

## Measurement of physical and frictional properties of aonla fruit

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■ **ABSTRACT** : The physical and frictional properties of aonla are important in designing and fabricating equipments and structures for handling, transporting, processing and storage, and also for assessing the quality of aonla. The present research work was carried out to measure some physical and frictional properties of aonla. The average range of polar diameter, equatorial diameter, maximum thickness, weight, bulk density and sphericity over three grades of aonla was found to be 2.97 to 4.10 cm, 3.04 cm to 4.43 cm, 3.05 cm to 4.40 cm, 27.07 g to 46.53 g, 585.52 kg/m<sup>3</sup> to 996.76 kg/m<sup>3</sup> and 100.84% to 105.00 per cent, respectively. The highest rolling angle of 8.3 degree was found on mild steel surface of and lowest of 8.1 degree on both plywood and aluminum surface. The static co-efficient of friction was found to be 0.648, 0.655 and 0.653 for aonla on plywood, mild steel and aluminum respectively. The dynamic co-efficient of friction value was highest on mild steel (0.87) for aonla.

■ **KEY WORDS** : Anola, Physical properties, Frictional properties

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**A**onla or Indian gooseberry is an indigenous fruit to Indian sub continent. India ranks first in the world with respect to area and production. Area, production and productivity of Aonla was 49.62 ha, 111.10 million tonnes and 2.24 MT/ha, respectively (Anonymous, 2006). Major producing states are Uttar Pradesh, Gujarat, Rajasthan, Maharashtra, Haryana, Mizoram, Tamil Nadu, Andhra Pradesh, Karnataka and Bihar.

The physical and frictional properties of soybean are important to design the equipments and machines for sorting, separation, transportation, processing and storing. Designing of such equipments and machines without taking these into considerations may yield poor results. For this reason the determination and considerations of these properties has an important role. The major physical and frictional properties of biological materials are shape, size, mass, bulk density, true density, porosity, static coefficient of friction against various surfaces etc. (Mohsenin, 1980).

In the recent years many research workers has measured some physical properties of granular biological materials but very limited research work is reported on the measurement of physical and frictional properties of aonla except an attempt of Goyal *et al.*, (2006).

By considering this, the study was undertaken to investigate some physical and frictional properties of aonla. The physical properties studied include polar diameter, equatorial diameter, maximum thickness, weight, bulk density and sphericity etc. Also some frictional properties such as rolling angle and coefficient of static and dynamic friction on various platforms were measured.

### ■ METHODOLOGY

#### Sample preparation :

This research work conducted in Maharashtra, India. The Random samples were drawn from a freshly harvested lot of aonla. Fifteen number of aonla in each three size grades: first (large), second (medium) and third (small) were taken as study samples. Physical and frictional characteristics of each grade were determined in laboratories.

#### Physical characteristics of aonla:

##### Linear dimensions:

There are two categories of aonla bulb diameter, polar diameter and equatorial diameter. Polar diameter is the distance between the fruit crown and point of root attachment of the