ABSTRACT

Studies on the Production and Storage of VAM fungus *Glomus intraradices* for Inoculum use.

Five host plants and five VAM fungi were screened to determine the best fungus-host combination for the production of VAM spores for inoculum use. The host plants were maize (*Zea mays*) cv Pioneer hybrid, two genotypes of pearl millet (*Pennisetum americanum*) and two genotypes of sorghum (*Sorghum bicolor*). The VAM fungi were *Glomus pallidum, G. fasiculatum, G. intraradices, G. microcarpa and G. aggregatum.* The host plant that grew best was *Zea mays* and the VAM fungus that produced the highest root colonization and spore production was *G. intraradices.* The best fungus-host combination was *G. intraradices* with *Zea mays.*

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Spore production and percentage root colonization by VAM fungus (*G. intraradices)* was greatest in the loamy soil medium followed by the sand medium and the soil-sand mix. However, spore retrieval and counting was easier in the sand medium as soil and organic debris were the least. Spore production in the sand medium was improved by Phosphorus fertilization when it was supplemented with 2, 5, 10 and 20 mg g^{-1} P. Spore production was best at 10mg g^{-1} P (45/100g soil) and least at 20mg g^{-1} P (430/100 g soil).

The effectiveness of three types of inocula was evaluated. These were *G. intraradices* spores only, mixed inoculum (containing *G. intraradices* spores, hyphae and colonized maize roots) and colonized maize root pieces only. Plants receiving mixed inoculum and inoculum of spores only were not significantly different in percentage root colonized. Mixed inoculum produced more spores per 100 gram soil (420) than the other inocula. The mixed inoculum had the highest root length colonized (67%), followed by the inoculum with spores only (63%) then the root inoculum (30%).

To determine the optimal number of spores in the inoculum, inocula containing 50, 100 and 200 spores were evaluated. Percentage colonization (65%) and root length colonized (298cms) was greatest

with 50 spores and least with 200 spores (51%). However, spore production was highest with 200 spores inoculum (250/100g soil) and least with 50 spores (42/100g soil). For maximizing benefits while reducing inputs (in terms of mycorrhizal spores/inoculum the best selection would be 50 spores per gram inoculum.

The VAM inoculum *(Glomus intraradices)* stored at 20C and 30C at 5% moisture content for 90 days remained viable. Inocula stored at all temperatures produced similiar percentage root colonization. No significant difference was observed in colonization between the varying storage temperatures. Spore production was greatest with inoculum stored at 20-30°C (1040-1010/100g soil) and least with inoculum stored at 5 ^{0}C (300/100g soil). It might not be necessary to store inocula at low temperatures, as viability of the inocula was not affected by high temperature.

After storage of inoculum at 5% moisture content spore production was the highest (2500/100g soil) compared with 13% (733/100g soil) and 20% (80/100g soil) moisture content levels. Viability was greatest at 5% moisture content (80%) compared to 13% and 20%, which were 67 and 25% respectively.

The inoculum of VAM fungus *(G. intraradices)* was tested in the field with three crop plants red pea (*Phaseolus vulgaris*), cow pea (*Vigna unguiculata*) and pearl millet (*Pennisetum americanum*) at 1P (15kgP/ha), 2P(30kgP/ha) and 3P(45kgP/ha) levels in the soil.

Inoculated cowpea plants *(Vigna unguiculata)* grown with 2P(30kgP/ha) fertilizer had the greatest shoot (18.62g) and root (7.90g) dry weights, yield (94 seeds/plant) and percentage colonization (66%), while inoculated plants with no P produced the lowest growth responses and yield (49.20 seeds/plant) as well as percentage root colonization (47%).

In inoculated red pea *(Phaseolus vulgaris)* the yield (57 seeds/plant), and percentage root colonization (66%) was greatest in inoculated plants at 2P level.

In inoculated millet plants *(Pennisetum americanum)* yield (2600 seeds/plant) and root dry weight (11.3g) were highest at 2P (30kgP/ha) level. The yield was lowest (2280 seeds/plant) at 3P level (30kgP/ha) and 1P(15kgP/plant) had the highest shoot dry weight. Percentage root colonization was not significantly different in inoculated plants at 1P and 2P levels. It was lowest (56%) in inoculated plants with no P added.