grown in an area of 11.86 lakh hectares with a production of 8.22 lakh tonnes. The different physical dimensions such as size, shape, weight and other properties of the pods play a vital role in deciding the clearances in threshing, decorticating and transporting machines, sieve sizes, seed drop mechanism etc. The physical properties were found to be significantly influenced by varietal differences (Adhoo *et al.*, 1976), the shape and size of the seed is an important engineering property for separating the seed from foreign material (Chowdegowda *et al.*, 1985) and the knowledge of seed weight and average seed size are useful indices of seed quality (Ahuja and Pathak, 1973). The cylindrical concave clearance if adjusted to seed size, has little effect on threshability and damage of bean crops (Singh and Bachchan singh, 1981). The information on engineering properties of groundnut varieties grown in northern Karnataka is very meagre and hence this study was made to determine some important physical properties of groundnut pods.

Pods of six groundnut varieties ICGS-11, S-206, R-9251, JL-24, R-8808 and KRG-1 were selected for determining the physical properties. the pods were selected randomly from the bulk samples of each variety for determining the physical properties at a pod moisture content ranging from 12-14% (db). The size, shape, bulk

density, real density, porosity hardness, coefficient of friction, angle of repose properties were determined using standard procedures.

The mean and the coefficient of variation observed for six varieties of groundnut pods are presented in Table-1. It indicated that the mean maximum length of 2.663 cm was observed for R-8808 followed by JL-24 (2.662 cm) and the minimum of 2.511 cm for S-206 variety with a standard deviation ranging from 0.095 to 0.194 cm and coefficient of variation (cv) of 0.04 to 0.077. The mean maximum breadth of 1.298 cm was observed for R-8808 followed by ICGS-11 (1.282 cm) and a minimum of 1.2 cm for R-9251 variety with a standard deviation ranging from 0.048 to 0.080 cm and cv of 0.042 to 0.062%. The mean thickness was maximum (1.300 cm) for R-8808 followed by ICGS-11 (1.299 cm) and a minimum of 1.219 cm for S-206 variety with standard deviation ranging from 0.047 to 0.083 cm and cv of 0.038 to 0.067%. The percent of roundness was maximum for R-8808 (36.2%) and minimum of 29.12% for JL-24 and standard deviation varied from 0.462 to 2.942% and cv of 0.017 to 0.099%. The percent sphericity was maximum (51.962) for ICGS-11 and a minimum of 47.41 for JL-24 with a standard deviation ranging from 0.313 to 1.077% and cv of 0.007 to 0.21%. These mean values of length, breadth, thickness, roundness and sphericity can be used in designing the appropriate dimensions of threshing cylinder concave of a thresher.

Table 1. Analysis of different physical properties of selected groundnut pods

Physical properties	ICGS-11	S-206	R-8808	R-9251	JL-24	KRG-1
Length(cm)						
Mean	2.661	2.511	2.663	2.385	2.662	2.523
C.V.	0.049	0.077	0.060	0.040	0.047	0.072
Breadth (cm)						
Mean	1.282	1.210	1.298	1.200	1.238	1.215
C.V.	0.044	0.051	0.062	0.055	0.040	0.040
Thickness (cm)						
Mean	1.299	1.219	1.300	1.232	1.241	1.234
Cv.	0.045	0.053	0.058	0.067	0.038	0.046
Roundness (Per cent)						
Mean	29.866	35.242	36.121	30.089	29.120	32.260
C.V.	0.099	0.013	0.010	0.021	0.058	0.017
Sphericity (Per cent)						
Mean	51.942	49.888	50.388	49.558	47.410	47.852
C.V.	0.006	0.019	0.021	0.012	0.011	0.007
Bulk density (gm/cc)						
Mean	0.229	0.234	0.259	0.253	0.256	0.210
C.V.	0.044	0.034	0.035	0.020	0.023	0.029
Specific gravity (gm/cc)						
Mean	0.227	0.447	0.495	0.516	0.618	0.456
C.V.	0.019	0.013	0.014	0.016	0.016	0.009
Porosity (Per cent)						
Mean	63.383	47.591	47.691	50.997	58.612	53.873
C.V.	0.024	0.054	0.031	0.023	0.017	0.028
Hardness (longitudinal) (kg)						
Mean	1.290	1.460	1.980	2.060	2.270	2.000
C.V.	0.106	0.138	0.169	0.117	0.088	0.281
Hardness (lateral) (kg)						
Mean	3.110	1.520	2.870	1.190	1.080	2.110
C.V.	0.044	0.034	0.035	0.020	0.023	0.029
Co-efficient of friction						
Mean	0.311	0.321	0.315	0.319	0.329	0.311
C.V.	0.035	0.025	0.032	0.031	0.040	0.029
Angle of repose (Degrees)						
Mean	280.52	280.56	290.30	290.30	290.56	290.55
C.V.	0.005	0.012	0.013	0.017	0.007	0.003

The average values of bulk density, specific gravity and porosity of different varieties measured revealed that the maximum bulk density of 0.259 gm/cc was observed for R-8808 and a minimum of 0.210 gm/cc for KRG-1 and standard deviation varied from 0.005 to 0.010 gm/cc and cv of 0.020 to 0.044%. The specific gravity observed was maximum (0.618 gm/cc) for JL-24 and minimum (0.227) for ICGS-11 variety. The standard deviation varied from 0.004 to 0.012 gm/cc and cv of 0.009 to 0.019 percent. A maximum porosity of 63.383 per cent was observed with ICGS-11 and a minimum of 47.591 per cent for S-206 variety and the standard deviation varied from 0.980 to 2.122 per cent and cv of 0.017 per cent. These parameters can be used in deciding the handling capacity of a thresher.

The average values of hardness (both longitudinal and lateral), co-efficient of friction and angle of repose revealed that the mean maximum hardness (longitudinal) of 2.27 kg was observed for JL-24 and the minimum (1.29 kg) for ICGS-11 variety. The standard deviation varied from 0.137 to 0.562 kg and cv of 0.088 to 0.281 per cent. The mean maximum hardness (lateral) of 3.11 kg was observed for ICGS-11 and minimum 1.08 kg for JL-24 kg and cv of 0.020 to 0.044 per cent. The mean co-efficient of friction found to be maximum (0.329) for JL-24 and minimum of (0.311) for KRG-1 and ICGS-11 varieties. The standard deviation varied from 0.008 to 0.110 and cv of 0.025 to 0.040 per cent. The mean maximum angle of repose of 29° 56 was observed for JL-24, where as minimum of 28° for ICGS-11. The standard deviation varied from 0.079 to 0.507° and cv of 0.003 to 0.017%. These values could be used in determining the force requirement to separate the pods from the vines of a crop and for designing the cleaning unit with proper selection of sieve sizes and selection optimum velocity for efficient cleaning and for designing the blower.

From the above discussions it may be concluded that the physical dimension and size of R-8808 followed by ICGS-11 were bolder and S-206 and R-9251 were smaller than the rest of the varieties. The average seed length, breadth, thickness, roundness, sphericity, bulk density, specific gravity, porosity, hardness, coefficient of friction and angle of repose were found to be 2.523 cm, 1.24 cm, 1.254 cm, 52, 116%, 49.506%, 0.24 gm/cc, 0.534 gm/cc, 53.69%, 1.84 kg (longitudinal) and 1.98 kg (lateral), 0.318 and 29° 13. the physical properties determined could be used for deciding the clearances in designing threshing cylinder concave, selection of sieve sizes for cleaning and for seed dropping.

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