COMPARATIVE STUDY OF GROWTH AND YIELD PERFORMANCE OF VARIOUS CARROT CULTIVARS UNDER CLIMATIC CONDITIONS OF BALOCHISTAN

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COMPARATIVE STUDY OF GROWTH AND YIELD PERFORMANCE OF VARIOUS CARROT CULTIVARS UNDER CLIMATIC CONDITIONS OF BALOCHISTAN

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Abstract

Purpose: Comparative study of growth and yield performance of various carrot cultivars under climatic conditions of Balochistan

Methodology: An experimental trial was conducted at Agriculture Research Vegetable Seed Production situated at Quetta, Balochistan. In order to determine the growth and yield of different carrot cultivars were collected throughout the country and planted during the year 2018 in three replicated randomized complete block design (RCBD) having a plot size of 6 m x 6 m (36 m²).

Finding: Out of 10 cultivars of carrot for higher productivity, all the growth traits was statistically significant except no of leaves, the cultivar Faisalabad T-29 was recorded high yielding (54.47 tons/ha) root yield of carrot, followed by Long Red India (48.49 tons/ha), T29 (VSF)(44.91 tons/ha), Amech (41.69 tons/ha), New Croda (32.87 tons/ha), D-C-3 (30.64 tons/ha), D-C96 (27.65 tons/ha), MP- 4(25.42 tons/ha) and Orange(23.05 tons/ha) root yield of carrot, respectively. However, minimum root yield (18.20 tons/ha) of carrot was recorded in D-C-W.

Unique contribution to theory and practice: Main aim of this study was to reveal the potential existing germplasm of carrots regarding their morphological aspect. Also this study has deep impact on growing communities of province.

Keywords: Carrot, Cultivars, Yield, Climatic conditions, Balochistan
INTRODUCTION

Carrot is one of the most valuable vegetable crop of winter season and its origin is Asia and Europe [1]. Growth cycle of Carrot comprises on biennial patterns and belongs to umbellifer family Apiaceae [2]. Carrot also played its significant role in nutritious aspects of human diet, and provide strength in juveniles against blindness through production of Vitamin A [3]. Carrot Root also hoard multi-bio active phytochemicals such as phenolic, carotenoids, polyacetylenes and ascorbic acid which impose positive impact on reducing the hazards of cardio vascular diseases and cancer in humans [4]. Carrot seeds also hold many medicinal values[1]. According to farming and consumers the attractive root part of crop is more productive for high market value [1,5]. Carrot also hold the low sensitivity in cropping system which give the edges toward the organic production on mass level [6]. Climate change impact the Agriculture Sector directly and limiting the efficiency factors of crops on large scale globally[7].

In Balochistan carrot is grown on an area of 3030 Hectares with the annual production of 52473 tons, however its average yield is 52473 ton ha-[8], which lower than average yield of other carrot growing countries. The high production of carrot can be achieved through the adoption of improve production technology of carrot especially growing the suitable varieties according to the environmental conditions. The present study was designed to find out carrot cultivars with high yield potential under the agro-ecological condition of Quetta-Balochistan (Pakistan).

MATERIALS AND METHOD

An experimental trial was conducted at Agriculture Research Vegetable Seed Production situated at Quetta, Balochistan. In order to determine the growth and yield of different carrot cultivars were collected throughout the country and planted during the year 2018 in three replicated randomized complete block design (RCBD) having a plot size of 6 m x 6 m (36 m²). The following ten carrot cultivars were included experimental trial. V₁ = New Croda, V₂ = Amech, V₃ = Faisalabad T-29, V₄ = T29 (VSF), V₅ = D-C-3, V₆ = D-C-W, V₇ = Long Red India, V₈ = D-C96, V₉ = MP- 4 and V₁₀ = Orange. Data regarding Plant height (cm), No of leaves, Leaves weight (g), Root length (cm), Root Weight (g), Root diameter (cm), Biological yield /t/ha and Root yield /t/ha were recorded during field study. The data collected were analyzed statistically using Statistix 8.1 (Statistix, 2006) and difference between means were compared by using least significant difference (LSD) test at P = 5% [9]
RESULT AND DISCUSSION

**Plant height (cm).** The data indicated that Faisalabad T-29 resulted in maximum plant height (51 cm) of carrot, followed by Long Red India (42 cm), T29 (VSF) (39.3 cm), Amech (36.7 cm), New Croda (35 cm), D-C-3 (35 cm), D-C96 (29 cm), MP-4 (26.7 cm) and Orange (23.3 cm) plant height of carrot, respectively. However, minimum plant height (19.3 cm) of carrot was recorded in D-C-W. LSD suggested non-significant differences (P>0.05) in plant height among V5-V2-V1 and among V9-V8; while significant (P<0.05) when All Varietal groups were compared with each other.

**No of leaves of leaves per plant.** The data indicated that V3 = Faisalabad T-29 resulted in maximum No of leaves (7.7) of carrot, closely followed by V2 = Amech(7.3), V7 = Long Red India(7.3), V1 = New Croda (7), V5 = D-C-3(7), V4 = T29 (VSF) (6.7), V9 = MP-4 (6.7), V10 = Orange(6.7) and V8 = D-C96 (6.3) no of leaves of carrot, respectively. However, minimum no of leaves (6) of carrot was recorded in V6 = D-C-W. LSD suggested non-significant differences (P>0.05) in no of leaves among V10-V9-V7-V5-V4-V2-V1; while significant (P<0.05) when V6-V3 varietal groups were compared with each other.

**Leaves weight (g).** The data indicated that V3 = Faisalabad T-29 resulted in maximum leaves weight (43.7g) of carrot, followed by V7 = Long Red India (37.3g), V4 = T29 (VSF) (33.7g), V2 = Amech (32.3g), V1 = New Croda (31.3g), V5 = D-C-3 (29.3g), V8 = D-C96 (29.3g), V9 = MP-4 (27.7g) and V10 = Orange(27g) leaves weight of carrot, respectively. However, minimum leaves weight (23g) of carrot was recorded in V6 = D-C-W. LSD suggested non-significant differences (P>0.05) in leaves weight among V5-V4-V2-V1 and V10-V9-V8; while significant (P<0.05) when V9-V7-V6-V5-V4-V3 varietal groups were compared with each other.

**Root length (cm).** The data indicated that V3 = Faisalabad T-29 resulted in maximum root length (25 cm) of carrot, followed by V7 = Long Red India (20.1 cm), V4 = T29 (VSF) (19.1cm), V2 = Amech (18.2cm), V8 = D-C96 (17.5 cm), V1 = New Croda (15.3 cm), V5 = D-C-3 (15.3 cm), V9 = MP-4 (15.3 cm) and V10 = Orange(13.8 cm) root length of carrot, respectively. However, minimum root length (15.5 cm) of carrot was recorded in V6 = D-C-W. LSD suggested non-significant differences (P>0.05) in root length among V7-V4; V4-V2; V8-V2 and V9-V5-V1; while significant (P<0.05) when V10-V8-V7-V6-V3-V1 varietal groups were compared with each other.
Root Weight (g). The data indicated that $V_3 = \text{Faisalabad T-29}$ resulted in maximum root weight (185g) of carrot, followed by $V_7 = \text{Long Red India} (172g)$, $V_4 = \text{T29 (VSF)} (167g)$, $V_2 = \text{Amech} (158g)$, $V_1 = \text{New Croda} (147g)$, $V_5 = \text{D-C-3} (137g)$, $V_8 = \text{D-C96} (124g)$, $V_9 = \text{MP-4} (114g)$ and $V_{10} = \text{Orange} (114g)$ root weight of carrot, respectively. However, minimum root weight (104g) of carrot was recorded in $V_6 = \text{D-C-W}$. LSD suggested non-significant differences ($P>0.05$) in root weight among $V_7-V_4$ and $V_{10}-V_9$; while significant ($P<0.05$) when $V_9-V_8-V_7-V_6-V_5-V_3-V_2-V_1$ varietal groups were compared with each other.

Root diameter (cm). The data indicated that $V_3 = \text{Faisalabad T-29}$ resulted in maximum root diameter (3.24 cm) of carrot followed by $V_7 = \text{Long Red India} (2.87 \text{ cm})$, $V_4 = \text{T29 (VSF)} (2.63 \text{ cm})$, $V_2 = \text{Amech} (2.53 \text{ cm})$, $V_1 = \text{New Croda} (2.53 \text{ cm})$, $V_5 = \text{D-C-3} (2.45 \text{ cm})$, $V_9 = \text{MP-4} (2.45 \text{ cm})$, $V_8 = \text{D-C96} (2.25 \text{ cm})$ and $V_{10} = \text{Orange} (2.06 \text{ cm})$ root diameter of carrot, respectively. However, minimum root diameter (1.74 cm) of carrot was recorded in $V_6 = \text{D-C-W}$. LSD suggested non-significant differences ($P>0.05$) in root diameter among $V_9-V_5-V_4-V_2-V_1$; while significant ($P<0.05$) when $V_{10}-V_9-V_8-V_7-V_6-V_5-V_4-V_3$ varietal groups were compared with each other.

Biological yield /t/ha. The data indicated that $V_3 = \text{Faisalabad T-29}$ resulted in maximum (69.24 tons/ha) biological yield of carrot, followed by $V_7 = \text{Long Red India} (59.31 \text{ tons/ha})$, $V_4 = \text{T29 (VSF)} (54.09 \text{ tons/ha})$, $V_2 = \text{Amech} (50.33 \text{ tons/ha})$, $V_1 = \text{New Croda} (40.33 \text{ tons/ha})$, $V_5 = \text{D-C-3} (37.61 \text{ tons/ha})$, $V_8 = \text{D-C96} (34.60 \text{ tons/ha})$, $V_9 = \text{MP-4} (31.96 \text{ tons/ha})$ and $V_{10} = \text{Orange} (31.26 \text{ tons/ha})$ biological yield of carrot, respectively. However, minimum biological yield (24.69 tons/ha) of carrot was recorded in $V_6 = \text{D-C-W}$. LSD suggested non-significant differences ($P>0.05$) in biological yield among $V_{10}-V_9$; while significant ($P<0.05$) when all varietal groups were compared with each other.

Root yield /t/ha. The data indicated that $V_3 = \text{Faisalabad T-29}$ resulted in maximum (54.47 tons/ha) root yield of carrot, followed by $V_7 = \text{Long Red India} (48.49 \text{ tons/ha})$, $V_4 = \text{T29 (VSF)} (44.91 \text{ tons/ha})$, $V_2 = \text{Amech} (41.69 \text{ tons/ha})$, $V_1 = \text{New Croda} (32.87 \text{ tons/ha})$, $V_5 = \text{D-C-3} (30.64 \text{ tons/ha})$, $V_8 = \text{D-C96} (27.65 \text{ tons/ha})$, $V_9 = \text{MP-4} (25.42 \text{ tons/ha})$ and $V_{10} = \text{Orange} (23.05 \text{ tons/ha})$ root yield of carrot, respectively. However, minimum root yield (18.20 tons/ha) of carrot was recorded in $V_6 = \text{D-C-W}$. LSD suggested significant ($P<0.05$) when all varietal groups were compared with each other.
Table-1: Mean Data of Growth and Yield Performance of Different Carrot Cultivars.

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Plant height (cm)</th>
<th>No of leaves</th>
<th>Leaves weight (g)</th>
<th>Root length (cm)</th>
<th>Root Weight (g)</th>
<th>Root diameter (cm)</th>
<th>Biological yield /t/ha</th>
<th>Root yield /t/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW</td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>CRODA</td>
<td>35 d</td>
<td>7 abc</td>
<td>31.3 cd</td>
<td>15.3 e</td>
<td>147 d</td>
<td>2.53 cd</td>
<td>40.32 e</td>
<td>32.87 e</td>
</tr>
<tr>
<td>AMECH</td>
<td>36.7 d</td>
<td>7.3 ab</td>
<td>32.3 c</td>
<td>18.2 cd</td>
<td>158 c</td>
<td>2.53 cd</td>
<td>50.33 d</td>
<td>41.69 d</td>
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<tr>
<td>FAISLABAD</td>
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<tr>
<td>T-29</td>
<td>51 a</td>
<td>7.7 a</td>
<td>43.7 a</td>
<td>25 a</td>
<td>185 a</td>
<td>3.24 a</td>
<td>69.24 a</td>
<td>54.47 a</td>
</tr>
<tr>
<td>T29 (VSF)</td>
<td>39.3 c</td>
<td>6.7 abc</td>
<td>33.7 c</td>
<td>19.1 bd</td>
<td>166 b</td>
<td>2.63 c</td>
<td>54.09 c</td>
<td>44.91 c</td>
</tr>
<tr>
<td>D-C-3</td>
<td>35 d</td>
<td>7 abc</td>
<td>29.3 de</td>
<td>15.3 e</td>
<td>137 e</td>
<td>2.45 d</td>
<td>37.61 f</td>
<td>30.63 f</td>
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<tr>
<td>D-C-W</td>
<td>19.3 g</td>
<td>6 c</td>
<td>23 f</td>
<td>12.5 g</td>
<td>104 h</td>
<td>1.74 g</td>
<td>24.69 i</td>
<td>18.20 j</td>
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<tr>
<td>LONG RED</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>INDIA</td>
<td>42 b</td>
<td>7.3 ab</td>
<td>37.3 b</td>
<td>20.1 b</td>
<td>172 b</td>
<td>2.87 b</td>
<td>59.31 b</td>
<td>48.49 b</td>
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<tr>
<td>D-C96</td>
<td>29 e</td>
<td>6.3 bc</td>
<td>29.3 de</td>
<td>17.5 d</td>
<td>123 f</td>
<td>2.25 e</td>
<td>34.60 g</td>
<td>27.65 g</td>
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<td>MP-4</td>
<td>26.7 e</td>
<td>6.7 abc</td>
<td>27.7 e</td>
<td>15.3 e</td>
<td>114 g</td>
<td>2.45 d</td>
<td>31.96 h</td>
<td>25.42 h</td>
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<tr>
<td>ORANGE</td>
<td>23.3 f</td>
<td>6.7 abc</td>
<td>27 e</td>
<td>13.8 f</td>
<td>114 g</td>
<td>2.06 f</td>
<td>31.26 h</td>
<td>23.05 i</td>
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<td>1.2804</td>
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<td>N.S</td>
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<td>6.8644</td>
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</table>

CONCLUSION

Carrot has one of the most prominent vegetable crop of Rabi season in temperate zones of Balochistan. Farmers relay on high yielding cultivars for more economic returns each year. In this context this study had carried out at ARI Sariab Quetta. This study unfold the potential of various germplasm and consolidate the data of yield for growers of Balochistan. Faisalabad T-29 is most prominent cultivar among this lot. Faisalabad T-29 is most suitable carrot cultivars for Temperate zones of Province. Long red India has also best results for general cultivation in Balochistan overall.

REFERENCES


