MANAGEMENT OF PHYTOPHTHORA AND RHIZOME ROT DISEASES INSMALL CARDAMOM USING WITH ICAR-IIHR ARKA MICROBIAL CONSORTIUM TECHONOLOGY

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Profile of Technology

Arka Microbial Consortia (AMC) is a novel 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. It can be applied either through soil and water. This synergistic effect of the formulated microbes can help in sustainable production of crops at a reasonable cost. This technology was introduced by ICAR-KVK, Santhanpara in IDUKKI district of Kerala for addressing the problems faced by small cardamom farmers of the district who were facing various problems like Azukhal disease and Rhizome rot. The technology gained popularity with the farmers and it is being followed by more than 5327 farmers of the district covering an area of 12452 ha and further popularized through FLDs and other extension activities

Challenges

The production and productivity of small cardamom (*Elettaria cardamomum*) is beset with many constraints and among them plant diseases play a major role. The pathogens such as *Phytophthora meadli, Pythium vexans, Rhizoctonia solani* were mainly responsible for causing an array of diseases in the past in the plantations. The development of plant disease requires suitable host tissue, a compatible pathogen, and prevalence of suitable microclimatic conditions. Rot diseases (Azhukal or capsule rot) caused by *Phytophthora meadii* and clump rot caused by *Pythium vexans* occur in a severe form during monsoon season and results in significant crop loss. The disease also occurs in nursery seedlings in the form of damping off or seedling rot. The incidence of capsule rot or clump rot has been reported as a severe problem in the cardamom plantations a decade ago and loses the yield of small cardamom 50 percent. On the infected leaves, water soaked lesions appear first followed by rotting and shredding of leaves along the veins. The infected capsules become dull greenish brown and decay. This emits a foul smell and subsequently shed. Application of different fungicides to manage these problems in soils, has only added to environmental hazards besides increasing the cost of cultivation.

Target Beneficiaries and Key Benefits

This technology was introduced by ICAR-KVK, Santhanpara in IDUUKI district of Kerala for addressing the problems faced by small cardamom farmers of the district who were facing various problems like Azukhal disease, Rhizome rot, Bacterial blight, dropping of capsules and death of roots due to a variety of factors like lack of nutrient uptake, Phytophthora and Clump rot infection. The Microbial consortium technology was taken up as an on-farm trial and FLDs. It was found that drenching of small cardamom plant with Mixing of 20 gm Arka Microbial Consortium per litre of water and drenching 5-6 litre of this solution per small cardamom plant during May-June, August-September and January months (Three times in a year performed significantly better in terms of reduction in Azukal, Clump rot, Nematodes. Technology assessment and demonstration of the technology has shown that AMC applied small cardamom field were showing early initiation of new shoots during pre-monsoon showers, less nematode (5.8%), less Azukal disease incidence (6.2 %), less Rhizome rot disease incidence (4.3 %) and have also recorded higher dry cardamom yield of (1.85 q/ha) compared to farmers practice yield range of (1.32 q/ha) after 4 years of AMC application.

Economic Benefits

The technology gained popularity with the farmers and it is being followed by more than 5000 farmers of the district covering an area of 12000 ha and further popularized through FLDs and other extension activities. After adoption of this technology it saves the cost of chemicals application Rs.4,500/- per ha. The cost of application of AMC is Rs.4400/ha as compared to regular chemical application where it costs Rs.21000/ha. So, the reduction in cost of cultivation per ha is Rs.65, 000. The total net return gained per ha is Rs.279,000/- due to introduction of AMC technology. The total economic benefits accrued since its release (2017) is estimated at Rs.27.84 crore during the period 2017 to 2021. To accelerate the adoption, KVK, Idukki has established AMC Production Unit at KVK premises with the financial support of Revolving fund and 14,846 kg of AMC has been produced and supplied to 5327 no. of farmers since 2017. So the AMC technology has spread to 12452 ha of the small cardamom plantation areas and the KVK is realizing Rs.11.50 lakhs sale annually.

Microbial Consortium applied small cardamom field visited by the Director, ICAR-ATARI, Bengaluru