the formation of other metabolites would be higher, e.g. leucine as a precursor for carotene biosynthesis, glutamic acid gets converted to γ-amino butyric acid and then gets incorporated into the TCA cycle[16, 18]. ABA treatment accelerates these processes, thus explaining lower incorporation of radiolabelled amino acid into proteins. Moreover, cycloheximide has been shown to inhibit the ABA-induced incorporation of the isotope during ripening of langra mangoes[19], suggesting that ABA action is mediated via protein synthesis.

Thus these results establish that ABA treatment enhances ripening of mangoes without causing any deleterious effects and at the same time increases their eating quality. Its action is mediated via protein synthesis. It is not clear at this stage whether ABA stimultes the synthesis of any specific enzyme(s) involved in the process of ripening, or whether it promotes the synthesis of a proteinic factor which indirectly governs the activity of all the enzymes required for the process.

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Occurrence of vesicular-arbuscular mycorrhizal fungi in some *Cymbopogon* species of north-east India

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Vesicular-arbuscular mycorrhizal associations were observed in many aromatic *Cymbopogon* species cultivated in north-east India. Among them *Cymbopogon citratus* Stapf. showed maximum colonization (82.2%). Arbuscules, the functional units of mycorrhizal colonies, were also observed in four *Cymbopogons* tested.

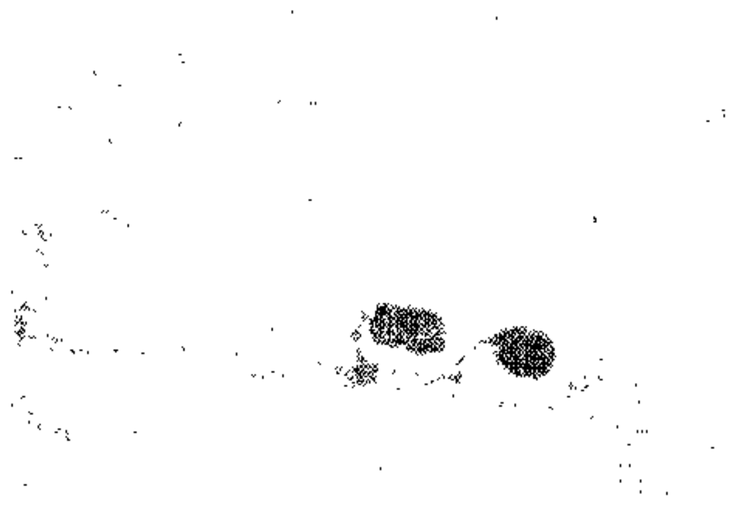
As a component of rhizosphere the vesicular-arbuscular mycorrhizal fungi (VAM) help the host plant in uptaking nutrients particularly phosphorus[1, 2] for which the vegetative growth of plant species increases considerably. VAM associations were also observed in many aromatic plants[3, 4]. However reports on such mycorrhizal associations are not adequately available on aromatic *Cymbopogon* species cultivated most extensively in different regions of north-east India.

In this study seven *Cymbopogon* species were screened for VAM association. Species were collected from the experimental farm of Regional Research Laboratory, Jorhat, where soil is silty clay loam with pH 4.8 and available N, P, K as 0.037, 0.009 and 0.006% respectively.

These were *Cymbopogon winterianus* Jowitt, *C. martini* Stapf. var motia, *C. flexuosus* Stapf, *C. citratus* Stapf, *C. flexuosus* (Nees ex Steud) Wats, var-*sikimensis*, *C. khashianus* (Hack) Stapf (ex Bor), *C. jwarancusa* Schulf. These *Cymbopogons* were commercially important for their respective constituents, viz. citronellal, citronellol, geraniol, citrol, methyl eugenol, etc.

Randomly selected 1 cm root segments of each plant species were cleared in 10% KOH solution and stained with 0.05% trypan-blue in loctoglycerol as described by Phillips and Hayman[5]. The per cent colonization was determined by following the slide technique[6].

Distinct variations in per cent colonization of VAM fungi, the presence of vesicles and arbuscules were noticed. Among the species *C. citratus* showed maximum VAM fungal colonization with moderate presence of vesicles (Figure 1) and arbuscules. The presence of vesicles was quite high in *C. winterianus* (Figure 2), moderate in *C. citratus* and *C. flexuosus sikimensis*, scanty in *C. flexuosus* and absent in *C. khashianus*, *C. jwarancusa* and *C. martini* var *motia*.



Figures 1 and 2. 1, Vesicles with VAM mycelia in the roots of *Cymbopogon citratus* (×70). 2, Vesicles in the roots of *C. winterianus* (×70).

On the other hand the functional units, the arbuscules, were also present in most of the tested *Cymbopogons* except in three cases (Table 1).

Interestingly all the *Cymbopogon* species that showed high per cent of VAM colonization are very common in the acidic soil which may be one of the reasons in obtaining higher herb yield with increased percentage of essential oil contents.

Further studies on relative merits of VAM association on these species in relation to different doses of phosphorus and plant growth, oil yield and quality

Table 1. Per cent colonization of VAM fungi in roots of different *Cymbopogon* species

Species	VAM colonization in roots (%)	Vesicles	Arbuscules
Cymbopogon winterianus	75.5	+++	++
C. martini var *motia*	40.2	Nil	+
C. flexuosus	75.5	+	+
C. citratus	80.2	++	++
C. flexuosus var *sikimensis*	72.0	++	Nil
C. khasianus	75.7	Nil	Nil
C. jwarancusa	50.4	Nil	Nil

+ Scanty, ++ Moderate, +++ High.

are in progress.

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Phenols and lipids in mycorrhizal and non-mycorrhizal roots of *Sesamum indicum*

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Mycorrhizal inoculation resulted in a significant enhancement of the percentage of infection, dry matter and phenolic content of plants in sterilized soils compared to others. Histochemical studies revealed an accumulation of different types of lipids and phenolic compounds in VAM structures; particularly neutral lipids and catechol tannins in vesicles. It is suggested that the reports on increased amounts of lipids and phenols in mycorrhizal plants could be the contribution of fungal structures.

Research in the last few decades has established that vesicular-arbuscular mycorrhiza (VAM) can improve plant growth through increased uptake of mineral nutrients. However, recent studies suggest that VAM infection may change the biochemical composition of the host plant. Information on the effects of VAM on histochemical and biochemical composition of the host plant is limited[1]. A few studies have shown that considerable differences exist between mycorrhizal and non-mycorrhizal plants with respect to total carbohydrates[2,3], amino acids[4], lipids[5–8] and phenols[9,10] The present work relates to the effect of *Glomus fasciculatum* infection on phenolics and lipids in the roots of *Sesamum indicum* L. var. Co-1 plants.

A pot culture experiment was conducted using phosphorus-deficient (5 mg of available P kg^{-1} of soil extracted with NH_4F and HCl), sandy loam soil with pH 7.2. Soil was sterilized in an autoclave for 3 h at 15 psi pressure for three consecutive days. Pots (15