EVALUATION OF ONION VARIETIES FOR GROWTH, YIELD AND QUALITY
TRAITS UNDER AGRO-CLIMATIC CONDITIONS OF KYMORE PLATEAU
REGION OF MADHYA PRADESH, INDIA

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ABSTRACT
Eight improved cultivars viz.; VL-1, VL-3, Arka Niketan, Arka Kalyan, Pusa Red, Pusa White flat,
Pusa Hybrid 107 and Pusa Hybrid 102 were tested in a randomized block Design with four replications
for two years to study their performance under agro-climatic conditions of Jabalpur (M.P.). The
results revealed that variety Pusa Hybrid 102 recorded significantly highest yield along with maximum
plant height, number of leaves/plant, width of bulb, weight of bulb and dry matter content. Variety
Pusa White flat produced bulb yield next to it with highest TSS content. Remaining varieties Pusa
Red, VL-3, Arka Niketan, Pusa Hybrid 107, VL-1 and Arka Kalyan exhibited bulb yield in decreasing
order.

Key words: Evaluation growth, Onion, Quality traits, Varieties, Yield.

INTRODUCTION
Onion (Allium cepa L.) is one of the important commercial vegetable crops. India ranks
second in area (0.83 million hectare) and production (13.56 million tones) in the world after China. It is a
valuable foreign exchange earner amounting to 7.61% in the total export of vegetables from India.
In onion export in the world India stands at third position after Netherlands and Spain (NHB, 2010).
Among the factors responsible for yield of a crop genetic potential of a variety holds prime
importance. Cultivation of high yielding varieties is a pre-requisite to step up the production level.
Though, several high yielding varieties have been developed by different institutions their productivity
did not show the same pattern under every agro-climatic condition. Hence, the present experiment
was designed to assess the performance of these varieties under agro-climatic condition of Kymore
Plateau region of Madhya Pradesh.

MATERIALS AND METHODS
Field experiments were carried out during rabi season of 1998-99 and 1999-2000 at Vegetable
Research Farm, JNKVV, Jabalpur (M.P.). The soil of the experimental field had sandy loam texture and
neutral (pH 7.3) reaction. It contains low available N (180 kg/ha), P2O5 (12 kg/ha) and high available
K2O (408 kg/ha). Eight improved cultivars viz., VL-1, VL-3, Arka Niketan, Arka Kalyan, Pusa Red, Pusa
White Flat, Pusa Hybrid 107 and Pusa Hybrid 102 were tested in a randomized block design with four
replications. The transplanting of forty five days old seedlings of all the varieties was done with 20cm x
10cm spacing on November 25 and 28 in the two consecutive years. A basal dose of 60 kg N, 80 kg
P2O5 and 50 kg K2O/ha was applied in all plots.
Thereafter, 60 kg N/ha was top dressed in two equal splits at 30 and 45 days after transplanting. Crop
was irrigated immediately after transplanting and two irrigations were given at the interval of five days
to establish the seedlings. Afterwards standard package of practices was followed. Different
observation on growth parameters, yield attributes, bulb yield and qualitative characters were recorded.
Dry matter content was calculated by drying a known weight of sample at 65± 2°C (AOAC, 1960). Total
soluble solids (TSS) were determined from onion juice using a hand refractometer.

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RESULTS AND DISCUSSION

Significant variations were observed in different varieties with regard to growth and yield attributes (Table 1). Pusa Hybrid 102 consistently exhibited tallest plants closely followed by VL-1, VL-3 and Pusa White flat. Maximum leaves were also recorded in Pusa Hybrid 102 which was at par with Pusa White flat, Pusa Red, VL-3 and Pusa Hybrid 107. Variety Arka Kalyan had the shortest plants and minimum number of leaves per plant.

During both the year of experimentation, significantly maximum length of bulb was noted in variety VL-3 as compared to other varieties. It was followed by Pusa Hybrid 102. Varieties Arka Kalyan and Pusa White flat were at par and exhibited lower length of bulb than others. The width of bulb recorded in Pusa Hybrid 102, Pusa White flat, Pusa Red and VL-3 was in decreasing order with non-significant difference, while rest of the varieties produced bulb of significantly less width than Pusa Hybrid 102. Similarly, Pusa hybrid 102 produced significantly heavy weight bulb as compared to others. Pusa White flat stood next to it in this regard being at par with other varieties, barring Arka Kalyan which had the least weight per bulb. The variation in genetic constitution may be attributed to varied growth parameters which in turn resulted in different synthesis and utilization efficiency of photosynthetic product thereby differences in yield characters of varieties. Singh and Korla (1991), Mohanty and Prusti (2000) have also reported the variation in growth and yield traits of different varieties.

Increased growth and yield attributes ultimately resulted in highest bulb yield of Pusa Hybrid 102 during both the years of investigation (Table 2). On the basis of pooled data it gained 31.07, 51.01, 61.89, 64.78, 69.25 and 93.80 per cent increase in yield over Pusa White flat, Pusa Red, VL-3, Arka Niketan, Pusa Hybrid 107, VL-1 and Arka Kalyan, respectively. The differences in bulb

### TABLE 1. Growth and yield attributes in different onion varieties.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Plant height (cm)</th>
<th>Leaves/plant</th>
<th>Length of bulb (cm)</th>
<th>Width of bulb (cm)</th>
<th>Weight of bulb (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y₁</td>
<td>Y₂</td>
<td>Y₁</td>
<td>Y₂</td>
<td>Y₁</td>
</tr>
<tr>
<td>VL-1</td>
<td>43.1</td>
<td>44.5</td>
<td>7.75</td>
<td>7.93</td>
<td>4.19</td>
</tr>
<tr>
<td>Arka Nikaten</td>
<td>39.4</td>
<td>40.8</td>
<td>7.45</td>
<td>7.73</td>
<td>4.24</td>
</tr>
<tr>
<td>Pusa Red</td>
<td>39.3</td>
<td>40.7</td>
<td>8.65</td>
<td>9.00</td>
<td>4.16</td>
</tr>
<tr>
<td>Pusa White Flat</td>
<td>40.7</td>
<td>42.3</td>
<td>9.43</td>
<td>9.50</td>
<td>3.93</td>
</tr>
<tr>
<td>VL-3</td>
<td>41.4</td>
<td>42.8</td>
<td>8.44</td>
<td>8.49</td>
<td>5.13</td>
</tr>
<tr>
<td>Arka Kalyan</td>
<td>34.5</td>
<td>35.6</td>
<td>6.45</td>
<td>9.96</td>
<td>3.67</td>
</tr>
<tr>
<td>Pusa Hybrid 107</td>
<td>37.7</td>
<td>38.4</td>
<td>8.05</td>
<td>8.22</td>
<td>4.22</td>
</tr>
<tr>
<td>Pusa Hybrid 102</td>
<td>43.7</td>
<td>46.6</td>
<td>9.45</td>
<td>9.60</td>
<td>4.26</td>
</tr>
<tr>
<td>SEM ±</td>
<td>1.14</td>
<td>1.95</td>
<td>0.42</td>
<td>0.64</td>
<td>0.09</td>
</tr>
<tr>
<td>CD 5%</td>
<td>3.36</td>
<td>5.73</td>
<td>1.23</td>
<td>1.87</td>
<td>0.26</td>
</tr>
</tbody>
</table>


### TABLE 2: Qualitative characters and bulb yield in onion varieties.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Neck diameter of bulb</th>
<th>Total soluble (cm)/solids (%)</th>
<th>Dry matter of bulb (%)</th>
<th>Bulb yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y₁</td>
<td>Y₂</td>
<td>Y₁</td>
<td>Y₂</td>
</tr>
<tr>
<td>VL-1</td>
<td>2.47</td>
<td>2.66</td>
<td>11.26</td>
<td>11.31</td>
</tr>
<tr>
<td>Arka Nikaten</td>
<td>1.63</td>
<td>1.82</td>
<td>12.18</td>
<td>12.32</td>
</tr>
<tr>
<td>Pusa Red</td>
<td>1.72</td>
<td>1.88</td>
<td>12.84</td>
<td>12.85</td>
</tr>
<tr>
<td>Pusa White Flat</td>
<td>1.40</td>
<td>1.58</td>
<td>13.28</td>
<td>13.39</td>
</tr>
<tr>
<td>VL-3</td>
<td>2.42</td>
<td>2.68</td>
<td>8.17</td>
<td>9.12</td>
</tr>
<tr>
<td>Arka Kalyan</td>
<td>1.27</td>
<td>1.43</td>
<td>11.97</td>
<td>12.13</td>
</tr>
<tr>
<td>Pusa Hybrid 107</td>
<td>1.46</td>
<td>1.70</td>
<td>11.06</td>
<td>11.28</td>
</tr>
<tr>
<td>Pusa Hybrid 102</td>
<td>1.73</td>
<td>1.95</td>
<td>11.59</td>
<td>11.76</td>
</tr>
<tr>
<td>SEM ±</td>
<td>0.04</td>
<td>0.05</td>
<td>0.95</td>
<td>0.73</td>
</tr>
<tr>
<td>CD 5%</td>
<td>0.13</td>
<td>0.16</td>
<td>2.78</td>
<td>2.14</td>
</tr>
</tbody>
</table>
A significant positive relation (Table 3) of bulb yield with number of leaves/plant (r = 0.8201), width of bulb (r = 0.7420), and weight of bulb (r = 0.8332) confirms the same view. Similarly, variations in bulb yield of different varieties due to genetic constitution have been reported by Aghora and Pathak (1991), Patil et al. (1991), Deka et al. (1994), Yadav et al. (2011).

The neck diameter of bulb was at par in VL-1 and VL-3 varieties which were significantly wider than others (Table 2). Variety Pusa Hybrid 102 was next to them in this regard, nearly followed by Pusa Red and Arka Niketan. The closest neck was observed in Arka Kalyan with a non-significant difference with Pusa White flat. Highest TSS was determined in variety Pusa White Flat. It did not show significant difference with other varieties except VL-3, which had markedly lowest TSS content. Dry matter content of bulb was maximum in Pusa Hybrid 102 closely followed by Pusa Hybrid 107 and Arka Niketan. Least dry matter content was recorded in bulb of variety VL-1. These results are in agreement to earlier workers (Bhonde et al. 1992, Sharma et al. 1996, Mohanty and Prusti 2000).

**CONCLUSION**

The results showed that Pusa Hybrid 102 recorded significantly highest yield along with maximum plant height, number of leaves/plant, width of bulb, weight of bulb and dry matter content. Variety Pusa White flat produced bulb yield next to it with highest TSS content. Remaining varieties Pusa Red, VL-3, Arka Niketan, Pusa Hybrid 107, VL-1 and Arka Kalyan exhibited bulb yield in decreasing order.

**REFERENCES**


