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Short Communication

Evaluation of Arka Microbial Consortium Technology in Black Pepper

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ABSTRACT

Arka Microbial Consortia (AMC) is an unique microbial technology released from ICAR-IIHR, Bengaluru for plant nutrition and health management in horticultural crops. It is a consortium of 3 unique bacterial strains viz. Bacillus, Pseudomonas and Azotobacter. This technology was introduced by ICAR-KVK, Gonikoppal in Kodagu district of Karnataka for addressing the problems faced by black pepper farmers of the district who were facing various problems like yellowing of leaves, spike dropping and death of vines due to a variety of factors like lack of nutrient uptake, nematodes, and Phytophthora infection. Farmers were applying different agro-chemicals to soils, thereby creating environmental hazards and increasing the cost of cultivation and still the vines were declining. The Microbial consortium technology was taken up as an on-farm trial and compared with 4 other treatments. It was found that drenching of pepper vines with AMC (@ 20g/l) three times in a year performed significantly better in terms of reduction in leaf yellowing, collar infection incidence, and wilting of vines. The pepper dry yield recorded with AMC application was 4.64q/ha which was higher than the other practices. The benefit cost ratio of 3.56 was higher than other practices. The technology gained popularity with the farmers and it is being followed by more than 2000 farmers of the district covering an area of 8000 ha. ICAR-KVK, Gonikoppal is annually producing 10-12 t of the AMC.

Key Words: Akra Microbial Consortium, Black Pepper, Phytophthora, yellowing, Kodagu, Income

INTRODUCTION

Arka Microbial Consortium is a carrier based product which contains N fixing, P & Zn solubilizing and plant growth promoting microbes as a single formulation. It is a consortium of 3 unique bacterial strains viz. Bacillus aryabhattai, Pseudomonas taiwanensis and Azotobacter tropicalis. The novelty of this technology is that farmers need not apply N fixing, phosphorous solubilizing and growth promoting bacterial inoculants individually. It can be conveniently, applied either through seed, soil, water and nursery media like coco-peat. This technology was introduced by ICAR-KVK, Gonikoppal in Kodagu district of Karnataka for addressing the problems faced by black pepper (Piper nigrum) farmers of the district who were facing various problems like yellowing of leaves, spike dropping and death of vines due to a variety of factors like lack of nutrient uptake, nematodes and Phytophthora infection. Farmers were applying different agro-chemicals to soils, thereby creating environmental hazards and increasing the cost of cultivation and still the vines were declining.

Black Pepper is cultivated to a large extent in Karnataka, Kerala and to a limited extent in Tamil Nadu and other states. The crop is grown in about 0.165 lakh hectares with a production of 364 t annually with productivity of 761 kg/ha. Kerala and Karnataka account for a major portion (92%) of production of black pepper in the country (Anon, 2013). The major problems in Black Pepper cultivation is infestation by fungi, bacteria, plant

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parasitic nematodes, phytoplasma and phanerogamic parasites (Anandaraj, 2000). Among the diseases caused by fungi, foot rot disease commonly known as quick wilt disease caused by Phytophthora capsici, yellowing due to nematodes is the major limiting factor in black pepper production. Foot rot disease occurs mainly during south west monsoon period (June to September) and occasionally up to November. Phytophthora foot rot, considered the most devastating disease of black pepper, has been reported to cause an annual crop loss of 5-10% (Kueh, 1990) and up to 95% for individual farmers (Manohara et al, 2004). Keeping this in view, ICAR-KVK, Gonikoppal, Kodagu conducted an on farm trial to test different technologies for solving the problems faced by black pepper farmers of Kodagu district in Karnataka.

MATERIALS AND METHODS

Field trials on management of yellowing in Black Pepper was carried out using different treatments of chemicals, biological agents and biofertilizer in farmer's field at Aruvuthoklu, Balyamanduru and Hudikeri villages of Virajpet Taluk of Kodagu District in Karnataka for two years during 2015-17 (with a population of 100 vines/ha in coffee based mixed cropping system). The treatments included spraying of 1% Bordeaux mixture (T1), spraying with Bordeaux mixture and drenching of Metalaxyl + Mancozeb (T2), soil application of Pseudomonas florescence along with FYM and mulching of UV stabilized plastic sheet around the base of the plant (T3), spraying of Potassium Phosphonate 3ml/l and drenching of Arka Microbial Consortium 20 g per lit (T4) and untreated check (T5). For each treatment 10 pepper vines were taken. AMC was drenched three times, during May-June, August-September and November- December months. The observations on percent yellowing and leaf infection, collar infection, wilted vines andyellowing (%) were recorded. The yellowing and leaf infection (%) was calculated at three areas (0.5 sqm) randomly selected in the canopy of black Pepper vines, preferably each at lower level, middle level and upper level of the canopy. The formula used is given below

$$\text{Percent Leaf Infection} = \frac{\text{No. of leaves infected by the disease}}{\text{Total no. of leaves in a vine}} \times 100$$

The collar infection and wilted vines were calculated as per the formula given below

$$\text{Percent collar infection/ wilted vines} = \frac{\text{No. of Plants infected (Collar infection)/wilted vines}}{\text{Total no. of Plants}} \times 100$$

RESULTS AND DISCUSSION

The least yellowing (7.99%), leaf infection (2.24%),collar infection (4.11%), wilted vines (0 %) was observed in the treatment involving spraying of Potassium Phosphonate and drenching of Arka Microbial Consortium. The highest percent yellowing (23.9 %), leaf infection (50.1 %) of Phytophthora, collar infection (26.3 %) and wilted vines (26.2 %) was observed in untreated check which was followed by the treatments T1, T2, T3.

The highest dry pepper yield (4.64 q/ha) was recorded in the treatment involving AMC application. The least dry pepper yield was observed in untreated check (1.25 q/ha) which was followed by the treatment T1 (3.35 q/ha), T2 (3.89 q/ha) and T3 (4.10q/ha). The benefit cost ratio of 3.56 was highest in the AMC treatment. The least benefit cost ratio of 1.20 was observed in untreated check, which was followed by the treatment T1 (2.89), T2 (3.01) and T3 (3.21).

CONCLUSION

It was found that drenching of pepper vines with AMC at 20g/l three times in a year and spraying with Potassium phosphonate two times performed better in terms of reduction in leaf yellowing , collar infection incidence, and wilting of vines.

Table 1. Assessment of yellowing, Phytophthora infection, yield and economics in Black Pepper

Treatment	Detail	Per cent leaf Yellowing	Per cent Leaf infection	Per cent Collar infection	Per cent wilted vines	Dry pepper yield (q/ha)	B:C
T1	Spraying of 1% Bordeaux mixture	18.2	12.4	13.9	13.9	3.4	2.89
T2	Spraying with Bordeaux mixture and drenching of Metalaxyl + Mancozeb	11.8	3.7	9.9	3.2	3.9	3.01
T3	Soil application of Pseudomonas florescence along with FYM and mulching of UV stabilized plastic sheet around the base of the plant	14.3	5.4	5.9	2.8	4.1	3.21
T4	Spraying of Potassium Phosphonate 3ml per lit. and drenching of Arka Microbial Consortium	7.9	2.2	4.1	0.00	4.6	3.56
T5	Untreated check	23.90	50.10	26.27	26.22	1.3	1.20

This technology has gained considerable popularity with the farmers and it is being followed by more than 2000 farmers of the district covering an area of 8000 ha. In addition the mortality is considerably less and the health of vines has improved, there is less spike drop. Berry and spike size was also found to have increased. ICAR-KVK, Kodagu is annually producing 10-12 t of the AMC and remaining requirement for the district is being met by other licensees of this technology from ICAR-IIHR, Bengaluru.

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