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Influence of Nursery Media and Mulching on Sprouting and Growth of Greater yam (*Dioscorea alata)* Minisetts

Greater yam (*Dioscorea alata*) is one of the preferred tubers among farmers in Kerala. The scarcity of planting material for cultivation resulted in the increased adoption of the rapid propagation technique using minisetts. Minisett cultivation is popular in the southern districts of Kerala, especially in homesteads. Among the different tuber crops, minisetts of cassava and yams are planted in nurseries and later transplanted, while minisetts of elephant foor yam and taro are planted directly in the main field. Otoo et al. (2001) reported that pre-sprouting of the minisetts in the nursery is useful for the success of yam minisett technique. This has necessitated the use of suitable media and seed treatment methods to stimulate early sprouting in the minisetts to avoid the loss of time in nursery in *Dioscorea*. Keeping this in view, an experiment was conducted to assess the influence of different nursery media including soil less media and seed treatments on the sprouting and early growth of *Dioscorea alata* minisetts.

The experiment was laid out in completely randomised design with eleven treatments and three replications during November 2012-January 2013 in trays of size 40 cm x 28 cm. Large corms were cut into 30 g minisetts and planted in different combinations of nursery media taken in equal proportions, with and without cow dung slurry treatment. The treatment combinations were: soil + vermicompost (T_1), soil + coir pith compost (T_2), soil + coir pith compost + vermicompost (T_3), coir pith compost + vermicompost (T_4), soil + farmyard manure (T_5) and soil alone (T_6) as control. A total of 165 minisetts were prepared for each replication, 90 minisetts were planted in the six treatments, T_1 to T_6 as such without any seed treatment, and the remaining 75 were dipped in cow dung slurry (fresh cow dung in water) for 30 min, dried in shade and planted in the media combinations as soil + vermicompost (T_7), soil + coir pith compost (T_8), soil + coir pith compost + vermicompost (T_9), coir pith compost + vermicompost (T_{10}) and soil alone (T_{11}). The treatments were replicated thrice and the experiment was repeated under mulched and non mulched conditions.

The minisetts were planted in the media with the cut surface facing upwards, covered with a thin layer of the media and irrigated. Observations on the number of sprouts were recorded daily whereas root length and shoot length were recorded two months after planting (MAP). The speed of emergence was also worked out as percentage based on the sprout counts at 45 and 60 days after sowing (DAS)

$$\text{Speed of emergence} = \frac{\text{Number of sprouts emerged at 45 DAS}}{\text{Number of sprouts emerged at 60 DAS}} \times 100$$

The vigour index was worked out using the formula of Abdul Baki and Anderson (1973).

Vigour index= Germination % x seedling length

The results revealed the differential influence of the growing media on sprouting and growth of *Dioscorea* minisetts (Table 1). Sprouting percentage and speed of emergence were significantly higher in the treatments in which soil alone was used as the medium. The significant variation in sprouting of the minisetts in the different media can be attributed to the characteristic differences among the media in providing the required conducive environment for sprouting of the minisetts. The media of soil alone proved to be the best and was on par with the treatments in combination with farmyard manure/coir pith compost/ vermicompost. The combined effect would have been due to the positive influence of soil in stimulating the germination and nutrient supply for the seedling growth from the organic component. Coir pith compost along with vermicompost would have enhanced the dampness of the media which would have initiated the rotting.

Table 1. Effect of nursery media on the sprouting percentage and speed of emergence of *Dioscorea alata* minisetts

Treatments		Sprouting at 2 MAP (%)		Days to 50 % sprouting		Speed of emergence (%)
		Non mulched	Mulched	Non mulched	Mulched	Non mulched
T_1	Soil + VC- non treated minisetts	46.6	92.67	62.0	23.33	61.67
T_2	Soil + CPC- non treated minisetts	48.7	87.00	65.0	21.00	72.08
T_3	Soil + CPC + VC- non treated minisetts	62.0	88.93	63.7	21.00	74.29
T_4	CPC + VC- non treated minisetts	51.2	86.67	59.3	22.00	56.67
T_5	Soil + FYM- non treated minisetts	60.1	86.67	54.0	22.67	72.62
T_6	Soil - non treated minisetts	92.0	92.67	52.6	16.00	83.76
T_7	Soil + VC-treated minisetts	57.3	96.33	60.3	17.33	64.74
T_8	Soil + CPC-treated minisetts	58.1	100.00	66.1	19.00	79.09
T_9	Soil + CPC+VC-treated minisetts	53.3	98.00	63.3	17.00	72.17
T_{10}	CPC + VC-treated minisetts	16.8	85.00	66.7	19.67	62.50
T_{11}	Soil-treated minisetts	99.2	100.00	60.0	15.67	83.29
CD (0.05)		24.7	1.04	17.8	NS	5.51

CPC-coir pith compost; VC-vermicompost; treated-with cow dung slurry; non treated- without slurry treatment

Similar results of the top soil being the ideal medium for the sprouting of yam minisetts was reported by Abudulai and Quansah (2002). In their study it was on par with a combination of river sand, top soil and rotten palm fibre in 1:1:1 ratio and it has been attributed to the better aeration and porosity compared to saw dust. Dasbak et al. (2011) observed highest sprouting percentage of *Dioscorea rotundata* minisetts in a nursery medium of rice straw followed by sandy soil and wood shavings/saw dust. The rice straw favoured the highest sprouting of minisetts because it permitted good aeration and easy drainage of any excess water thus providing a conducive environment for sprouting.

It is normally inferred that the coir pith compost on account of the high water holding capacity and porosity would promote seedling root growth. Vermicompost would add to the nutrient value of the medium. However, in this experiment it was observed that a soil component in the medium was important for stimulating sprouting of the minisetts. Positive effect of composted coir pith as potting media has been reported by Reghuvaran and Rabindranath (2010). Nevertheless, the coir pith compost medium had pH 7.2 and electrical conductivity (EC) 1.55 m mohs cm^{-1} and the latter would have interfered with the sprouting in the soil less media compared to the soil medium that had a pH of 6 and EC 0.55 m mohs cm^{-1}. Khan et al. (2006) observed that media combinations having low EC were good for plant growth and development, while that with high EC exhibited poor plant growth. Inclusion of soil in the media with coir pith compost would have nullified the effect, which otherwise would have affected the germination. In a study to evaluate the best potting media for teak seedlings, Sujatha and Florence Maria (2010) stated that a combination of coir pith compost, mixed weed compost, soil and sand was the most ideal as this mixing would alter the properties of coir pith creating a more favourable environment for the production of healthy seedlings.

Significantly superior performance of the minisetts treated with cowdung slurry in sprouting and early growth was also observed (Table 1). The cow dung coating would have taken care of the immediate nutrient needs of the sprouts rather than being absorbed from the medium.

The effect of mulching was significant on the sprouting (Table 1) and growth of minisetts in *Dioscorea alata*. Perusal of the data revealed significant variations in sprouting and vigour index with variations in the media used and seed treatment given. Vigour index values were also higher in all treatments of the soil containing media (1926.89 to 11366.22) compared to the soil less media (T_{10}) (1662.22). Significantly earlier sprouting (15.67 to 23.30 days) (Table 1) and vigour were noticed in all treatments with mulching irrespective of the media used and this was more effective with cow dung slurry treated setts (Fig.1).

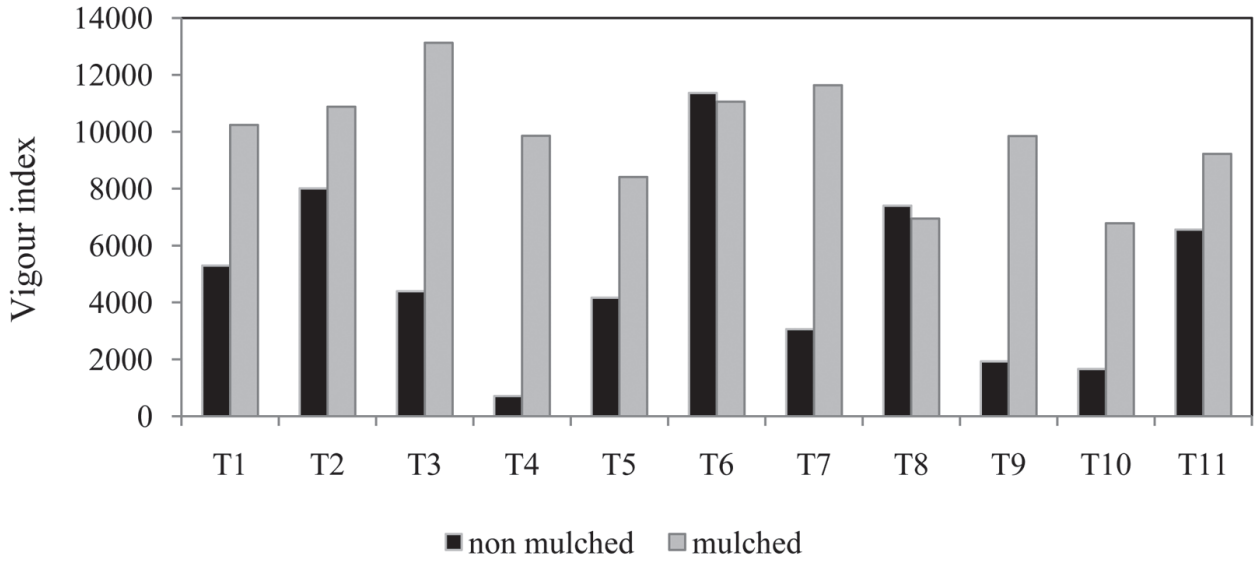

Fig.1. Variations in the vigour index of sprouts raised in different media under mulched and non mulched conditions

The positive effect of mulching on early sprouting and development in *Dioscorea* has been reported earlier (Budelman, 1989). This can be attributed to the moisture conserving effect of the mulches and the temperature regulation that might have stimulated the sprouting and induced better vigour of the sprouts. The soil less media of vermicompost and coir pith compost produced lowest vigour both in the mulched and non mulched situations bringing to light its non suitability as nursery media in *Dioscorea.*

It is concluded that sprouting of yam minisetts is best in soil medium, provided the setts are treated with cow dung slurry and the soil is mulched, which reduces the time in nursery and ensures good crop stand in the main field.

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