caju (20.25 mg/100g), *P.eous* (17.81 mg/100g), *P.flabellatus* (17.93 mg/100g), *P.florida* (17.87 mg/100g) and *P.sapidus* (16.99 mg/100g) were significantly higher when grown on cotton + paddy, soybean, cotton + wheat, cotton + paddy and cotton + wheat straw.

It could be concluded from the results that the mineral contents of different *Pleurotus* spp. differed differently when cultivated on different agro-wastes. The *Pleurotus* spp. observed to be rich in phosphorus, iron, potassium and deficient in sodium and calcium and provide valuable nutrients to the diet. Due to high K/Na ratio, mushrooms were recommended to be the best food for the persons suffering from hypertension and heart diseases. Similar results in respect of mineral contents of *Pleurotus* spp. were reported earlier (Bisaria *et al.* 1987; Verma *et al.* 1987; Prasad, 1997; Rai *et al.* 1998). Alofe (1991). Ereifei and Raddad (1999) reported that the trace element contents were varied by species, stage of growth, type of substrates used, variety of mushroom and they also reported that mushrooms were the chief source of Ca, K, Mg, iron, P and Zn.

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Research Notes

Effect of fungicides on *Phytophthora capsici* in black pepper

M. JAYASEKHAR
Horticultural Research Station, Tamil Nadu Agricultural University, Pechiparai-629 161.

Foot rot of black pepper caused by *Phytophthora capsici* Leonian emend A.Alizadeh and PH.Tsao is one of the major diseases which occurs both in nursery as well as in grown up vines. In view of the season bound nature of the disease and lack of early detection of root infection, fixed schedules of fungicides application are recommended. Wilson *et al.* (1974) studied the *in vitro* effect of different organic fungicides and reported that complete inhibition of growth of the fungus could be obtained with ceresan-wet, captafol, mancozeb, miltox and thiram.

In this study different fungicides *viz.* copper oxychloride, bordeaux mixture, carben-

dazim, ethazole, fosetyl-Al and metalaxyl were tested for their efficacy in inhibiting the growth of *P.capsici* by poisoned food technique at two levels of concentrations. The fungicides were mixed with Potato Dextrose Agar (PDA) before inoculation. Twenty ml of media were added to each petriplate and the plates were inoculated with 10 mm mycelial disc of *P.capsici* and incubated for four days at room temperature (28 ± 2°C). The treatments were replicated thrice and suitable control were maintained. The linear mycelial growth was recorded after four days and the per cent reduction in mycelial growth over control was calculated. A pot culture experiment was also conducted to find out the efficacy of fungicides on foot rot disease incidence in nursery at Horticultural Research Station, Pechiparai. Three months old Panniyur 1 pepper cuttings raised in polybags were used. Five per cent inoculum multiplied in sand-maize medium was incorporated before planting. The fungicides at two concentrations were applied as soil drenching. Four replications with control was maintained and per cent disease incidence was recorded.

Among the fungicides metalaxyl was highly effective at 0.1 per cent and complete inhibition of growth was observed. This was followed by metalaxyl (0.05%), Bordeaux mixture (1%) copper oxychloride (0.2%) and fosetyl-Al (0.1%) which recorded an inhibition of 94.70 93.30 91.10 and 90.70 per cent respectively over control. The minimum inhibition of 6.7 per cent was recorded in carbendazim (0.05%). The hyphae and sporangium of the fungus could be completely inhibited by metalaxyl.

In pot culture, among the fungicides tested metalaxyl 0.1 per cent concentration was significantly superior in disease control by recording a minimum of 18.0 per cent which was 78.05 per cent reduction over control. This treatment was significantly followed by Bordeaux mixture (1%) which recorded 24.0 per cent disease incidence. Carbendazim at 0.05 and 0.1 per cent was ineffective which recorded 78.0 and 70.0 per cent disease incidence respectively as against 82.0 per cent in control. Ramachandran *et al.* (1988) confirmed that metalaxyl was highly effective in suppressing soil production of *P. palmivora*.

Table 1. Effect of fungicides on pepper foot rot disease *P. capsici* incidence

Sl. No.	Fungicide concentration (%)		Mycelial growth of *P. capsici* (mm)	Inhibition over control (%)	Disease incidence (%)	Decrease over control (%)
1.	Copper oxychloride	(0.1)	32.4	64.0	56.0 (48.40)	31.70
2.	Copper oxychloride	(0.2)	8.0	91.1	32.0 (34.67)	60.98
3.	Bordeaux mixture	(0.5)	32.0	64.4	40.0 (39.33)	51.22
4.	Bordeaux mixture	(1.0)	6.0	93.3	24.0 (29.30)	70.73
5.	Carbendazim	(0.05)	84.6	6.7	78.0 (62.03)	4.88
6.	Carbendazim	(0.1)	76.4	15.0	70.0 (56.70)	14.63
7.	Ethazole	(0.05)	49.2	4.3	58.0 (49.65)	29.27
8.	Ethazole	(0.1)	21.0	76.7	44.0 (41.50)	46.34
9.	Fosetyl-Al	(0.05)	26.4	70.7	49.0 (44.50)	40.24
10.	Fosetyl-Al	(0.1)	8.4	90.7	35.0 (36.35)	57.32
11.	Metalaxyl	(0.05)	4.8	94.7	26.0 (30.62)	68.29
12.	Metalaxyl	(0.1)	0.0	100.0	18.0 (25.10)	78.05
13.	Control		90.0	-	82.0 (64.90)	
	CD (P=0.05)		4.6	-	4.4	

(Figures in parentheses are arcsine transformed values)

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Research Notes

Effect of root dipping of seedlings with plant growth regulators and chemicals on yield and yield components of rice (*Oryza sativa* L.) transplanted by broadcast method

A. SENTHIL, M. DJANAGUIRAMAN AND R. CHANDRA BABU

Department of Crop Physiology, Tamil Nadu Agricultural University, Coimbatore-641 003, Tamil Nadu

Presowing treatments to seeds or seedlings with growth regulators and other chemical substances have been found effective for improving plant growth and development (Gupta, 1956). However, the role of these growth regulators and other chemicals in improving agricultural productivity of many crops has largely remained unexplored. Thus the present study has been conducted in the Department of Crop Physiology, Tamil Nadu Agricultural University, Coimbatore during 1997-1999 to assess the effect of different growth regulators and chemicals on the yield and yield components of rice, transplanted by broadcast method.

The practice of broadcasting the seedling in the main field has the advantage of time and labour saving and thus minimise the cost of cultivation, though this practice pose problems like poor rooting, poor establishment and late maturity which finally reflects on the yield. To overcome these problems, a trial was conducted by root dipping of rice seedlings with plant growth regulators (PGRs) and chemicals. The PGRs IBA (25 ppm), NAA (25 ppm), Mepiquat chloride (10 ppm), CCC (10 ppm), Alar (25 ppm) and Chemicals Thiamine (10 ppm), Ascorbic acid (10 ppm), Resorcinol (25 ppm) and $ZnSO_4$ (2.5%) were given as root dipping for 60 minutes (Table 1).

Data on the yield and yield components indicated that there is a possibility of yield increase in rice by root dipping treatment with PGRs and chemicals. The yield and yield components showed significant improvement as a result of root dipping treatments. The number of productive tillers $hill^{-1}$, number of filled grains $panicle^{-1}$, 1000 grain weight and harvest index (HI) were higher in IBA (25 ppm) treatment followed by mepiquat chloride and thiamine treatments. For instance, the root dipping of 25 day old seedlings with IBA 25 ppm increased the grain yield by 17.86 per cent over untreated control.

Significant yield increase in wheat by presoaking of seedlings with IBA and vitamins (Thiamine) had been reported earlier by Chhipa and Lal (1988). Increased grain yield may be due to enhanced growth and translocation of photo assimilates to the reproductive organs, increased panicle number, total grain number, filled grain number and 1000 grain weight (Chatterjee *et al.* 1975).

From this study, it is evident that root dipping of seedlings with PGRs and chemicals has got positive effect on yield improvement in rice.

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