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(RESEARCH ARTICLE)



## Studies on variation in morphological traits of mango trees (*Mangifera indica*) growing on Kogi State University campus, Anyigba, Kogi State, Nigeria

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### Abstract

Mango (*Mangifera indica*) is an economically important tropical fruit consumed all over the world due to its large fruit with a soft, sweet pulp. In this study, morphological characters of sixty (60) randomly selected mango trees growing on Kogi State University campus, Anyigba were examined. These characters were examined by comparison with those highlighted in mango descriptor by International Plant Genetic Resources Institute (IPGRI). The characters studied were crown shape, tree growth habit, leaf blade shape, leaf altitude in relation to branch, leaf apex shape, leaf margin, leaf base shape, and colour of fully developed leaf. Results revealed that 53.30% of the selected trees had broadly pyramidal crown shape; the highest percentage observed, none of the trees had spherical crown shape. There was no Drooping tree growth habit while spreading tree growth habit was the highest in 68.30% of the selected trees. Ovate, lanceolate and oblanceolate leaf blade shapes were not observed in any of the selected trees while oblong was the highest leaf blade shape observed in 50% of the selected trees. For leaf Apex Shape; Acuminate was observed in 65% of the selected trees, Acute in 35% and obtuse in none of the selected trees. Most of the trees had entire leaf margin with a percentage of 98.30% of the trees having the entire leaf margin. There were morphological variations among the selected trees for all the characters studied.

**Keywords:** Variation; Mango; Morphological; Character; Genetic; Shape

### 1. Introduction

Mango (*Mangifera indica* L.) is one of the choicest fruits in the world [1]. It belongs to the family of Anacardiaceae, one of the most important species of the family and one of the most preferential fruit crops of the tropical and subtropical regions of the world for human consumption [2]. Mango (*Mangifera indica*) is one of the most important fruit crops of the world due to its large fruit with a soft, sweet pulp.

Due to its popularity and importance, *M. indica* is often named “King of fruits” for its luscious flavour and taste. The mango is among the widely grown tropical and subtropical fruit of the world and is a diploid fruit tree with  $2n = 40$  chromosomes [3]. The mango tree is an evergreen tree of varying size and shape. It has a deep taproot and profuse surface roots [4], a stout trunk (90 cm in diameter) and an umbrella-shaped crown that may reach 20-40 m high [4, 5]. The leaves are simple, alternate, borne on 1-12.5cm long petioles. Leaves are 16-30 cm long x 3-7 cm broad on flowering branches and up to 50 cm long on sterile branches. Young leaves are orange-red and turn shiny dark green on the upper surface when they mature.

The edges of the leaves are somewhat wavy. Mango tree flowers are fragrant, pentamerous, greenish-white or pinkish, very small (3-5 mm long x 1-1.5 mm broad) and densely borne on 30 cm long, pyramidal panicles [4, 5]. Morphological variations of mango varieties have been studied extensively [6, 7]. Detailed descriptions of mango cultivars are available in the publications of Knight *et al* [8]. Levels in variation amongst types of mango are being studied via morphological

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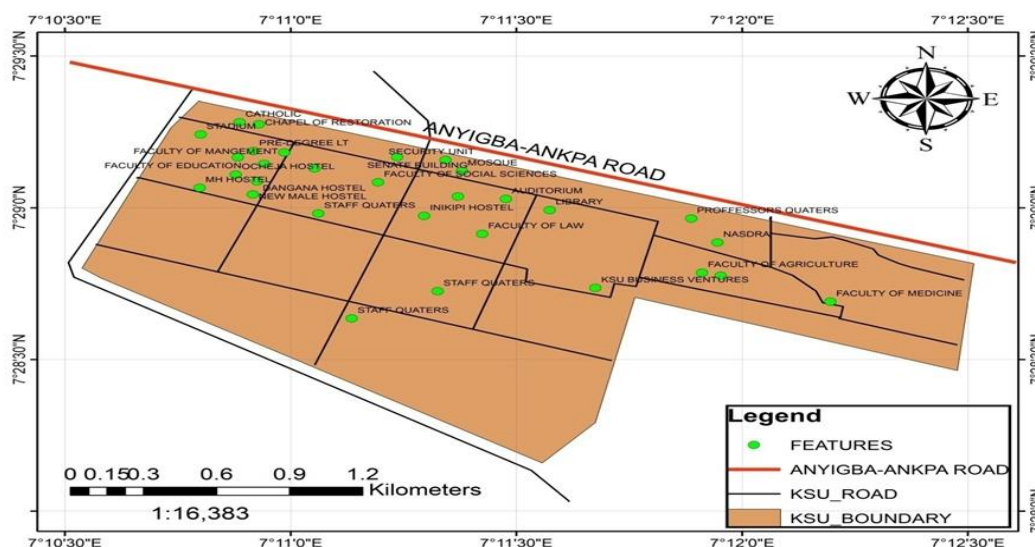
characterization of qualitative and quantitative characters [9, 10]; iso-enzymatic [11], and molecular by using different types of markers, like RAPD [12, 13]. Differentiation between types of mango has been done by characters associated with yielding components; that is, fruit size and weight, flesh and fiber content [14] and fruit shape- aroma [15]. Despite its popularity, limited scientific attention has been directed towards the characterization of the numerous cultivars found in Nigeria [16].

Morphological characterization is the first step that should be done before more profound biochemical or molecular studies are carried out [17]. The evaluation of morphological and agronomic characters can provide relevant information on yield and quality traits, as well as other information of great interest to breeders, such as descriptions of available variation and estimates of trait heritability [18]. Thus, this study was carried out to observe the Morphological Variations among mango trees growing on Kogi State University Campus, Anyigba.

## 2. Material and methods

### 2.1. Study Area and map

The study area is located on latitude 7°49' N and longitude 7°18' E. Anyigba is located at Eastern part of Kogi State in Dekina local government area. Anyigba lies between latitude 7°15'-7°29' N and longitude 7°11'-7°13' E and with average altitude of 420 meters above sea level. The study area falls within the tropical wet and dry climate region and the guinea savanna, with mean annual temperature of 25°C and rainfall 1600 mm.



**Figure 1** Map of Kogi State University, Anyigba. Source: Department of Geography, KSU, Anyigba.

### 2.2. Material used

Tags, nail, hammer, marker, nylon bag and paper.

### 2.3 Method

Sixty (60) randomly selected trees of *Mangifera indica* were tagged with alphabets A1-A60

### 2.4 Data collection

Data were collected from the tagged trees and the following data were collected.

#### 2.2.1. Crown shape

The crown shape of each selected tree was observed directly on the field and compared with shapes in cashew descriptors by International Plant Genetic Resources Institute [19].

### 2.2.2. Tree growth habit

The tree growth habit of the selected trees were observed directly on the field and compared to tree growth habit by International Plant Genetic Resources Institute.

### 2.2.3. Leaf blade

The leaf blade of each tree was identified by comparing with leaf shapes in mango descriptor by the International Plant Genetic Resources Institute [19].

### 2.2.4. Leaf attitude in relation to branch

The leaf attitude in relation to branch of each tree was identified by comparing with leaf attitude in mango descriptor by the International Plant Genetic Resources Institute [19].

### 2.2.5. Leaf apex shape

The leaf apex shape of each tree was identified by comparing with leaf apex shape in mango descriptor by the International Plant Genetic Resources Institute [19].

### 2.2.6. Leaf base shape

The leaf base shape of each tree was identified by comparing with leaf base shape in mango descriptor by the International Plant Genetic Resources Institute [19].

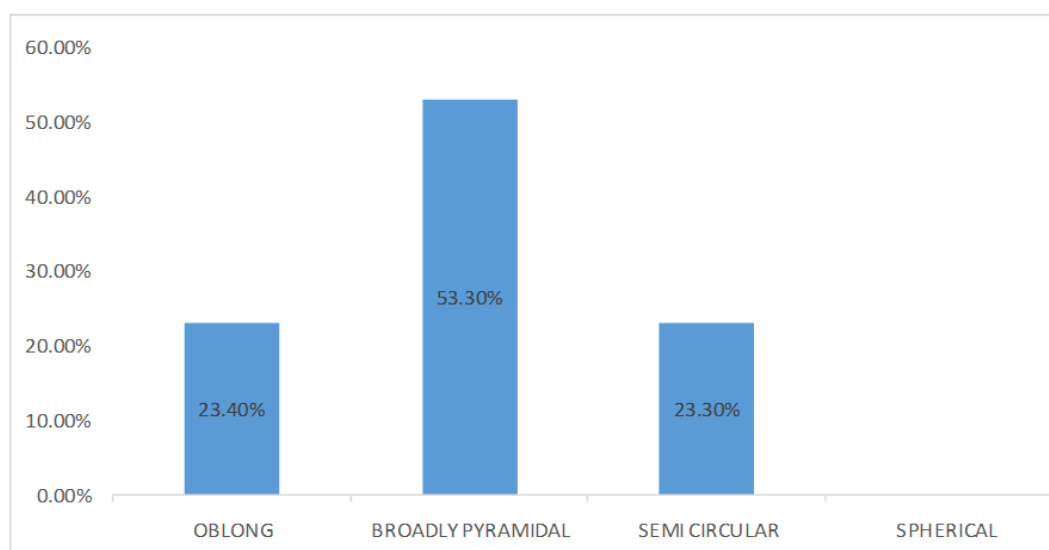
### 2.2.7. Leaf margin

The leaf margin of each tree was identified by comparing with leaf margin in mango descriptor by the International Plant Genetic Resources Institute [19].

### 2.2.8. Colour of matured leaves

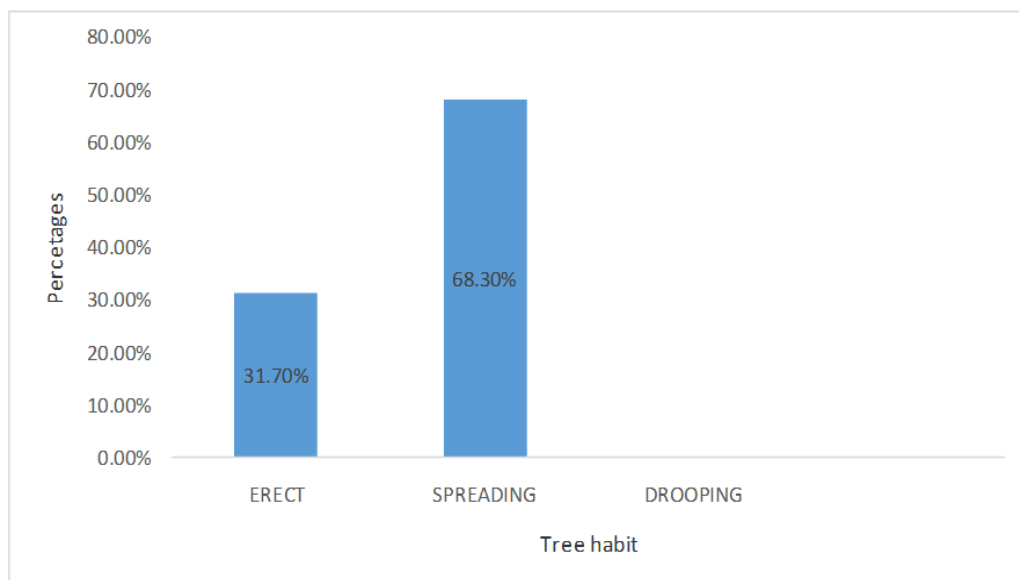
The colour of matured leaves of each tree was observed using colours of matured leaves in mango descriptor by the International Plant Genetic Resources Institute [19] as a guide.

## 3. Results and discussion



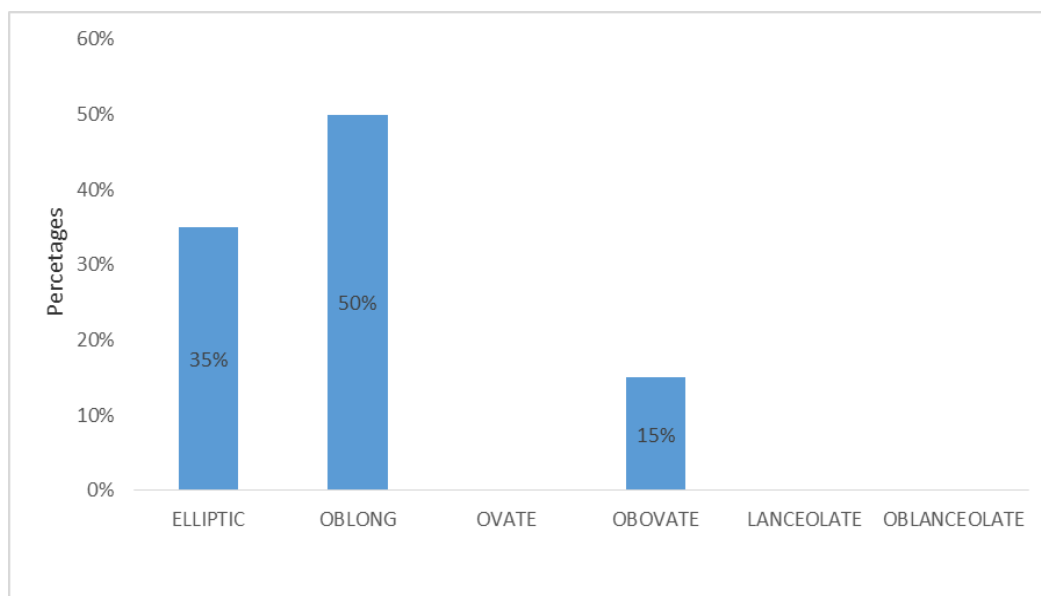
**Figure 2** Percentages of Crown shapes observed in the selected trees

The percentages of crown shapes of the selected trees presented in Figure 2 indicates broadly pyramidal to be the most observed crown shape in 53.30% of the selected trees and this was similar to an earlier report by [20]. The Oblong and Simi-circular crown shapes were observed in 23.40% and 23.30% of the selected trees respectively while none of the selected tree was observed to have spherical crown shape.



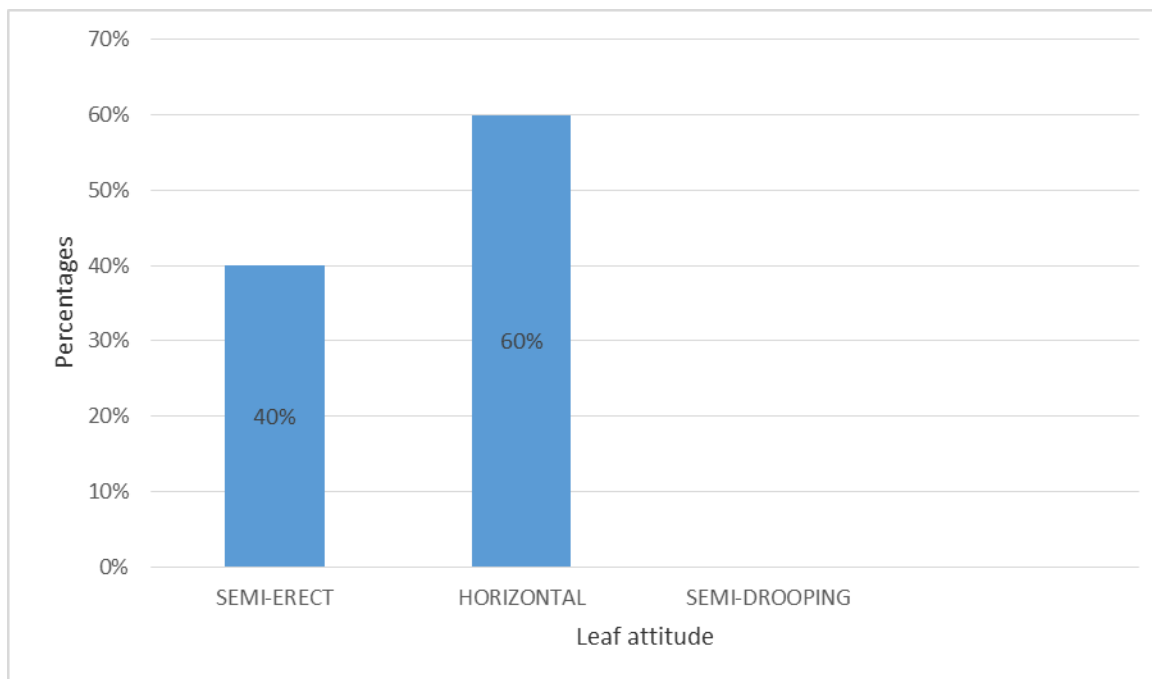
**Figure 3** Percentages of tree growth habits observed in the selected trees

The tree growth habit result presented in Figure 3 shows that spreading tree habit was the most observed in 68.30% of the selected trees. The result is in agreement with a similar work by [21] on mango who reported that the highest tree growth habit was spreading with 65.1%. The erect tree growth habit was observed in 31.70% of the selected tree while none of the selected tree had the drooping tree growth habit.



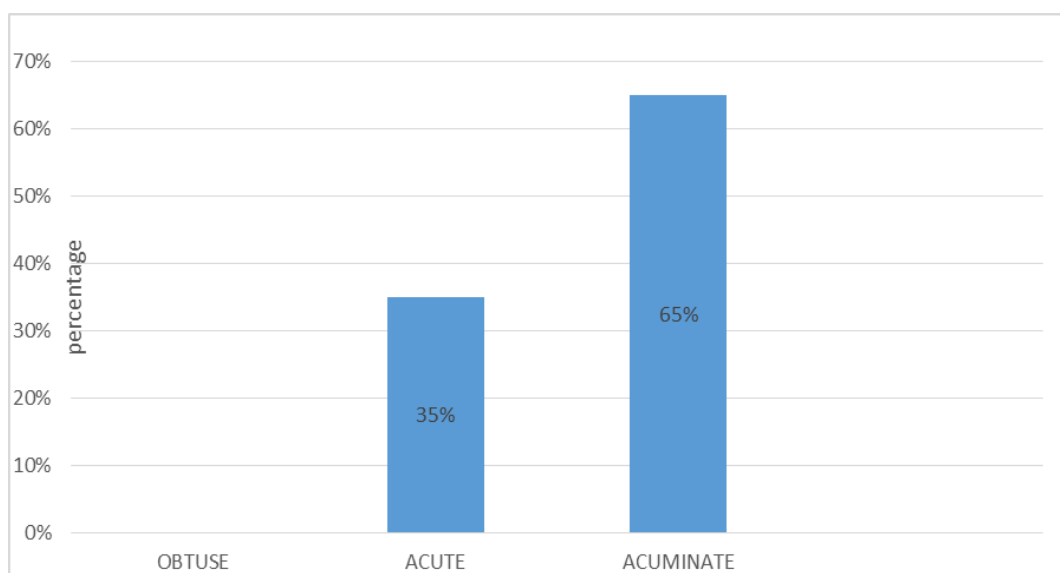
**Figure 4** Percentages of leaf blade shapes observed in the selected trees

The blade shape presented in Figure 4 shows oblong leaf shape to be the highest observed in 50% of the selected trees followed by elliptical in 35% of the selected trees. Toili et al. [21] reported elliptical to be the highest (62.8%) observed leaf blade shape in a similar study on mango. Ovate, lanceolate and oblanceolate leaf blade shapes were not observed in any of the selected mango trees.



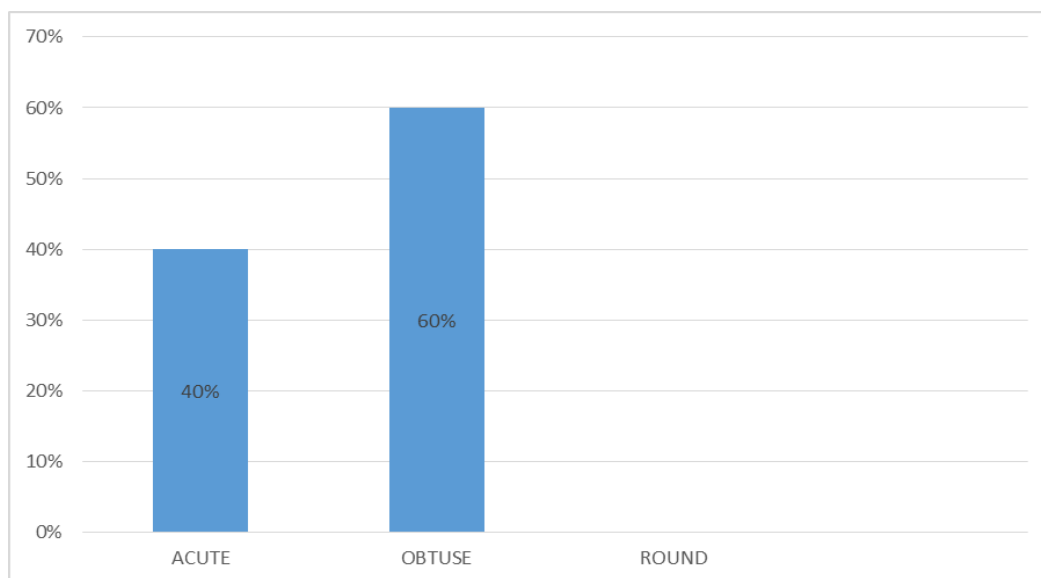
**Figure 5** Percentages of Leaf attitude in relation to branch of the selected trees

Result for leaf attitude in relation to branch presented in Figure 5 shows the horizontal leaf attitude to be the most observed with 60% of the selected trees possessing this attitude. The semi-drooping leaf attitude in relation to branch was not observed in any of the selected trees and this was also reported by [21] in their work on mango.



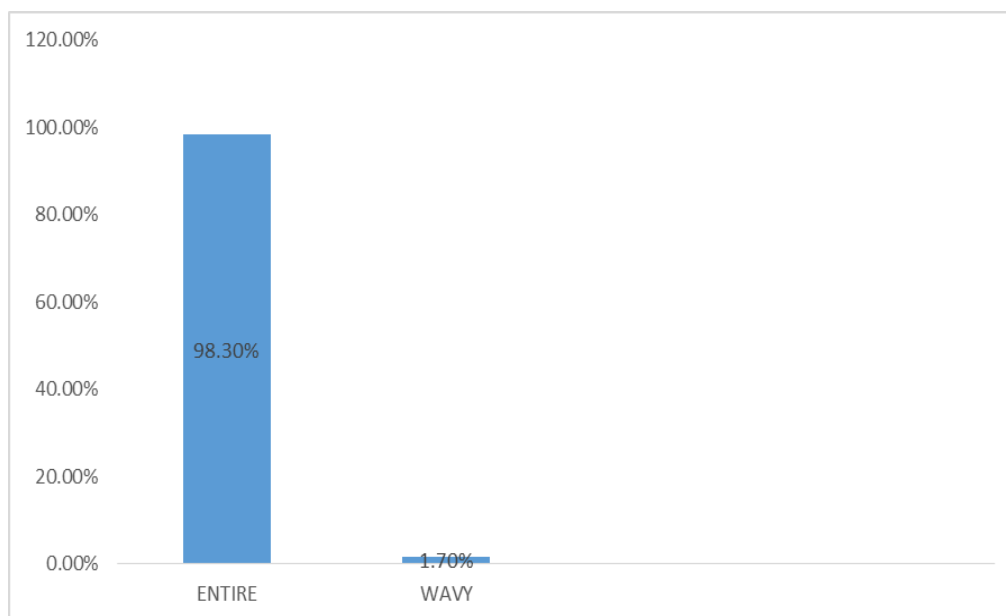
**Figure 6** Percentages of Leaf apex shape of the selected trees

The leaf apex shapes presented in Figure 6 reveals acuminate to be the most observed leaf apex shape with 65% of the selected trees while acute was observed in 35% of the selected trees. The obtuse leaf apex shape was not observed in any of the selected trees.



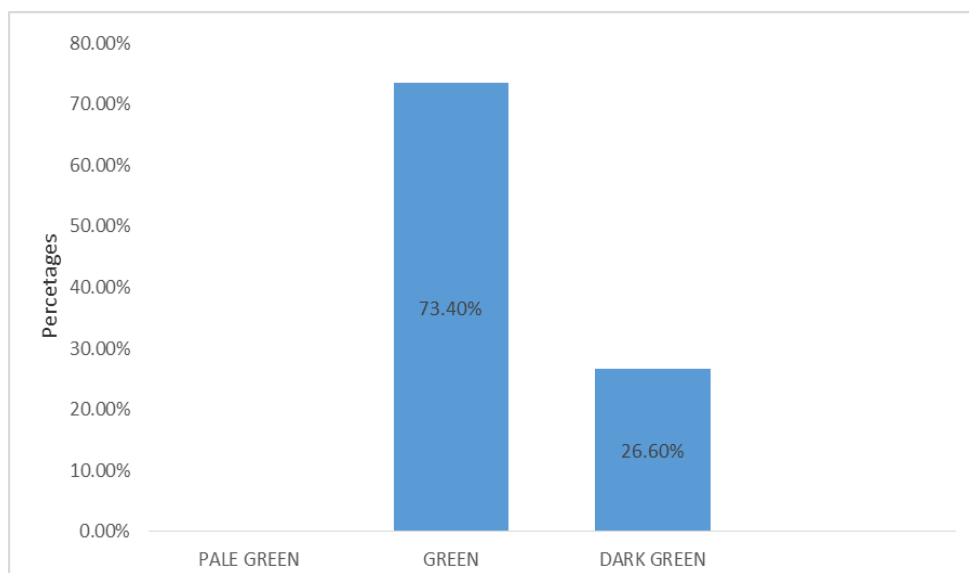
**Figure 7** Percentages of Leaf base shape of the selected trees

Result of leaf base shape presented in Figure 7 shows that the most observed leaf base shape was obtuse in 60% of the selected trees. The result was similar with earlier report by [21] who also reported 84.9% obtuse leaf base shape in their work on mango. The round leaf base shape was not observed in any of the selected trees.



**Figure 8** Percentages of Leaf margin of the selected trees

The result of leaf margin presented in Figure 8 shows that the entire leaf margin was observed in 98.30% of the selected trees and this is similar to the work of [21] who reported 77.9% for entire leaf margin. Kanchan *et al* [20] also reported to have observed the entire leaf margin in 21 genotype of the 24 genotype they studied.



**Figure 9** Percentages of Colour of matured leaves of the selected trees.

The colour of matured leaves presented in Figure 9 showed that 73.40% of the selected trees had green matured leaves while 26.60% of the selected tree had dark green mature leaves. This result is consistent with kanchan *et al* [20] who reported green mature leaf in 20 out of 24 genotypes studied. However in this work, the pale-green mature leaf was not observed in any of the selected trees.

#### 4. Conclusion

This study has revealed and provided the morphological variations that exist in mango trees growing on the University campus. The evaluation of morphological variations obtained in this present study may be of help to breeders for various genetic breeding programs in mango cultivars and also serve as a baseline for further study on mango in the area. However, to confirm whether the variations are genetic in nature there is need for characterization using molecular markers.

#### Compliance with ethical standards

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##### *Disclosure of conflict of interest*

There is no conflict of interest.

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