independent variables *viz.*, fodder, concentrates and maintenance cost during dry period to the extent of 94.31 percent. The co-efficient of multiple correlation 0.9711 is highly significant at 1 per cent level of significance.

The study of the partial regression co-efficients revealed that the income from milk increased by Rs. 2.281 and Rs.1.943 respectively with every rupee of expenditure on fodder and concentrates and diminishes by Rs. 0.721 for every rupee of expenditure during dry period.

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EFFECT OF SOIL DRENCHING WITH BORDEAUX MIXTURE ON THE MANAGEMENT OF PHYTOPHTHORA WILT OF BETELVINE (*PIPER BETLE* L.)

R. RABINDRAN and T. MARIMUTHU
Centre for Plant Protection Studies,
TNAU, Coimbatore - 641 003

ABSTRACT

Field trials conducted revealed that for effective and economical control of *Phytophthora* wilt, Bordeaux mixture 0.25 per cent has to be applied either by forming furrows along the hills or forming basins around the hills at 30 days interval.

KEY WORDS : Betelvine, wilt, Bordeaux mixture, *Phytophthora palmivora*.

Betelvine is one of the most economically important cash crops of Tamil Nadu. Betelvine cultivation is a highly specialised job and the crop requires greater care and huge investment when compared to any other crop. In Tamil Nadu betelvine is threatened with many diseases; by far, the most important one is the wilt caused by *Phytophthora palmivora* which takes a very heavy toll which runs into lakhs of rupees year after year (Marimuthu and Samiyappan, 1982). Since its first report by Dastur (1926), attempts have been made to control this disease by using various fungicides (Subramanian and Venkata Rao, 1970; Venkata Rao *et al.*, 1969; Antoni Raj *et al.*, 1973; Narasimhan *et al.*, 1976). Perusal of the work on the chemical control of wilt shows that the workers who attempted chemical control of *Phytophthora* wilt through Bordeaux mixture have tried only higher concentrations. Further, not much work has been done to determine the effect and economical concentration and proper method of application of Bordeaux mixture and hence the present study was undertaken.

MATERIALS AND METHODS

Experiments were laid out in Randomised Block Design at Pothanur from 1982 to 1985 to assess the effective and

economical concentration and interval between drenchings of copper fungicides like Bordeaux mixture and copper oxychloride (Fytolan) in containing the wilt. Three levels of Bordeaux mixture *viz.*, 1.0 0.5, 0.25 per cent and two levels of copper oxychloride 0.3 and 0.5 per cent were applied in basins at 15, 30 and 45 days interval. In a separate trial conducted during 1984-85 and 1985-86 in two locations, Bordeaux mixture was applied at 1.0, 0.5 and 0.25 per cent concentrations following four different methods *viz.*, forming basin around the hills, forming 3 peg holes near the root zone, drenching with rose can and forming furrows to the entire length of the bed along the hills. The drenchings were given at monthly interval at the rate of 500 ml/hill during September to February. The susceptible variety Karpoori was used throughout the period of study under trench type of cultivation. Forty hills (40 x 2 vines) were maintained per treatment per replication in both the experiment. Observations on per cent wilt incidence. yield of leaves in weight and numbers recorded are furnished in Tables 1, 2 and 3.

RESULTS AND DISCUSSION

The first set of experiment conducted for three years revealed that all the treatments were significantly superior over control in containing wilt except drenching with Bordeaux mixture 0.25 per cent at 45 days interval. The beds receiving copper oxychloride 0.5 per cent at 15 days interval

Table 1. Effect of soil drenching with copper fungicides and frequenncy of application on the management of Phtophthora wilt and yield of betel leaves.

S.No.	Treatments	Interval	Pooled mean for three years from 1982 to 1985	
			Mean percent wilt incidence	Yield of leaves in bundles of 100 leaves *
1.	Bordeaux mixture 1.0%	15 days	8.00 (16.19)	86.97
2.	- do -	30 days	9.97 (16.63)	86.11
3.	- do -	45 days	13.67 (21.00)	85.93
4.	Bordeaux mixture 0.5%	15 days	10.69 (18.59)	86.51
5.		30 days	10.19 (18.51)	83.31
6.	- do -	45 days	10.14 (18.23)	83.60
7.	Bordeaux mixture 0.25%	15 days	8.85 (17.29)	88.37
8.	- do -	30 days	13.82 (19.66)	90.28
9.	- do -	45 days	24.42 (26.94)	77.20
10.	Copper oxychloride 0.3%	15 days	13.87 (19.88)	92.70
11.	- do -	30 days	11.16 (19.40)	82.17
12.	- do -	45 days	17.15 (24.35)	86.43
13.	Copper oxychloride 0.5%	15 days	5.71 (11.76)	88.61
14.	- do -	30 days	8.90 (15.17)	88.55
15.	- do -	45 days	14.55 (19.79)	81.42
16.	Control		33.94 (35.10)	67.98
		CD (P = 0.01)	11.85	9.56

Figures in parenthesis are transformed values.
Population : 40 hills/treatment.
* Yield recorded from October to March.

gave maximum reduction of *Phytophthora* wilt. However, it is on par with all the other treatments. The beds drenched with copper oxychloride 0.3 per cent at 15 days interval gave maximum yield and it was on par with drenching copper oxychloride 0.5 per cent at 15 and 30 days interval. Drenching Bordeaux mixture 1.0 and 0.25 per cent at 15 and 30 days interval and Bordeaux mixture 1.0 and 0.5 per cent at 15 days interval were on par with each other. While considering the cost benefit ratio, application of Bordeaux mixture 0.25 per cent at 30 days interval was found to be effective and economical with a cost benefit ratio of 1:5.58.

The results of the second set of experiment envisaging different methods and concentrations revealed that Bordeaux mixture at all concentrations when applied in any of the methods has significantly reduced the wilt incidence. However, among the four different methods of drenching, the rose can method was inferior to other three methods in containing wilt Maximum reduction of wilt was recorded i beds drenched with 1.0 per cent Bordeau: mixture (8.85), with about 60.2 per cen reduction of wilt over control. Maximun yield of leaves was obtained in bed: drenched with 1.0 per cent Bordeau: mixture in basin.

Sharma and Jain (1977) pointed out the inconsistency of results in controllin *Phytophthora* wilt through coppe fungicides. In a thought provoking revie they have stated that the experiments or fungicidal control of foot-rot of betelvine had been a merry-go-round research so far. getting the same results with no solution tc the problem and will continue to remain sc if the approach is remaining the same. Further, Sharma and Jain (1965) found that copper fungicides in suspension wher applied on soil remain on the surface and even the copper ions in solution ge absorbed to soil colloids. It is imperative that the copper fungicides are to be placed as nearer as possible to the root zone o

Table 2. Effect of diffferent methods and concentrations of Bordeaux mixture drenching on wilt and yield of betal leaves.

S.No.	Treatments	Methods	Percent wilt incidence	Yield of leaves	
				Kg	bundles *
1.	Bordeaux mixture 1.0%	Basin	8.85	8.77	30.41
2.	- do -	Holes	10.60	8.21	28.15
3.	- do -	Rose can	17.60	7.93	27.63
4.	- do -	Furrows	10.25	7.80	27.28
5.	Bordeaux mixture 0.5%	Basin	9.97	8.19	27.55
6.	- do -	Holes	8.89	7.93	27.51
7.	- do -	Rose can	14.69	7.94	26.49
8.	- do -	Furrows	9.71	7.88	27.40
9.	Bordeaux mixture 0.25%	Basin	11.40	8.16	28.17
10.	- do -	Holes	11.74	7.96	27.68
11.	- do -	Rose can	14.43	7.50	25.46
12.	- do -	Furrows	9.70	8.01	27.83
13.	Control		22.28	5.70	22.26
		CD (P = 0.01)	1.88	2.43	1.14

* Mean of 3 season / location. @ 1 bundle = 100 leaves.

Table 3. Economics of different treatments in the management of Phytophthora wilt of betalvine

S.No.	Treatments		Interval	Average * yield of leaves in numbers	Yield / * acre (baskets)	Increased yield/ acre over control	Cost of inputs Rs.	Profit / acre Rs.	Cost benefit ratio
1.	Bordeaux mixture	1.0%	15 days	8696	2174.00	474.50	16464	-2110.37	1:0
2.			30 days	8611	2152.00	452.50	8232	5456.13	1:0.6
3.			45 days	8593	2148.25	448.75	5458	8116.69	1:1.4
4.	Bordeaux mixture	0.5%	15 days	8651	2162.75	463.25	8904	5109.31	1:0.5
5.			30 days	8331	2082.75	383.25	4452	7141.31	1:1.6
6.			45 days	8360	2090.00	392.50	2968	8905.13	1:3.0
7.	Bordeaux mixture	0.25%	15 days	8837	2209.25	509.75	5124	10295.94	1:2.0
8.			30 days	9028	2257.00	557.50	2562	14302.38	1:5.6
9.			45 days	7720	922.00	230.50	1708	5264.63	1:3.0
10.	Copper oxychloride	0.5%	15 days	9270	2317.50	618.00	12144	6550.50	1:0.5
11.			30 days	8217	2054.25	354.75	6072	4659.19	1:0.7
12.			45 days	8643	2160.75	461.25	4048	9904.81	1:2.4
13.	Copper oxychloride	0.3%	15 days	8861	2215.25	515.75	19344	-3742.56	1:3.0
14.			30 days	8855	2213.75	514.25	9672	5884.06	1:0.6
15.			45 days	8142	2035.50	336.00	6448	3716.00	1:0.5
16.	Control			6798	1699.50				

* Value of leaves : Rs. 30.25/2000 leaves (1 basket).
Cost of copper sulphate = Rs. 14.80/Kg ; Cost of lime : Rs. 2.00/Kg
Cost of copper oxychloride (Fytolan) : Rs.40.00/Kg.
Fungicidal fluid 7500 litres / ac. / application.

betelvine for getting maximum effect of the copper compounds.

Further studies with different methods of application revealed that Bordeaux mixture when applied either in basin formed around the hills or in furrows formed along the hills or in peg holes at lower concentrations (0.5 per cent and 0.25 percent) gave maximum reduction of wilt with increased yield of leaves.

Copper fungicides (both Bordeaux mixture and copper oxychloride) have been proved to be effective in controlling the *Phytophthora* wilt of betelvine by several workers (Subramanian and Venkata Rao, 1970; Anthoni Raj *et al.*, 1973; Narasimhan *et al.*, 1976), which is also in conformity with the present study. Though Bordeaux mixture and copper oxychloride at higher concentration were more efficient in containing the wilt, the cost of chemicals are very prohibitive. In lieu of high cost of chemicals Bordeaux mixture 0.25 per cent at 30 days interval could conveniently be applied by forming basins around the hill or forming furrows along the hills for economical and efficient management of *Phytophthora* wilt of betelvine.

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INFLUENCE OF PROPAGULES, MEDIUM AND SEASON ON ROOTING OF CHRYSANTHEMUM

L. JEEVA JOTHI, K. NANJAN, N. CHEZHIYAN and MD. ABDUL KHADER
Department of Floriculture, Tamil Nadu Agricultural University, Coimbatore - 641 003.

ABSTRACT

An experiment was conducted to study the effect of five different types of propagules and two media on rooting of chrysanthemum Co 1. Suckers and terminal cuttings from vegetative shoots recorded higher percentage of rooting, more number of primary and lengthier roots when compared to other propagules. Sand was the best medium for rooting chrysanthemum propagules, while June - July was found to be the best season.

KEY WORDS : Chrysanthemum, Rooting.

Chrysanthemum is one of the most important commercial flower crops of Tamil Nadu. It is cultivated in an area of 1,200 ha in Tamil Nadu, the commercial types being yellow, white with yellow centre and pink with yellow centre. Recently two improved varieties *viz.*, Co 1 and MDU 1 have been released by the Tamil Nadu Agricultural University for commercial cultivation. Generally suckers from the previous crop