SPECIAL DISCUSSION ON MYCORRHIZAE

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Report on Special Discussion on Mycorrhizae

During the PLACROSYM–V following the Session VI on Plant Pathology, a special discussion on Mycorrhizae was organized on 17–12–1982, under the Chairmanship of Dr. C. L. Powell of the Ruakura Social & Plant Research Station, Hamilton, New Zealand, who was in India as a Visiting Professor of Microbiology at TNAU, Coimbatore. Invited speakers included, Dr. K. R. Krishna from ICRISAT, Hyderabad, Dr. A. Manjunatha from GKVK, Bangalore, Dr. D. Kandaswamy from TNAU, besides Dr. C. R. Ramesh of CPCRI, Kasaragod.

Dr. Krishna briefly outlined ICRISAT's work on genotype response to VAM infection, efficiency of VAM strains, use of xylem-sap technique, and hybridizing VAM-sensitive hosts with those possessing other useful attributes. Dr. Manjunatha spoke of their VAM studies concerning, nutrient mobilization, resistance to disease and drought, interactions with rhizobia and nematodes, and efficiency of different inoculation methods. He outlined a procedure for selecting efficient organisms. Dr. C. R. Ramesh described the two programmes in progress at CPCRI, on the role of VAM on nutrient mobilization and their population dynamics in coconut-based multistoreyed cropping sysytem. The areas of future investigations emphasized were, VAM inoculation in nurseries, their ecophysiology in multilevel cropping systems, interaction with soil-borne pathogens and nematodes in the quick and slow wilts of pepper, effect of plant protection chemicals on mycorrhizal load, effect on rooting and field establishment of cashew, nutmeg and cloves, role of small mammals in VAM dispersal, and the mass production and establishment of VAM banks.

Dr. Kandaswamy outlined their programmes on VAM interaction with phosphobacteria, rhizobia, and the effect of plant protection chemicals on VAM ecology, population dynamics, and spore survival. In their studies on nine plantation crops, cinnamon was found to harbour the maximum VAM spores (314/50 ml soil) and nutmeg had the least (15/50 ml soil). *Glomus*

was the major species forming 66.6 to 96.1 per cent of the resting spores, followed by *Gigaspora* (3.2–26.6 per cent). Other species like *Acaulospora* and *Sclerocystis* varied in their relative abundance with the crops studied.

The Chairman, Dr. Powell in his concluding remarks emphasized that all plantation crops are already having mycorrhizal infection, and hence for enhancing production as well as protection from root diseases, it is imperative to inoculate nursery plants with an efficient strain since the load required would be only 10–30 kg mycorrhizal soil per ha. The best strain to be used in the nursery mix must be assessed before attempting to produce plants for field trials. He advocated, therefore, nursery and field surveys to be followed subsequently by well planned field trials with adequate plot size, replications, and P-fertilizer rates, so that the long-term economic benefits of VAM inoculation can be assessed.

Discussions

R. D. IYER (CPCRI): How long does the VAM effect last and how often do you have to repeat the inoculation in a perennial system such as *Asparagus*?

POWELL: I have evidence that mycorrhizal inoculation will be needed only once in a perennial crop's lifetime.

K. D. PATIL (CPCRI): Does irrigation increase or decrease the mycorrhizal population?

POWELL: Excess irrigation, leading to waterlogging and consequent anaerobic conditions will greatly reduce mycorrhizal infection.

C. A. JOSEPH (KAU): The efficacy of nursery inoculation for coconut is doubtful since there are not many roots on the seedling at the time of planting. The technique may be useful for polybag nurseries. Since this has its own drawbacks preventing it from wide adoption, effect of inoculation of the planting pits may be studied.

POWELL: Mycorrhizal inoculum will still be present in the remaining root fragments. Mycorrhizal inoculum can be added to the planting hole also.

K. R. KRISHNA (ICRISAT): Host genotype is very impotrant since the natural susceptibility varies even within a species.

POWELL: It is most important that we select VAM fungi for the growth effects they have on plants and not necessarily for the number of spores they produce in soil.

CHANDRAMOULI (UPASI): How do you quantify the infection?

KRISHNA: According to the procedure given by Philips, JM. and Hayman, DS (1970): *Trans. Brit. mycol. Soc.* **55**: 158–161.

M. LAKSHMANAN (Madurai Kamaraj Univ.): Is there a natural association of mycorrhizae with arid-zone crops such as maize and sorghum, or do they just respond to artificial inoculation with mycorrhizal fungi? What is the extent of prevalence of mycorrhizal infection?

KRISHNA: Arid-zone plants like sorghum and millets seem to have picked up mycorrhizae through an evolutionary process. In these crops, the infection rate is as follows: Sorghum 28–30%; Millets 30–45%, and chickpea 60%. They also respond to artificial inoculation of VAM.

M. S. SREENIVASAN (CCRI): Can we not use Gymnosperm mycorrhizae as a source of inoculum for other crop plants?

KRISHNA: As we find that there are highly specific combinations which confer greater efficiency, I wonder whether this source could be highly beneficial on crop plants.

C. KURUVILLA JACOB (RRII): Can mycorrhizal fungi and their propagules survive in acidic soils?

R. MANJUNATH: Mycorrhizal fungi can grow in soils having pH ranging from 4 to 8.

K. D. PATIL (CPCRI): How do mycorrhiza help in conferring greater drought tolerance to plants?

R. MANJUNATH: In stray cases, higher uptake of K has been observed which may be responsible for drought tolerance. The extending mycelial strands may help absorb water even below the wilting point. Mycorrhizal plants have revealed higher proline and thus might have imparted higher resistance for stomatal diffusion, compared to non-mycorrhizal plants. Mycorrhizal plants, when subjected to drought recover sooner compared to non-mycorrhizal plants after re-watering.

D. KANDASWAMY (TNAU): What is the extent and mode of survival of mycelium in soil?

R. M.: The fungus can survive in the roots of certain weeds like *Parthenium*, hariyali, nutgrass, etc. during the off-season.

RAJASAB (Gulbarga Univ.): How exactly do mycorrhizae spread from place to place?

R. M.: In a population, plant spread can occur through mycelium. We also have other dispersal agents like water. Animals also help to disseminate the spores.