Among the different fruits grown in India, citrus is the third most important fruit crop after Mango and Banana. Citrus occupies about 961.1 thousand hectares of land and produces annually 9452.1 thousand metric tones of fruits in India (NHB, 2010).

Among the different species of citrus grown in India, Mandarin Orange occupies the major portion. The mandarin growing belts of the country may be divided into four regions viz., Punjab where mostly kinnow oranges is dominating, Nagpur belt where mostly Nagpur oranges are grown. Next is the eastern foot hills of Nilgiri (Coorg region) where Coorg mandarin are grown. Lastly, Meghalaya, Arunachal Pradesh, Assam and surrounding foothills where Khasi Mandarin are predominantly grown. In Arunachal Pradesh major Khasi Mandarin growing belts are the East Siang, West Siang and Lower Dibang Valley district. The total area covered by citrus in Arunachal Pradesh is 25000 hectares and produced 37780 tonnes of fruits of which Lower Dibang Valley occupies 2780 hectares of land under citrus out of which orange area is 762 hectares under bearing and 1456 hectares under non bearing and produces 5715 tonnes (Anonymous, 2010).

In the Lower Dibang Valley district Roing area is well known for the production of mandarin, a few pockets of mandarin growing belts are also prevailing around Balek.

**RESEARCH METHODS**

A base line survey was conducted during 2010-2011 in predominantly citrus growing tracts of Lower Dibang Valley district. The existing gardens of those tracts were divided into three groups based on the number of plants existed in each garden as follows:

- Large garden: More than 200 plants
- Medium garden: 50-199 plants
- Small garden: Less than 50 plants

From each categories of the gardens, 8 gardens of similar age i.e. 24 gardens of three strata were selected for the study. From each of the selected gardens 10 plants were selected randomly for different observations. 240 numbers of plants in total were selected from all type of garden for the study. Main items of observation were pulp weight, peel weight, pulp-peel ratio, juice percentage (%) and TSS percentage (%). The sampling design for this experiment was stratified random sampling.

**RESEARCH FINDINGS AND DISCUSSION**

Results of the present studies revealed that there was significant difference among the various types of the gardens.

Different quality characters of different types of garden
are presented in Table 1.

**Pulp weight:**

Among the three types of garden the highest pulp weight was recorded in the small gardens (159.7g) followed by medium gardens (87.9 g) and large gardens (64.0 g). Among the gardens of same type differences were not significant. The differences among the three types of garden were statistically significant.

**Peel weight:**

From the studies of peel weight it had been revealed that, with the increase in the size of the gardens the peel weight decreased considerably. The highest peel weight (39.5 g) was observed in small gardens followed by medium gardens (10.1 g) and large gardens (9.7 g). Differences in the peel weight recorded within the same type of gardens were not found to be significant. A significant difference was recorded within the type of gardens.

**Pulp-peel ratio:**

It is observed that pulp-peel ratio decreased with the reduction in size of gardens. Among the three types of garden, medium gardens (7.03) recorded the highest pulp-peel ratio followed by large (6.9) and small gardens (4.04). However, the gardens of different sizes differed significantly from one another in respect of pulp-peel ratio.

**Juice percentage:**

Differences in the juice percentage recorded within the same type of gardens were not found to be significant. Among the gardens the large gardens (56.37%) recorded the highest juice percentage followed by medium gardens (49.77%) and small gardens (42.94%), respectively. Highly significant differences were recorded within the type of gardens (Table 2).

**TSS percentage:**

It is observed that the TSS content of fruit increased

### Table 1: Pulp weight (g), peel weight (g) and pulp-peel ratio of different types of garden

<table>
<thead>
<tr>
<th>Gardens</th>
<th>Pulp weight (g)</th>
<th>Peel weight (g)</th>
<th>Pulp-peel ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large garden</td>
<td>Medium garden</td>
<td>Small garden</td>
</tr>
<tr>
<td>G₁</td>
<td>64.4</td>
<td>88.6</td>
<td>162.2</td>
</tr>
<tr>
<td>G₂</td>
<td>57.0</td>
<td>88.1</td>
<td>157.6</td>
</tr>
<tr>
<td>G₃</td>
<td>58.0</td>
<td>87.4</td>
<td>162.6</td>
</tr>
<tr>
<td>G₄</td>
<td>70.2</td>
<td>89.4</td>
<td>158.6</td>
</tr>
<tr>
<td>G₅</td>
<td>65.4</td>
<td>86.7</td>
<td>157.6</td>
</tr>
<tr>
<td>G₆</td>
<td>63.4</td>
<td>88.9</td>
<td>160.0</td>
</tr>
<tr>
<td>G₇</td>
<td>65.2</td>
<td>87.0</td>
<td>159.4</td>
</tr>
<tr>
<td>G₈</td>
<td>68.4</td>
<td>87.1</td>
<td>159.6</td>
</tr>
<tr>
<td>Mean</td>
<td>64.0</td>
<td>87.9</td>
<td>159.7</td>
</tr>
<tr>
<td>S.E. (+)</td>
<td>3.24</td>
<td>1.64</td>
<td>2.52</td>
</tr>
<tr>
<td>C.D. (P=0.05)</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS=Non-significant

### Table 2: Juice and TSS percentage of different types of garden

<table>
<thead>
<tr>
<th>Gardens</th>
<th>Juice (%)</th>
<th>TSS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large garden</td>
<td>Medium garden</td>
</tr>
<tr>
<td>G₁</td>
<td>55.07</td>
<td>51.34</td>
</tr>
<tr>
<td>G₂</td>
<td>56.68</td>
<td>50.27</td>
</tr>
<tr>
<td>G₃</td>
<td>57.67</td>
<td>49.15</td>
</tr>
<tr>
<td>G₄</td>
<td>56.25</td>
<td>49.81</td>
</tr>
<tr>
<td>G₅</td>
<td>56.13</td>
<td>48.08</td>
</tr>
<tr>
<td>G₆</td>
<td>55.57</td>
<td>49.64</td>
</tr>
<tr>
<td>G₇</td>
<td>56.63</td>
<td>51.36</td>
</tr>
<tr>
<td>G₈</td>
<td>57.02</td>
<td>48.52</td>
</tr>
<tr>
<td>Mean</td>
<td>56.37</td>
<td>49.77</td>
</tr>
<tr>
<td>S.E. (+)</td>
<td>1.69</td>
<td>1.60</td>
</tr>
<tr>
<td>C.D. (P=0.05)</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS=Non-significant
with the reduction in the size of the gardens. Among the three
types of garden the highest TSS was recorded in the small
gardens(9.60%) followed by medium(9.28%) and large
gardens(8.78%). However, the gardens of different sizes
differed significantly.

The quality of fruits more particularly mandarin orange
is influenced by climatic and nutritional factors as well as
rootstock effects. In the present investigation, the quality
parameters differed significantly among various size of
gardens. Most of the quality attributes were superior in small
gardens. As a consequence of higher fruit weight in small
gardens, both of the components viz., pulp weight and peel
weight were higher in small gardens followed by medium and
large gardens. The higher pulp weight is mainly contributed
by the juice content of the fruits and the peel weight depends
on thickness. The lowest pulp-peel ratio in the present study
was associated with small gardens.

The juice percentage was found to be highest in large
gardens followed by medium and small gardens. On the other
hand, fruits from small gardens contained more TSS than
medium and large gardens. Ghosh et al.(1982) recorded wide
variation in juice and TSS percentage in mandarin oranges of
different orchards of north eastern region.

The results of the investigation can be summarized that
among the different type of mandarin gardens in lower Dibang
Valley district of Arunachal Pradesh, small gardens attributed
highest in quality parameters comparatively than other types
of garden.

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