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Decomposed coconut coirpith and AM fungal inoculum - A good nursery media mix for *Ruta gravelens* L.

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ABSTRACT

Slow growing *Ruta gravelens* at nursery stage was tested by using five media mixes. The use of (G. *mosseae*) VAM fungi as biofertilizer with decomposed coconut coirpith in 50 and 75 per cent most significantly increased the vigour, plants height, increased in the vigour index , root length, number of leaves, VAM per cent colonization, spore number and nutrient content in shoots. The use of decomposed coconut coirpith with mycorrhizal inoculation at nursery stage of slow growing plants, must be suggest to chosen as the preferred strategy for waste treatment management.

Key words : Vesicular -arbuscular (VA) Mycorrhizal fungi *Ruta gravelens*, Plant growth, Vigour index.

INTRODUCTION

Ruta gravelens L. is a most important medicinal plants, belonging to family Solanaceae. It grows as shrubby bushes reach up to 1.25 meter in height. Plants occur throughout drier parts, subtropical and semi temperature region of India. Plant whose roots have been employed as valuable drug in Indian traditional systems of Ayurveda. It is used in the treatment of rheumatic pain, inflammation of joints, nervous disorders and epilepsy. It is mainly used as aphrodisiac and diuretic, restorative and rejuvenative drug. Plants grow at very slow rate at nursery stage. They normally raised in a medium containing red earth, farm yard manure and fine sand in equal volumes. Several hard wood trees are infected with vesicular arbuscular mycorrhiza as a microsymbiont (Lakshman, 1992). Significance of VA-mycorrhizal fungi on plant growth and nutrients uptake by tree species was reported earlier Mosse (Nalini *et al*., 1986). Healthy and vigorous seedlings will stand better in plantations and hence a nursery mix which will promote better germination and seedling vigour is a must to sustain the demand for seedlings. Hence, the present investigation was undertaken to standardise a media mix suitable for *Ruta gravelens* using Mycorrhiza (*G. mosseae*) with coconut coirpith which is available in plenty in Karnataka, Tamil Nadu and Kerala.

MATERIALS AND METHODS

Preparation of VAM inoculum:

Chlorios gayana Munch. (Rhode grass) is a potential host plant for culturing mycorrhiza. Therefore, the grass was grown in separate earthen pots to culture *G.mosseae*. Mixed mycorrhiza inoculum of the pot cultured of 25 g. was provided to each polythene bag with 25 g. decomposed coconut coirpith.

Preparation of composed coconut coirpith:

The raw coconut coirpith (RCCP) collected from Kumta area of North Canara district. It was decomposed using edible oyster mushroom fungus, *Pleurotus platypus* following the method of Nagarajan *et al*. (1985) and modified by Theradimani and Marimuthu (1992) and Kumar and Marimuthu (1997) for laboratory conditions. Well decomposed coconut coirpith available after 30 days of inoculation was shade dried for 24 days and then thoroughly mixed with normal nursery mix in varying proportions (V/V) to get the following treatments.

- Normal nursery mix (NNM)
- Decomposed coconut coirpith (DCCP)
- Raw coconut coirpith (RCCP)
- NNM 25 % + DCCP 75 % (DCCP 75)
- NNM 50 % + DCCP 50 % (DCCP 50)
- NNM 75 % DCCP 25% (DCCP 25)

The experiment was conducted in Randomized Block Design replicated four times. Seeds were collected from four year old plant of *Ruta gravelens*, where plants were maintained at Karnataka forest Department Dharwad. The media mixes were separately filled in plastic trays of size 26 × 26 × 10cm. Well filled seeds were hand picked with the aid of hand lens (5×) from the seed lot and were sown in line on the media mixes contained in polythene bags. Each replication had 100 seeds. The different growth parameters were observed and seedling vigour

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index in nursery was calculated based on formula suggested by Abdul Bakri and Anderson (1973), which was modified to calculate seedling vigour index in nursery (SVIN).

SVIN = Survival per cent of seedlings on 30 days After sowing × Root length + Shoot length

The seedlings were transferred to the containers after 25 days of growth in beds. The polythene, containers were filled with media mixes of *G. mosseae* mycorrhiza and *Ruta gravelens* seeds were sown. The growth parameters like shoot length, root length and dry matter of seedlings were calculated after 3 months of transplanting.

RESULTS AND DISCUSSION

The seedling vigour index in nursery (SVIN) shoot, root, length, number of leaves and dry weight of *Ruta gravelens* are presented in Table 1. The SVIN was 431.2, 284.1, 579.6, 912.3, 726.2, respectively for NNM, RCCP, DCCP. The maximum SVIN was recorded in M + DCC P50% followed by M + DCCP 75% and M + DCC P25% over the (control) *i.e.* non mycorrhizal or non mix of coconut coirpith either in raw coconut coirpith (RCCP) or DCCP without mycorrhizal inoculation. However the DCCO 75% and DCCP 25% did not differ significantly from each other with respect to the production of leaves In case of shoot length and dry matter production significantly higher 72.4 mg, 53.1 mg and 47.4 mg/plant was recorded over the control plants. Therefore M + DCCP 50% followed by M + DCCP 75% and M + DCCP 25% favoured better shoot length and dry matter than NM+ DCCP or RCCP alone.

Per cent VAM colonization in roots and spore number was higher in whose plants treated with M + DCCP 50%, M + DCCP 75% and M + DCCP 25%, respectively. Similarly there was a significantly higher N P K per cent concentration in the shoots of *Ruta gravelens* treated with M + DCCP 50%, M + DCC 75% and M + DCCP 25% than NM + NNM (control) plants (Table 2). In contrast to this mg concentration did not increased in those plant treated with M + DCCP 50% or M + DCCP 75% or M + DCCP 25 % of coconut coirpith with mycorrhizal inoculation.

The reestablishment of mycorrhizal relationship in denuded areas, mined spoils and coastal zones has come to be recognized as an important biofertilizer component and an overall reclamation strategy (Peterson and Farguhar, 1994; Lakshman 2002). Smith and Read, 1997). In the present investigation the M+DCCP with 50% and 75% (V/V) to NNM successful boosted the vigour of the *Ruta gravelens* seedling. The DCCP 50% is being recommended as a soil amendment to reclaim problem soils (Ramaswami and Kothadaraman, 1985; Nagarajan *et al*., 1986). This organic manure might help in increasing the vigour of seedlings through (a) supply of plant nutrients

Table 1 : Effect of VAM (G. mosseae) with coconut coirmix on the vigour of *Ruta gravelens* shoot length, root length, dry matter and leaves for 90 days

VAMF + Media mix	Seedlings vigor index In nursery	shoot length (cm)	Root length (cm)	No of leaves *per* plant	Dry weight per plant (mg / plant
NM + NNM	19.24	2.1	1.0	2.1	21.4
M + NNM	43.12	3.6	2.4	4	58.2
M + RCCP	28.4	2.9	1.8	4	28.1
M + DCCP 25%	579.6	4.7	2.3	5.1	47.4
M + DCCP 50%	912.3	6.8	4.2	8.7	72.4
M + DCCP 75%	726.2	5.1	3.4	5.2	53.1
C.D. (P=0.05)	115.2	0.8	0.4	1.3	6.2

VAMF = Vesicular-arbuscular mycorrhizal fungi. M= Mycorrhizal, NM = Non mycorrhizal

Table 2 : Effect of VA, (G. *mosssae*) with coconut coir mix on the *Ruta gravelens* per cent VAM colonization, spore number and nutrient content in dry weight of shoots for 90 days in %

VAMF + media mix	% of VAM colonization	No. of spores/ 50 g. soil	N%	P%	K%	Mg%	Cu%
NM + NNM	-	-	0.26	0.05	0.31	0.18	0.14
M + NNM	47.4	102	0.21	0.1	0.34	0.16	0,18
M + RCCP	36.2	98	0.27	0.008	0.29	0.11	0.14
M + DCCP 25%	52.6	96	0.31	0.17	0.37	0.13	0.15
M + DCCP 50%	58.3	112	0.38	0.21	0.34	0.15	0.18
M + DCCP 75%	55.2	102	0.32	0.19	0.39	0.14	0.17
C.D. (P= 0.05)	19		0.11	0.004	0.12	0.12	0.009

and (b) improvement in physical, chemical and biological properties of soil. Dry matter production and number of leaves per seedling were also more in DCCP 50% with mycorrhiza amended media mix than in others . It is also possible to raise seedlings in water deficient area using DCCP 50% with mycorrhiza improves the water holding capacity of soils in polythene bags.

The rapid reestablishment of *Ruta gravelens* plants in polythene bags contained DCCP 50% with mycorrhiza is to be major concerned of reclamation strategy and growth of plants. There is tremendous potential for practical research on this accept of VAM and ectomycorrhiza *(Pleurotus platypus)* association (Felker, 1999). This study suggests the plants with dual symbiotic association or successful as primary colonization of pioneer habitats such as temperature area or dry lands (Sen, 1992). Manipulation of symbiotic associations of revegetation purposes as great potential in reclamation of drastically disturbed lands.

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