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MANAGEMENT OF *SCLEROTAIL* WILT DISEASE OF BETELVINE IN MADHYA PRADESH

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ABSTRACT
Stem rot or basal rot of Betelvine (*Piper betle* L.) caused by *Sclerotium rolfsii* is most destructive disease in Madhya Pradesh. The results of research as well as on farm trails revealed that the Sclerotial wilt disease significantly controlled by seed treatment and soil drenching with Hexaconozole (4.5 %), *Trichoderma viride* (4.6 %) and Carboxin + Thiram (4.8 %) in comparison to control (21.7%). In on farm research trails, sclerotial wilt disease incidence reduced 84.6 % by seed + soil drenching with Hexaconozole 0.1 per cent.

INTRODUCTION

Betelvine (*Piper betle* L.) is an important cash crop and cultivated in the several states of the country with an area of about 52,000 ha. In Madhya Pradesh, it is cultivated in an area of 4000 ha for its leaves, known as "Pan". Betel leaves are richest source of Vitamins and minerals, essential for human health (Anonymous, 2002). In Madhya Pradesh, the crop is cultivated in artificially prepared garden; locally called "Bareja". The structure of bareja provides moist, humid and shaded condition inside; favorable for vine growth these conditions are also congenial for development of many root and aerial diseases like, Stem rot or basal rot (Monhanty and Das Gupta, 2005). Stem rot or basal rot or sclerotial wilt of Betelvine (*Piper betle* L.) caused by *Sclerotium rolfsii* is prevalent in almost all the betelvine growing areas of Madhya Pradesh. It is more destructive when associated with *Phytophthora* sp. *Trichoderma harzianum* and some of the systemic fungicide have been consistently recommended for *Sclerotial* stem rot control by Singh and Singh (2005) but qulity of bio-agent is a limiting factor among its adoption among the farmers.

Sclerotium rolfsii initiate infection usually at the collar region of susceptible host, as result of which white cottony growth appears, which later forms white sclerotia in the collar region of dead plants. (Punja and Grogan, 1985). Disease normally appears when temperature of soil and humidity in bareja is high. These conditions are common in April- July. The fungus attacks in collar region. After death of plant white sclerotia are present in the collar region of dead plants. The effective control measures against the disease are needed, besides eco-friendly approach for betelvine production and protection is need of the day. Hence, the present investigation was carried out on the management of betel vine diseases with new fungicides in comparison with the traditional application of Bordeaux mixture.

MATERIALS AND METHODS

The trails were conducted at Betelvine Research Station (JNKVV), Nowgong, Chhatarpur (M.P.) as well as farmer's fields in the Betelvine growing villages of Chhatarpur districts in Bundelkhand region of Madhya Pradesh in light to medium soil, slightly alkaline low in available nitrogen, medium in available phosphors and potash to control the betelvine diseases with special reference to Sclerotial wilt. Betelvine (var. Bilhari) was planted in second week of March 2008 in raised rows 60 cm apart and plant to plant distance was kept 20 cm. Four healthy cuttings with mother leaves were planted in paired rows of 4 metre length. The gross plot size was 1.2 X 4 met^2 in which two row of betelvine were planted in randomized block design with three replications. The cuttings of betelvine firstly treated by Streptocycline and then in each treatment. The treatments were - Corboxin 37.5 % + Thiram37.5 % (Vitavax power), Metalaxyl 8 % + Mancozeb 64 % (Dhanuxyl), Carbendazion 12 % + Mancozeb 63 % (Sixer), Copper oxychloride 50 % (Blitox) Hexaconazol 5 EC (Cantaf), *Trichoderma viride* (Niptron) and Control. First drenching of soil with each treatment was done in the last week of April. General spray with Mancozeb was given in the month of October to check the infection from anthracnose disease and spray with Dichlor was 76 S L for control of coccids and sooty mould. Bacterial leaf spot symptoms developed in few leaves which were roughed out periodically as suggested by Anonymous, 2002. The percentage motility was recorded for

calculation PDI (percentage disease intensity) by stem rot / Phytophthora leaf rot periodically. Finally the yield was recorded and data was subjected to statistical analysis to know the effectiveness of each treatment against sclerotial wilt (Rangaswamy, 2002). The following formulae were used to calculate the parameters:

Disease incidence (%) = Number of wilted plant/ total number of plant in a selected plot X 100

Increase in Yield = Yield from treatment – Yield from FP or control plot /Yield from treatment plot X 100

For validation of the technology generated through research experiment, on farm trails were conducted on 20 farmer's fields of two Betelvine growing villages viz; Garhi malehra and Maharajpur of Chhatarpur district in Bundelkhand region of Madhya Pradesh during summer seasons of 2009 to 2011 in light to medium soil with low to medium fertility status. Each trail was conducted on an area of 0.40 ha with three treatments (T1- Betelvine cutting treatment with Hexaconazole 0.1 per cent, T2- Cutting treatment with Hexaconazole 0.1 per cent and soil drenching with the same fungicide @ 0.1 per cent after one month of planting, T3- Cutting treatment with Bordeaux mixture 0.2 per cent as farmers practice). Cutting of Betelvine were planted between February 25 to 10 March in both the years with spacing of rows to row 60 cm and plant to plant 20 cm. Recommended dose of fertilizer (150 :80:50 NPK kg ha-1) were supplied through Oil cakes 25 q/ha, urea, single super phosphate and murate of potash. Full doses of phosphorus, potassium and ½ dose of nitrogen were applied as basal. The remaining half amount of nitrogen was top dressed in four split doses Data on germination per cent, disease incidence, yield of green leaves were recorded during the crop.

RESULTS AND DISCUSSION

The data on germination, disease incidence and yield of betelvine are presented in Table 1. It is evident from the data that all the fungicides were increases the germination of Betelvine and controlling the disease as compared to control. Seed treatment and soil drenching with fungicides gave better survival of cutting as compared to control. Least Sclerotial wilt incidence was recorded in Hexaconazole 4.5 % whereas 21.7 % in control plot. However, Hexaconazole, Carboxin + Thiram (4.8%) and *Trichoderma viridae* (6.6%) were at par and superior to all the other treatments and control. The quality of fast multiplication and myco-parasitism of *T. viridae* reduces the population of soil fungi like *sclerotium rolfsii* as also reported by Tripathi (2014). *Trichoderma harzianum* and some of the systemic fungicide have been consistently recommended for *Sclerotial* stem rot control by other workers (Singh and Singh, 2005 and Chattopadhyay, 1967). The incidence of Phytophthora foot and leaf rot effectively controlled by Copper oxychloride (4.8 %) Metalaxyl + Mancozeb (6.2 %) and *Trichoderma viride* (7.5 %) and statistically at par. Effectiveness of the Copper oxychloride formulation in reducing the intensity of Phytophthora rot stand confirmed (Mohanty and Das Gupta, 2005 and Maithi *et al*., 1978). Yield of Betelvine was significantly higher under Metalaxyl + Mancozeb (78.7 q/ ha), Copper oxychloride (75.0 q/ha), *Trichoderma viridae* (71.2 q/ha), Hexaconazole (68.6 q/ha) and over control (37.5 q/ha). Earlier worker Maithi *et al*. (1978), Chattopadhyay, 1967, Singh and Singh (2005) and Chakrabarty *et al*. (2013) also reported the higher yield of betelvine by the application of Carbedazim, *Trichoderma harzianum* and Copper oxy-chloride in comparison to untreated control.

The Results of on farm trails (Table 2) revealed that Sclerotial wilt disease incidence was minimum in the treatment of seed + soil drenching with Hexaconozole 0.1 per cent i.e. 2.4 % and 7.4 in Seed (planting material) treatment with Hexaconozole 0.1 per cent in comparison to farmers practice 15.6 %. Both the treatments reduced the sclerotial wilt incidence by 84.6 and 52.5 per cent. By the use of proper control measure yield of Betelvine increased from 61 q/ha to 64.5 (5.7 %) and 78.4 q/ha (28.5 %).

For eco-friendly and economical cultivation of Betelvine, application of bio-agents like *T. viridae* as seed treatment and

Table 1: Effect of fungicidal seed treatment and soil drenching on Sclerotail wilt disease of Betelvine

S. No	Treatments	Germination (%)	Sclerotial wilt incidence (%)	Yield (q/ha)	Additional yield after treatment (q/ha)
1	Carboxin 37.5 % +Thiram37.5 % (Vitavax power)	97	4.8	63.7	26.2
2	Metalaxyl 8 % + Mancozeb 64 % (Dhanuxyl)	98	7.8	78.7	41.2
3	Carbendazion 12 % + Mancozeb 63 % (Sixer)	94	11.4	60.0	22.5
4	Copper oxychloride 50 % (Blitox)	97	6.8	75.0	37.5
5	Hexaconazol 5 EC (Cantaf)	92	4.5	68.6	31.1
6	*Trichoderma viride* (Niptron)	98	6.6	71.2	33.7
7	Control	89	21.7	37.5	-
	CD(5%)	3.3	5.49	5.94	-

Table 2: Management of Sclerotial wilt disease in Betelvine under On farm trails (Mean of two years i.e. 2010-11 and 2011-12)

Treatments	Sclerotial wilt disease incidence (%)	Yield (q/ha)	Increase in yield (%)
Cutting treatment of Betelvine with Hexaconazole 0.1 per cent	7.4	64.5	5.7
Cutting treatment of Betelvine with Hexaconazole 0.1 per cent and Soil drenching with the same fungicide after one month of planting	2.4	78.4	28.5
Cutting treatment with Bordeaux mixture (Farmers practice)	15.6	61.0	-

soil drenching reduces the growth of soil borne fungi *i.e. Phytophthora* and *sclerotium rolfsii* due to its quality of fast multiplication and myco-parasitism as also reported by Chakrabarty *et al*. (2013) and Singh *et al*. (2006).

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