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Control of Common Scab of Potato Through Seed Treatment

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Abstract: Two chemical viz. 3% boric acid solution and 3% elemental sulphur solution each for two different duration of times i.e. 10 and 20 min were evaluated again common scab of potato at Battakundi Farm in Kaghan valley in summer 2001. Both the chemicals gave significant control of the disease incidence as compared to the control. However T_3 gave the best results among all the treatments in terms of disease incidence and disease severity. No significant difference was observed in both chemicals in terms of yield.

Key words: Chemical control, Potato, common scab

Introduction

The potato crop in Pakistan is cultivated on more than 108800 hectares with a production of 1616100 tones with an average yield of 14.9 t ha^{-1} (APCOM 1998-99).

Nutritionally Potato is a wholesome food it is a good source of carbohydrates, vitamins, minerals and proteins. Moisture accounts for 80% of the bulk and the remaining 20% dry matter contain about 17% carbohydrates (mainly starch) and 2% proteins, the rest being fiber and minerals.

The disease commonscab is caused by a bacterium ***Streptomyces scabies*** and is both soil as well as tuber borne disease. Soil and tuber borne disease are multifaceted in nature. They not only cause economic losses to potato crop but are also carried over from season to season through seed tubers soil. Although the disease does not cause yield reduction but disfigure the tubers and thereby reduce their marketability leading to low economic returns (Dutt and Pushkarnath, 1960; Pushkarnath, 1960 and Pushkarnath ***et al.***, 1966). The disease mainly affects the young tubers and its infection stops with the ripening of tubers. The earliest symptoms on tubers appear as small, circular to irregular lesions around the lenticulas, with periderm turning brown and rough (Paharia and Pushkarnath, 1963). Infected tubers and soil serve as the primary source of inoculum. The pathogen is carried through the infected seed tubers to the soil where it multiplies, spreads and infects the crop under favourable conditions. Sing ***et al.*** (1986) and Shekawat (1990) reported the pathogen throughout the Indian state of HP but observed that the pathogen was more severe in Lahoul valley where its incidence goes as high as 100%.

Materials and Methods

In the experiment there were 10 treatments replicated four times in RCB Design. There were four rows in each treatment with a 4 m length. Row to row distance was 75 cm with 25 cm plant to plant distance. Potato seed tubers were subjected to the following treatments prior to sowing.

Treatments

T_1 = Infected seed treated with 3% boric acid solution for 10 minutes.
T_2 = Infected seed treated with 3% boric acid solution for 20 minutes.
T_3 = Healthy seed treated with 3% boric acid solution for 10 minutes.
T_4 = Healthy seed treated with 3% boric acid solution for 20 minutes.
T_5 = Infected seed treated with 3% elemental sulphur solution for 10 minutes.
T_6 = Infected seed treated with 3% elemental sulphur solution for 20 minutes.
T_7 = Healthy seed dipped in 3% elemental sulphur solution for 10 minutes.
T_8 = Healthy seed dipped in 3% elemental sulphur solution for 20 minutes.
T_9 = Infected seed untreated.
T_{10}= Healthy seed untreated.

The experiment was conducted at Battakundi Farm situated in Kaghan Valley in summer 2001. Recommended doses of N.P.K was applied @ 120-120-180 kg ha^{-1}. Whole of P and K were applied at the time of land preparation while half of the N_2 was applied at planting and the remaining half was applied at the time of first earthingup.

Results and Discussion

%Emergence

Table 1 shows that T_9, T_2, T_3 and T_{10} gave highest % emergence and is significantly different from T_1. There is no significant difference among all other treatments. There seems to be no adverse effect of both chemicals on plant emergence on the whole. The results are in accordance with the findings of Sengupta (1992).

Stem density

The highest numbers of stems were recorded in T_7. T_7 is significantly different from T_1, T_4, T_6 and T_9. There is no significant difference between T_2, T_3, T_5, T_7, T_8 and T_{10}. The lowest numbers of stems were recorded in T_9 (Table 1).

Number of marketable tubers

The highest numbers of marketable tubers were recorded in T_{10} which is health seeds untreated followed by T_6 and T_8, while the lowest were observed in T_1. T_{10} is significantly different from T_1, T_2 and T_5. There is no significant difference between T_2, T_3, T_4, T_5, T_6, T_7, T_8 and T_9. The highest number of marketable tubers were obtained in a control treatment which shows that the pathogen does not affect the yield but it only disfigure the tubers which resulted

Table 1: Evaluation of different chemicals against common scab of potato

Treatment	1	2	3	4	5	6	7	8	9	10	11	12
T_1	87.89	3.43	76.25	6.08	110.0	4.03	16.5	20.5	4.25	0.21	186.3	10.10
T_2	94.52	4.5	91.75	7.63	153.3	4.4	28.4	25.0	3.0	0.1	245.0	12.03
T_3	94.14	4.25	98.25	7.1	116.0	4.25	2.25	7.45	1.0	0.03	214.3	11.35
T_4	92.95	3.85	110.3	7.23	105.0	3.38	4.25	16.25	0.75	0.01	215.3	10.6
T_5	89.84	4.6	89.75	6.13	125.0	3.5	30.75	12.5	2.25	0.08	214.8	9.63
T_6	93.36	4.0	116.5	8.75	105.5	2.75	32.75	11.25	1.5	0.08	222.0	11.43
T_7	92.96	4.9	109.8	8.73	90.75	2.43	6.75	7.5	2.5	0.11	199.5	11.15
T_8	93.36	4.45	112.3	8.4	110.5	2.88	5.5	12.5	2.25	0.08	222.8	11.28
T_9	94.53	3.28	102.0	7.63	104.5	2.78	70.0	68.0	0.75	0.04	206.5	10.40
T_{10}	94.14	4.2	125.8	9.15	113.3	2.78	62.75	36.25	2.5	0.08	239.0	11.93
LSD 5%	6.048	0.7	30.94	2.576	31.23	1.579	16.04	22.18	3.47	0.1835	30.77	2.286

1 = % emergence; 2 = Stem density; 3 = No. of marketable tubers
4 = Wt. of marketable tubers (kg); 5 = No. of small tuber; 6 = Wt. of small tubers (kg)
7 = Scab incidence (%); 8 = Scab severity (%); 9 = No. of bored tubers
10 = Wt. of bored tubers; 11 = Total No. of tubers; 12 = Yield (kg)

in low economic return to the farmers in the market. The results are in accordance with those of Dutt and Pushkarnath (1960) and Pushkarnath ***et al.*** (1966).

Weight of marketable size tubers (kg)

The highest weight of tubers was observed in T_{10} while the lowest was in T_1, T_{10}, T_6 and T_7 were observed significantly different from T_1 and T_5 in terms of weight of tubers.

Numbers of small tubers

The highest numbers of small tubers were observed in T_2 while the lowest were observed in T_7. T_2 is significantly different from T_1, T_3, T_4, T_6, T_7, T_8, T_9 and T_{10}. There is no significant difference among the treatment T_1, T_3, T_4, T_6, T_7, T_8, T_9 and T_{10}.

Weight of small tuber (kg)

The highest weight in kg was observed in T_2 while the lowest weight was observed in T_7, T_2 is significantly different form T_6, T_7, T_9 and T_{10} (Table 1).

Incidence of common scab (%age)

The highest % of disease incidence was observed in T_9 followed by T_{10} while the lowest disease incidence was observed in T_3. T_3 was found significantly different from T_2, T_5, T_6, T_9 and T_{10}. Both the chemicals effectively control the disease as compared to the check (i.e. T_9 and T_{10}). However the best results were obtained when healthy seeds were treated with 3% boric acid solution for 10 minutes in controlling the disease. The results were in accordance with the findings of Sengupta (1993).

Severity of disease (%age)

The disease severity was more in T_9 followed by T_{10}. The lowest disease severity was

observed in T_3. Both the chemicals significantly lowers the disease severity as compared to the control but among these two chemicals there was no significant difference. The results are in agreement with the findings of Somani and Shekhawat (1985) and Somani (1988).

Numbers of bored tubers

The highest number of bored tubers was observed in T_1 while the lowest number of bored tubers was observed in T_4 and T_9. T_1 is significantly different from T_4 and T_9 in terms of bored tubers. No significant difference was observed between T_1, T_2, T_3, T_5, T_6, T_7, T_8 and T_{10}.

Weight of bored tubers (kg)

The highest weight of bored tubers were observed in T_1 while the lowest weight of bored tubers in kg was observed in T_4. T_1 is significantly different from T_4 only in terms of weight of bored tubers.

Yield (kg)

The highest yield was observed in T_2 followed by T_{10}. Although the highest yield was obtained in T_2 but there was no significant difference between T_2 (infected seed treated with 3% boric acid solution for 20 min) and T_{10} (healthy seed untreated) which shows that the pathogen does not affect the yield but it lowers down the quality of tubers only. The results are in accordance with Dutt and Pushkarnath (1960) and Pushkarnath ***et al.*** (1966).

References

Dutt, B.L. and Pushkarnath, 1960. Resistance of potato varieties to powdery scab. Indian Potato J., 2: 78-82.

Paharia, K.D. and Pushkarnath, 1963. Occurance of common scab on potatoes in Bihar. Indian Potato J., 5: 104-105.

Pushkarnath, D. Sahai and S.N.S. Srivastava, 1966. The rot and deterioration of potatoes in storage. In: Sp Ray Chaudhary ***et al.*** (Ed.) Plant diseaseproblems. Proc. Int. Symp. Pl. Pathol., New Dehli, pp: 324-328.

Sengupta-P.C. De-Bk, 1992. Control of common scab disease of potato through boric acid treatment. Indian Agriculturist, 36: 117-124.

Sengupta-P.C. De-B.k., 1993. Chemical control of common scab of potato. J. Indian Potato Assoc., 20: 273-274.

Shekhawat, G.S., 1990. Potato disease and pests and their management in the hills of Himachal Pradesh. J. Indian Potato Assoc., 17: 94-101.

Sing, B.P., R.A. Singh and R.P. Singh, 1986. In: KSK Prasad and NP Sukumaran (Ed.). Potato diseases in Himachal Pradesh> Central Potato Research Institute, Shimla, pp: 30-42.

Somani, A.K. and G>S. Shekhawat, 1985. Evaluation of chemicals to prevent soft rot of potato. J. Indian Potato Assoc., 12: 214-216.

Somani, A.K., 1988. Control of black scurf (***Rhizoctonia solani***) and common scab (***Streptomyces scabies***) of potato (***Solanum tuberosum***) with boric acid. Indian J. Agri. Sci., 8: 696-698.