

RESEARCH ARTICLE

Effect of artificial injuries and fresh neck cutting against black mould (*Aspergillus niger*) on onion bulb

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ABSTRACT

Experiment was conducted to determine effect of artificial injuries and fresh neck cutting to onion bulb on incidence of black mould disease. Onion bulbs were artificially injured at different sites *viz.*, top, side, bottom, scattered and fresh neck cutting. Injured and un injured onion bulbs were inoculated with spore suspension (1×10^6 /ml) of *Aspergillus niger*. Without dipping in conidial suspension were served as check. The selected bulbs were packed in sterilized polythene bags and stored at room temperature for 21 days. Maximum black mould disease intensity (38.86 %) and weight loss (5.44 %) was recorded in the fresh neck cutting followed by top, scattered, middle and bottom injuries. The check treatment recorded minimum black mould (10.81 %) intensity and weight loss (2.66 %).

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INTRODUCTION

The onion (*Allium cepa* L.) is an important vegetable crop grown and consumed by masses in India. Production of onion in world is about 47.55 million tones from 2.69 million hectares (Pandey and Bhonde, 2002). In India onion crop occupied an area of 0.52 million hectares with production of 6.5 million tonnes (Singhal, 2003). Among the various states of India, the average per hectare yield is highest in Gujarat *i.e.* 20.82 tonnes/ha. The state of Gujarat ranks 6th in terms of area and second in terms of production (Wadhvani and Bhogal, 2003). Sometime losses are as high as 60 % in India due to inadequate post harvest management and lack of proper processing facilities.

The onion is known to suffer from several post harvest disease, among them black mould caused by *Aspergillus niger* V. Tiegh. assumed greater significance as it was found to occur regularly during the storage period in south Saurashtra region of Gujarat. At the time of harvest, the onion bulbs get injured in the field at various places and also neck cutting is routine

practice of onion harvest. Therefore, to know the effect of injury and neck cutting of onion bulb, black mould disease and ultimately the loss in storage, present investigation was undertaken.

MATERIAL AND METHODS

The susceptible variety Talaja red was selected for the experiment. Each treatment was replicated four times in a completely randomized design. The healthy onion bulbs from the field were selected and surface sterilized with 0.1 % mercuric chloride solution, which were artificially injured with sterilized pin followed by dipping in conidial suspension (1×10^6 /ml) of *A. niger* for one minute, followed by air-drying the bulbs and packed in sterilized polythene bags with sterilized cotton plugs and stored at room temperature for 21 days. Observations were recorded at 7, 14 and 21 days after inoculation and the disease intensity and weight loss were recorded. The treatments were comprised of injury to onion bulbs at five sites *viz.* top, middle, bottom, scattered and fresh

neck cutting. Without injury to onion bulbs (un injured only) and without injury and without dipping in conidial suspension were served as two checks.

The disease intensity was recorded on the basis of 0 to 5 scale (Maheshwari *et al.*, 1988). The scale and rating used where 0: 0 per cent area of the bulb affected 1 : 1-10 per cent area of the bulb affected 2 :11-20 per cent area of the bulb affected 3 : 21-50 per cent area of the bulb affected 4 : 51-75 per cent area of the bulb affected 5 : 76-100 per cent area of the bulb affected.

Per cent disease intensity (PDI) was calculated by after Mckinney (1923) :

$$\text{PDI} = \frac{\text{Sum of all numerical ratings}}{\text{Total No. of bulb assessed} \times \text{Maximum No. of ratings(s)}} \times 100$$

Per cent loss increase over check was calculated by using following formula :

$$\text{Per cent loss increase over check} = \frac{T - C}{T} \times 100$$

where,

T = Per cent disease intensity/weight loss in treatment

C = Per cent disease intensity/weight loss in control.

RESULTS AND DISCUSSION

Periodical observations were recorded for black mould disease and weight losses are presented in Table 1 and 2. Data presented in Table 1 revealed that onion bulbs inoculated with *A. niger* after injuries at various sites (methods) and fresh neck cutting showed significantly higher black mould disease compared to check. Maximum disease (38.86 %) and

highest per cent loss increased over check (72.18 %) was recorded in treatment of fresh neck cutting. However, in top injury treatment 35.51 per cent disease intensity and 69.56 per cent loss increased over check was found which was statistically at par with the fresh neck cutting treatment. Scattered, middle and bottom injury treatments were found next effective method and found statistically at par, where recorded 28.47, 28.44 and 27.50 per cent disease intensity and 62.03, 61.99, 60.69 per cent disease increased over check, respectively. The uninjured treatment recorded 24.72 and 56.27 per cent black mould disease and per cent disease increase over check, respectively.

From the data presented in Table 2, it makes clear that onion bulbs inoculated with *A. niger* after various injury methods and fresh neck cutting the increase in weight loss and per cent loss increase over check were high as compared to check. The highest mean weight loss of 5.44 per cent with a 51.10 per cent loss increased over check was recorded in the treatment of fresh neck cutting and it was at par with top injury, where 5.01 and 46.91 per cent mean loss and weight loss increased over check was found, respectively. The other treatments namely scattered, middle, bottom and uninjured treatment found to be moderate in weight loss of onion and were statistically at par, where 3.73, 3.70, 3.43, 3.34 and 28.68, 28.11, 22.45, 20.35 per cent mean loss and loss increase over check was recorded, respectively. The control treatment recorded minimum weight loss (2.66 %).

Injuries at various sites and fresh neck cutting to onion bulbs provided avenues to enter the *A. niger* and thus supported to increase black mould disease intensity and ultimately resulted in weight loss. Similar results were also

Table 1 : Effect of artificial injuries at various sites and fresh neck cutting to onion bulb on incidence of black mould disease (*A. niger*)

Injury	Per cent disease intensity*				% Disease increase over check
	Days after inoculation				
	7	14	21	Pooled mean	
Fresh neck cutting	19.87 (26.47)	42.46 (40.67)	56.23 (48.58)	38.86 (38.57)	72.18
Top injury	18.68 (25.61)	36.21 (37.00)	53.73 (47.14)	35.51 (36.58)	69.56
Scattered injury	12.37 (20.60)	33.70 (35.49)	42.46 (40.67)	28.47 (32.25)	62.03
Middle region injury	16.18 (23.72)	27.45 (31.59)	43.70 (41.38)	28.44 (32.23)	61.99
Bottom injury	11.15 (19.51)	28.71 (32.40)	43.95 (42.10)	27.50 (31.34)	60.69
Un injured (With inoculated)	11.16 (19.52)	26.11 (30.73)	39.95 (39.20)	24.72 (29.82)	56.27
Check (un injured and without inoculated)	0.00 (0.00)	12.37 (20.30)	36.21 (37.00)	10.81 (19.20)	–
S. Em. ±	(1.06)	(1.03)	(1.41)	(0.80)	–
C. D. (P=0.05)	(3.12)	(3.03)	(4.15)	(2.23)	–
C. V. %	(10.98)	(6.31)	(6.67)	(8.78)	–

* Average of four replications. Data presented in parentheses are transformed angular values.

Table 2 : Effect of artificial injuries at various sites and fresh neck cutting to onion bulb inoculated with *A. niger* against weight loss

Injury	Per cent weight loss*				% Loss increase over check
	Days after inoculation				
	7	14	21	Pooled mean	
Fresh neck cutting	2.42	6.02	7.89	5.44	51.10
Top injury	2.29	5.37	7.47	5.01	46.91
Scattered injury	1.74	3.49	5.94	3.73	28.68
Middle region injury	1.47	3.46	6.23	3.70	28.11
Bottom injury	1.41	3.45	5.44	3.43	22.45
Un injured (With inoculated)	1.62	3.31	5.08	3.34	20.35
Check (un injured and without inoculated)	0.73	2.64	4.62	2.66	–
S. Em. ±	0.15	0.28	0.42	0.17	–
C. D. at 5 %	0.43	0.81	1.25	0.52	–
C. V. %	17.54	13.90	13.90	15.44	–

* Average of four replications.

obtained in case of tomato and mango (Fuschs and Barki Golan, 1979 and Singh *et al.*, 1993). Chaudhary and Gupta (2000) also reported maximum rotting in onion bulbs having top injury (30.60 %) followed by side injury (24.00 %) after 14 days of inoculation with *A. niger*.

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