

Effects of Time of Planting and Irrigation Levels on Incidence of Potato Stem Necrosis Disease (PSND)

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(Received 02/05/2012 ; Accepted 16/06/2012)

Abstract

Potato crop in tarai of Uttarakhand is adversely affected by potato stem necrosis disease (PSND) which is a new record in this area and become a serious problem on the early planted crop in the central western parts of India. During cropping season of 2009-10, the results revealed that more disease incidence (16%) was recorded in early planted crop (24 October) than with late planting (23 November) of K. Bahar which observed only 3% of disease incidence. The effect of irrigation levels was significant and it was found that on any date of planting, more disease was observed with less irrigation.

Key words : Potato, Potato stem necrosis disease (PSND), Disease incidence.

Potato (*Solanum tuberosum* L.) is the world's fourth important food crop after wheat, rice and maize because of its potential and high nutritive value. The United Nations (UN) had officially declared the year 2008 the International Year of the Potato (IYP) (1) to increase awareness of the importance of potato in addressing issues of global concern, including hunger, poverty and threats to the environment. The UN declaration of the IYP reflects the importance of the potato in the diet of the world's population. In India, important diseases of potato are reported to cause nearly 30—40% reduction in yield and this is about 6—10 million tones of potato per year (2). Potato stem necrosis has become a serious problem on the early crop in the central western parts (Including plateau) of India. Disease incidence up to 90% was recorded in some parts of Madhya Pradesh and Rajasthan (3). The management efforts have been made and recommendation includes early planting of tolerant potato cultivars and spraying of systemic insecticide (Imidacloprid) during the first two weeks of crop emergence.

Methods

Field experiments were conducted during *rabi* season of 2009-2010 at Crop Research Center (C. R. C.) and Vegetable Research Center (V. R. C.) of G. B. Pant University of Agriculture and Technology,

Pantnagar Topographically, Pantnagar is located at 29°N latitude and 79.73°E longitude having an altitude of 243.8 meter above mean sea level (MSL), in North-West Plain Zones (NWPZ) and has sub-tropical (hot humid) climate. During the summer, the temperature exceeds 40°C and in winter the minimum temperature often falls below 10°C. Average rainfall in this area is about 1,400 mm per annum. Field trials were conducted during *rabi* season 2009-2010 by planting potato cultivar K. Bahar on three dates viz. 24th October, 8 November and 23 November. The gross plot size of was 7.0 × 5.0 m² (net plot size was 6.4 × 5.0 m²) with spacing of 60 × 20 cm. First appearance of disease and further progress of disease was recorded at weekly intervals using stem necrosis disease intensity assessment key (4).

Nature of infection	Score
No infection	0
Traces scattered patches of necrosis on stem and petiole	1
Coalescing and enlargement of patches on stems covering 2-3 branches	2
Further enlargement of patches with about 5 branches drying	3
Drooping of about 50% branches and 50% stem being infected	4
Drooping of plant, breaking of stems and death of plants	5

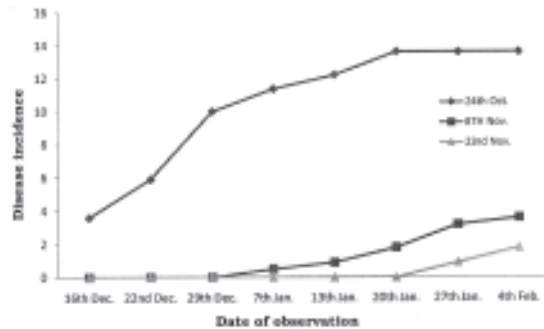


Figure 2. Effect of time of planting on disease incidence of stem necrosis of potato (K.Bahar) with one irrigation.

Disease Incidence (DI)

avoided and the thrips activity was less as compared to early planting. Late planted (23 November) crop showed late appearance of disease and to slow progress of disease due to late planting crop escaped early infection and prevalence of low temperatures during December and January further slowed the progress of disease.

The results are in line with (3). Potato stem necrosis has become a serious problem on the early planted crop in the central western parts (including plateau) of India. Disease incidence up to 90% was recorded in some parts of Madhya Pradesh and Rajasthan. Singh et al. (5) reported the effect of date of planting on thrips population and stem necrosis of potato. Found that highest percent incidence of PSND (74%) was recorded in case of early planting on October 2 followed by 9 October (51.50%).

Table 1. Effect of times of planting on disease incidence (DI) of stem necrosis at CRC trail. T₁-No irrigation, T₂-One irrigation, T₃-Two irrigation, T₄-Three irrigation.

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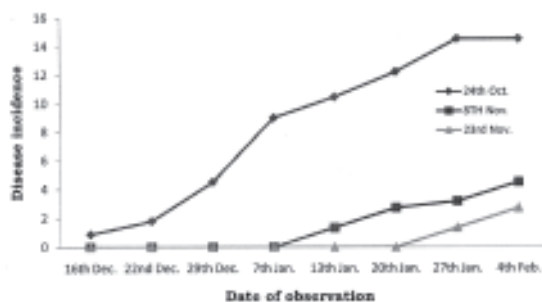


Figure 3. Effect of time of planting on disease incidence of stem necrosis of potato (K. Bahar) with two irrigations.

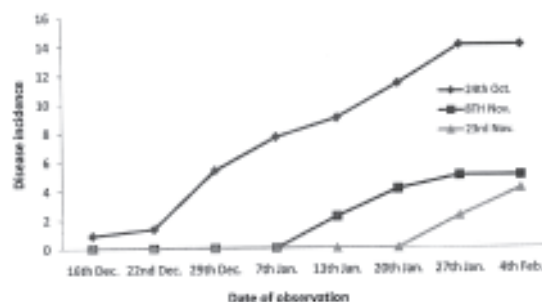


Figure 4. Effect of time of planting on disease incidence of stem necrosis of potato (K. Bahar) with three irrigations.

Effect of Different Levels of Irrigation on Stem Necrosis Incidence

During 2009-10 crop season, data revealed that on early date of planting (24 October) the disease incidence was 18.63% in plots without irrigation and 13.60% for one irrigation level, 14.50% for two irrigation level and 14% for three irrigation levels. Early planted (24 October) crop showed fast progress of disease in plots that had no irrigation, as the crop was less vigorous as compared to other treatments and thrips activity was more during early periods of crop growth. As the irrigation level was increased the disease incidence was decreased probably due to more vigorous growth of plants. The data revealed that crop planted on (8 November) the disease incidence was 5.45% for no irrigation while 3.6, 4.5 and 5% for one, two and three irrigation levels respectively. The progress of disease was slow in late plantings as compared to early planting. The results revealed that on last date of planting (23 November) the disease incidence was only 2.72% for no irrigation while 1.8, 2.72 and 4.09% for one, two and three irrigation levels respectively. The crop showed low level of disease for different irrigation treatments in late planting as the crop duration was 93 days and disease duration was only 23 days. Irrespective of irrigation levels the maximum disease incidence (18%) was recorded on early date of planting (24 October) as compared to low disease incidence was recorded in medium (8 November—4.6%) and late planting (23 November 2.8%)

In conclusion, the efforts were made to study the effect of cultural practices (date of planting and

irrigation levels) on progress of disease which can be utilized for integrated management of PSND. During cropping season 2009-10, the results revealed that more disease incidence (16%) was recorded in early planted crop (24 October) while late planted (23 November) K. Bahar showed less disease incidence (3%). The effect of irrigation levels was significant and it was found that on any date of planting more disease was observed with less irrigation. The data revealed that more disease index, disease severity and AUDPC was recorded in early planted (24 October) K. Bahar. Delay in planting from 24 October to 8 November and to 23 November significantly reduced the disease parameters.

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