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## Evaluation of different onion varieties for morphological traits, yield and maggot incidence under cold arid conditions of Ladakh

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#### Abstract

An experiment was conducted to identify promising accessions suited for cultivation under cold arid conditions of Leh, Ladakh. The main objective of the experiment was to evaluate the different varieties of onion for different morphological traits, Yield and maggot incidence under arid hill conditions of Ladakh. Seven onion varieties, namely Brown Spanish, Yellow Globe, Onion red, Red Coral, Bhima Shakti, Pinnari, Rosa bella and Local as Check with three replications were the treatments of the experiment. The observations were recorded on plant height, No. of leaves/plant, days to maturity, Pseudo length, Bulb diameter, Neck diameter, Bulb weight (fresh), yield/ha and maggot incidence. All the varieties have shown significant differences for all the traits under study. Bhima shakti showed highest plant height (63.90 cm) whereas red coral exhibited lowest plant height (46.33 cm). For number of leaves/plant yellow Globe was at 1st number with 15.96 /plant followed by Local (11.86/plant). Among the 7 varieties including check Red Coral was early in maturity (138.66 days) followed by Bhima shakti (142.33 days). Highest yield/ha was exhibited by red coral (19.17 q/ha) followed by Bhima shakti (18.60 q/ha) where as lowest yield/ha was observed in Pinnari (16.21 q/ha). Maggot pest incidence was observed lowest in Red coral (11.0%) followed by Local (14.66%) similarly highest maggot incidence was observed in the variety Bhima Shakti (15.00%). Among the seven varieties Red coral exhibits highest yield and lowest maggot incidence followed by Bhima shakti under cold arid conditions of Ladakh. Further Neck diameter which is regarded as storability parameter was lowest in Red coral (10.26mm) followed by Pinnari (10.46 mm).

**Keywords:** onion, evaluation, yield, maggot incidence, ladakh

#### Introduction

The Himalayan mountain range has significant bearing on the climate of India, as its towering height created a vast rain shadow zone in the north. Among the cold arid parts of India, Ladakh in Jammu & Kashmir is one of the highest and coldest. Ladakh constitutes the eastern most trans- Himalayan part of Jammu & Kashmir state of India, bordering Pakistan and China constituting of two districts viz. Leh and Kargil. Leh district is situated between 32°N to 36°N latitude and 75°E to 80°E longitude at an altitude ranging from 2900-5900 m amsl <sup>[1]</sup>. Onion (*Allium cepa*) belongs to the family Liliaceae, an important group of crops worldwide. Onion is grown in temperate <sup>[2]</sup>, sub-tropical <sup>[3]</sup> and tropical climate <sup>[4]</sup> throughout the world. Onion also known as “queen of kitchen” is one of the oldest known and important high value spice cum bulbous vegetable crop cultivated throughout India <sup>[5]</sup>. Onion is one of the oldest bulb vegetables in continuous cultivation dating back to at least 4000 BC <sup>[6]</sup>. It is cultivated round the year but maximum during *Rabi* season in our country. In cold arid region where topography has considerable variation, onion cultivation is possible only in lower and central agricultural zones but it may be grown in upper agricultural zone on small scale under protected conditions inside the trenches or polyhouses for vegetable purposes. Amongst the onion producing countries in the world India ranks second in area and production, the first being China. Even though India ranks second in area under onion in the world and third in production but its productivity is low as compared to world’s productivity. Onion occupies an important place in the economy of cold arid region of Ladakh owing to the fact that high onion productivity is possible and farmers can earn a lot of money by supplying the produce to the market over a long period of time either green as vegetable or mature bulbs after storing for sometimes. In winter when no fresh vegetables are available in Ladakh, onion can be taken out

of store houses for regular consumption or supply to the market [7]. Among several factors, maggots are the most important factor associated with low productivity in onion. Onion maggot, *Delia antiqua* (Meigen), is a chief pest of onion and other *Allium* spp. in many temperate regions of the world [8]. If not controlled, onion maggot can reduce onion stands by as much as 55–80% [9]. Onion maggot has three generations per year in the northern US and Canada, but control of the first generation is sufficient, as long as the crop is healthy [10]. Healthy onions, once they begin to bulb, are more difficult for newly hatched onion maggot larvae to penetrate [11]. Diseased or physically injured onions are susceptible to damage by second- and third-generation onion maggots because bulbs become more attractive to ovipositing flies and more penetrable to maggots [12, 13]. In Ladakh region maggots, *Delia antiqua* (Meagan) are found in all major onion growing areas which cause severe damage to onion crop [14]. Though there are many chemical practices developed to overcome this problem in onion, but it is very obligatory to have insecticide free measures to control this pest problem mostly in the Ladakh region where use of insecticides are prohibited due the Buddhist religious belief. Eckenrode and Walters (1997) [15] studied that several onion lines from German cultivar exhibited moderate resistance to onion maggot and resistance was superior to the chemical check in a few cases. Varietal evaluation for screening best genotype/variety which shows resistance to this serious pest is one of the most effective tool to get rid of this problem in the region. Thus study was conducted with the objective to evaluate 7 varieties including one check for yield, morphological traits and maggot pest incidence under cold arid climatic conditions of Ladakh.

### Materials and Methods

The experiment was carried out at the experimental field of High Mountain Arid Agricultural Research Institute Leh, SKUAST-Kashmir which is situated at an altitude of 3319 meter masl. The treatment consists of seven varieties namely, Brown Spanish, Red coral, Onion Red, Yellow globe, Bhima Shakti, Pinnari, Rosa Bella and Local Variety of Leh as a check. The trial was conducted in randomized block design with three replications. Plot size was maintained at 2m × 2m and spacing of 15x10cm was followed. Onion seeds were sown in the nursery beds on 15th 2018 of March under poly house and consequently transplanting was done on 17th of May 2018. Recommended agronomic practices were followed to raise a good crop. Observations were recorded on plant height (cm), number of leaves, pseudo length (cm), days to maturity, bulb diameter (cm), bulb neck diameter (mm), fresh bulb weight (g), yield/ha and Maggot incidence. All observations were recorded on six plants in each plot except days to maturity and yield/ha which were recorded on plot basis. Maggot incidence was recorded on percentage basis e.g. number of plants attacked/total number of plants in a plot. All the observations recorded were analyzed for analysis of variance, critical difference (CD) and coefficient of variance (CV) in statistical package OP stat.

### Results and Discussion

#### Morphological traits

Plant height varied significantly among the varieties under study (Table 1). The highest plant height was recorded in Bhima Shakti (63.90 cm) followed by Yellow globe (61.13cm) while as the lowest plant height was recorded in

Red coral (46.33 cm). Similar findings were revealed by Gautam *et al.* (2006) [16]. Number of leaves also showed significant differences among the all seven varieties. The highest number of leaves were recorded in Yellow Globe (15.96) followed by Local (11.86). The lowest number of leaves were recorded in Pinnari (9.03) followed by Red coral (9.70) and Onion red (10.20). Neck diameter is regarded one of the important morphological parameter related to bulb storability. The onion bulbs with thin neck stores better than onion bulbs with thick neck [16]. Among the seven varieties including Local check Red coral showed thin neck diameter (10.26 mm) followed by Pinnari (10.46 mm) and Bhima Shakti (10.80 mm). The highest neck diameter was recorded in Yellow Globe (16.40 mm). The findings revealed that Red coral stands superior to store for long period on the basis of this morphological parameter. Bhonde *et al* (1992) [17] too found thinner neck in 'Agrifound Light Red' in a late kharif season trial, which supports our findings. Pseudo length was recorded maximum in Yellow Globe (7.96cm) followed by Rosa bella (7.60 cm) and Pinnari (7.56cm). The lowest Pseudo length was recorded in Onion red (5.86cm).

#### Days to maturity

Red coral (138.66 days) was early in maturity among all the seven varieties and all the varieties showed significant difference for days to maturity. Second earliest variety was Bhima shakti (142.33) followed by Onion Red which matures in (150 days) after transplanting. Variety Brown Spanish showed maximum number of (161.33) days to harvest. Rivera *et al.* (2006) [18] also reported significant differences in days to maturity among different onion varieties.

#### Yield and yield components

Yield/ha, bulb diameter and fresh bulb weight had significant differences in all the varieties. Yield among cultivars ranged from 16.21 to 19.17 t/ha. Highest yield was obtained in Red coral (19.17t/ha) which was significantly higher than yield of other varieties. Varieties Bhima shakti (18.60 t/ha), Rosa bella (18.53 t/ha) and local (18.01 t/ha) respectively, were observed to be the next best performers. Thus only red coral showed significantly higher production over the check. The lowest yield was obtained in Pinnari (16.21 t/ha). Sharma (2009)[19] also reported better performance in cvs. Nasik Red, N-53 and Agrifound Dark Red than in the other cultivars.

Significant variation was found in all the varieties for bulb diameter. The bulb diameter among varieties ranged from 6.00 to 7.23 cm. The highest bulb diameter was recorded in Red coral (7.23cm) followed by Bhima shakti (7.08 cm) and Yellow globe (6.92 cm). The lowest bulb diameter was recorded in Brown Spanish (6.00 cm) and Pinnari (6.00 cm). Similar findings were also reported by Patil and Kale (1985) [20]. Fresh bulb weight has also significant differences in all the varieties. The fresh bulb weight among varieties ranged between 141.33g to 188.66g. The highest fresh bulb weight was found in Red Coral (188.66g) followed by Rosa bella (181.66g). However the lowest fresh bulb weight was found in Brown Spanish (141.33g) and Onion red (159.33g).

#### Maggot incidence

Maggots are found in all major onion growing areas which cause severe damage to onion crop. In order to evaluate the materials under appropriate conditions, screening was carried out on percent basis with natural onion maggot populations within previously grown onion fields. The maggot incidence

among the varieties ranged between 11.00 to 27.00 percent during kharif 2018. Maximum maggot incidence (27.00%) was recorded in the accession variety Pinnari which was statistically at par with Onion red and Brown Spanish with average maggot incidence of 25.66 and 23.33% respectively.

**Table 1:** Morphological and yield performance of different varieties of onion under cold arid condition of Ladakh.

Variety	Pl. Ht.	No. Of Leaves	Days to mat.	Pseudo length	Bulb Dia	Neck Dia.	F Bulb Wt.	Y/ha (tons)
Local	48.66	11.86	151.66	7.16	6.70	13.16	160.00	18.01
Yellow Globe	61.13	15.96	158.33	7.96	6.92	16.40	171.66	17.04
Onion Red	49.06	10.20	150.00	5.86	6.74	12.36	159.33	16.90
Red Coral	46.33	9.70	138.66	7.00	7.23	10.26	188.66	19.17
Brown Spanish	59.93	11.83	161.33	6.73	6.00	14.96	141.33	16.97
Bhima Skakti	63.90	11.46	142.33	6.33	7.08	10.80	173.33	18.60
Pinnari	49.53	9.03	151.66	7.56	6.00	10.46	174.66	16.21
Rosa Bella	58.70	11.26	144.33	7.60	6.90	13.26	181.66	18.53
CD	4.48	1.98	5.61	0.67	0.50	1.61	16.88	0.97
CV	4.63	9.82	2.11	5.44	4.29	7.17	5.65	3.12

**Table 2:** Reaction of onion varieties to maggot incidence under cold arid conditions of Ladakh.

Variety	Maggot incidence	CD at 5%	CV
Local	19.66	2.93	8.36
Yellow Globe	20.33		
Onion Red	25.66		
Red Coral	11.00		
Brown Spanish	23.33		
Bhima Skakti	15.00		
Pinnari	27.00		
Rosa Bella	17.00		

### Conclusion

Each plant variety has the capacity to grow up with their inheritance of traits and present environments. In this study, we tried to find out the capacity of onion varieties for yield, storage capacity on the basis of morphological trait and tolerance to maggot incidence under natural conditions of Leh. Among all the seven varieties Red coral has shown best performance in terms of yield and resistance to Maggot incidence under Ladakh conditions.

### References

- Anonymous. Statistical Hand Book for the Year 2005-06, (District Statistical & Evaluation Agency, Ladakh Autonomous Hill Development Council, Leh, Government of Jammu & Kashmir, India), 2006.
- Brewster JL. Cultural system and agronomic practices in temperate climates. In. Onion and Allied Crops. 1990; II 1-31.
- Corgan JN, Kedar N. Onion in tropical climate. In: Onion and allied crops. 1990; II:31-37.
- Currah I, Proctor FJ. Onion in tropical region. National Research Institute Kent UK. Bulletin No 1990; 35:20.
- Ritesh Kumar Yadav, Amarjit Singh, Ajmer Singh Dhatt Sandeep Jain Field. Assessment of Onion Genotypes for Resistance against Purple Blotch Complex (*Alternaria porri* and *Stemphylium vesicarium*) under Artificial Epiphytotic Conditions in Indian Punjab. International Journal of Applied Sciences and Biotechnology. 2017; 5(4):498-504.
- Ahmad S, Chohan TZ, Saddozai KN. An investigation into cost and revenue of onion production in Azad Jammu Kashmir. Sarhad Journal of Agriculture. 2008; 24(4):737-743.
- Ganie SA, Bilal Ahmad Wani, Ashiq Hussain Lone, Bilal

Table 2 results depicted that among all the seven varieties, Red coral shows significantly lowest maggot incidence (11.0%).<sup>[15]</sup> Also have studied resistance of some lines of onion against maggot infestation. Similar results were observed by McFerson *et al.* 1996<sup>[21]</sup>.

Ahmad Zargar, Masoodi TH. Screening of onion genotypes against purple blotch under cold arid conditions of Ladakh. Journal of Pharmacognosy and Phytochemistry. 2018; 7(6):2775-2777.

- Ellis PR, Eckenrode CJ. Factors influencing resistance in *Allium* sp. to onion maggot. Bulletin of Entomological Society of America. 1979; 25:151-153.
- Taylor AG, Eckenrode CJ, Straub RW. Seed coating technologies and treatments for onion: challenges and progress. Hort Science 2001; 36:199-205.
- Hoeping CA, Scott-Dupree CD, Harris CR, McDonald MR. Insecticide and fungicide combinations to optimize control of onion maggot (*Delia antiqua*) and onion smut (*Urocystis cepulae*) in Ontario. Journal of Vegetable Crop Production 2003; 9:49-63.
- Hausmann SM, Miller JR. Ovipositional preference and larval survival of the onion maggot (Diptera: Anthomyiidae) as influenced by previous maggot feeding. Journal of Economic Entomology. 1989; 82:426-429.
- Finch S, Cadoux E, Eckenrode CJ, Spittler TD. Appraisal of current strategies for controlling onion maggot (Diptera: Anthomyiidae) in New York State. Journal of Economic Entomology. 1986; 79:736-740.
- Eckenrode CJ, Nyrop JP. Impact of physical injury and commercial lifting on damage to onion bulbs by larvae of onion maggot (Diptera: Anthomyiidae). Journal of Economic Entomology. 1986; 79:1606-1608.
- Ajay KP, Namgayal D. Quantification of damage and evaluation of different insecticides against onion maggot, *Delia antique* in Kargil district of Ladakh region. Journal of Hill Agriculture; 2010; 1(1):62-65.
- Eckenrode CJ, Walters TW. The onion maggot in New York State: evaluation of host plant resistance. International symposium on Edible Alliaceae. Acta Horticultureae. 1997, 433.
- Gautam IP, Khatri B, Govinda PP. Evaluation of different varieties of onion and their transplanting times for off-season production in mid hills of Nepal. Nepal Agricultural Research Journal. 2006; 7:21-26.
- Bhonde SR, Srivastava KJ, Pandey UB. Evaluation of varieties for growing "Rangda" crop of onion (*Allium cepa* L.) in Nasik area of Maharashtra. Maharashtra Journal Horticulture. 1992; 6:39-42.
- Rivera MA, Fernández PJ, Andrés AJL. Evaluation of local onion lines from northwest Spain. Spanish Journal

- of Agricultural Research. 2006; 3(1):90-97.
19. Sharma AK. Evaluation of onion varieties in kharif season under submontane low hill conditions of Himachal Pradesh. Annals of Horticulture. 2009; 2:191-193.
  20. Patil RS, Kale PN. Correlation studies on bulb characteristics and storage losses in onion. Journal of Maharashtra Agricultural University. 1985; 10:38-39.
  21. McFerson JR, Walters TW, Eckenrode CJ. Variation in *Allium* spp. damage by onion maggot. Hort Science. 1996; 31:1219-1222.