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Effect of irrigation regime and IW:CPE ratio on survival of *Phytophthora parasitica* Dastur causing foot and leaf rot of betelvine (*Piper betle* L.)

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As the betel leaves is irrigated frequently, an experiment was laid out to find out the effect of irrigation regime and Irrigation water (IW) : Cumulative pan evaporetion (CPE) ratio on survival of *Phytophthora parasitica* (Dastur) causing foot rot and leaf rot of betelvine (*Piper betle* L.). The experiment was conducted at the pan barejas, situated at Plant Virus Research Farm, BCKV, Kalyani, during winter months. In the treatment rows inoculum of *P. parasitica* were mixed with the soil @ 5000 propagules per g of soil. Irrigation in the form IW:CPE ratio was given as per treatment schedule in between rows. Soils from the different treatment rows were collected for determination of population of *P. parasitica* just before the application of irrigation. The population of *P. parasitica* was enumerated in terms of cfu. The number of irrigation applied was different in different treatment. The results revealed that in case of IW:CPE at 0.75 and at 3 cm irrigation depth, survival of *P. parasitica* was highest. Lowest survival of *P. parasitica* was recorded in the treatment where irrigation was given at 3 cm depth at 1.25 IW:CPE ratio. From this experiment, it could be concluded that when interval of application of irrigationn was increased, the survival of *P. parasitica* was also increased and depth of irrigation had no signifcant effect on survival of the pathogen.

Key words: Irrigation regime, IW:CPE, foot rot, leaf rot, betelvine

INTRODUCTION

Betelvine cultivation is highly risky and returns are uncertain because of its proneness to several diseases, aggravated by the moist and humid conditions of the plantation. The serious diseases reported include a foot rot syndrome produced by a number of pathogens including *Phytophthora parasitica* var. *piperina*, *Phytophthora nicotianae* var *parasitica*, species of *Rhizoctonia*, *Pythium* and *Sclerotium* and foliage diseases like leaf rot by *P. parasitica*, *P. palmivora*, leaf spot and stem anthracnose caused by *Colletorichum capsici* and bacterial leaf spot and stem rot caused by *Xanthomonas campestries* pv. *betlicola*. Among the pathogens, *Phytophthora* sp. perhaps ranks first in its destructiveness under both field and storage conditions. The extent of losses may vary from 30-100% in case of foot rot and 20-40% in case of leaf rot, leading to almost total crop failure (Dasgupta *et al.*, 2000).

Soil moisture plays a vital role in the survival of *Phytophthora* sp. It has been found that disease severity in infested plots increased as flooding frequency increased (Fallon *et al.* 1991). Ristaino *et al.* (1989) have found that less frequent irrigation of infested plots of tomato caused a delay in disease on set. Cafe-Filho *et al.* (1995) have reported that less frequent furrow irrigation is effective way to reduce the loss due to *Phytophthora* sp.

MATERIALS AND METHODS

As the betel leaves is irrigated frequently, the present investigation has been laid out to find out the effect of irrigation regime and IW:CPE ratio on survival of *Phytophthora parasitica* (Dastur) causing foot rot and leaf rot of betelvine(*Piper betel* L.).

The experiment was conducted at the University farm, Kalyani, during winter months. The experiment was started in the month of October and continuted

up to start of the monsoon.

The treatments were as follows :

I_1 0.50 IW:CPE at 3 cm depth
0.50 IW:CPE at 5 cm depth

I_2 0.75 IW:CPE at 3 cm depth
0.75 IW:CPE at 5 cm depth

I_3 1.00 IW:CPE at 3 cm depth
1.00 IW:CPE at 5 cm depth

I_4 1.25 IW:CPE at 3 cm depth
1.25 IW:CPE at 5 cm depth

I_4 Cultivators practice (control)

For estimating cumulative pan evaporation (CPE) a Pan Evaporometer was placed in side the bareja. Before starting experiment the treatment rows were selected with three replications and each treatment row was separated by 3 buffer rows. Inoculum after growing in sand oat meal medium for 15 days was mixed with the soil of each treatment rows @ 5000 propagules per g of soil. Irrigation was given as per treatment schedule in between the row by binding both of the open ends of the channel. Soils from different treatment rows were collected for determination of population of *P. parasitica* just before the application of irrigation. The population of *P. parasitica* was enumerated using carrot agar medium in terms of cfu (colony forming unit). The number of irrigation applied was different in differents treatments. The results were analysed by factorial RBD analysis.

RESULTS AND DISCUSSION

The results (Table 1) showed that when IW:CPE ratio was considered at 3 irrigation depth, higher survival of *P. parasitica* population was recorded in treatment I_2 and it was statistically superior to all other treatments. Lowest survival of *P. parasitica* population was recorded in treatment I_4 and it was statistically at par with I_1 and I_3. When IW:CPE ratio was considered at 5 cm irrigation depth, highest survival of *P. parasitica* population was recorded in I_1 but it was statistically at par with the treatment I_2 and I_4. Lowest survival of *P. parasitica* was recorded in I_3 and it was statistically inferior to all other treatments.

When depth of irrigation was considered, it was observed that at 3 cm depth, higher survival of *P. parasitica* was recorded, although both the depth of irrigation i.e., 3 cm and 5 cm were statistically at par.

Interaction of depth and irrigation water (IW:CPE) showed that I_2 at 3 cm depth and 5 cm depth supported highest population of *P. parasitica.* It was statistically at par with I_1 at 3 cm and 5 cm depth and I_4 at 3 cm and 5 cm depth. The lowest population

Table 1 : Effect of irrigation regime and IW:CPE ratio on survival of *P. parasitica.*

Treatment IW:CPE ratio	Depth of irrigation		
	3 cm	5 cm	Mean
I_1 0.50	880.20[1]	940.86	910.53
I_2 0.75	1020.78	920.50	970.64
I_3 1.00	940.57	770.67	855.62
I_4 1.25	860.00	890.60	875.30
Mean	925.39	880.66	
I_5 (Control)	890.28		
SEm(+) (depth	26.79		
C.D. (5%)	57.46		
SEm (+) (IW:CPE ratio)	37.89		
C.D. (5%)	81.27		
SEm+ (IW:CPE ratio x Depth of irrigation water)	53.57		
C.D. (5%)	114.91		

[1]= Effective inoculum density; IW=irrigation water and CPE=cumulative pan evaporation

of *P. parasitica* was recorded in treatment I_3 at 3 cm and 5 cm depth and it was statistically at par with two subsequent treatments. The results contradicts the findings of Fallon *et al.,* (1991)., Ristaino *et al.* (1989) and Cafe-Filho *et al.,* (1995) where they observed that less frequent furrow irrigation was effective way to reduce the loss due to *Phytophthora* sp.

From the results it could be concluded that the highest survival of *P. parasitica* was recorded at IW:CPE 0.75 at 3 cm depth and there after survival of population decreased with increases in irrigation regime. At 5 cm depth the highest survival of *P. parasitica* was recorded at IW:CPE 0.50 and there after survival of population decreased with increases in irrigation regime. The depth of irrigation had no effect on survival of *Phytophthora parasitica.*

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