Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(2): 252-255
Received: 15-01-2018
Accepted: 17-02-2018

Mushtaq Ali
Division of Floriculture & Landscaping, SKUAST-K Shalimar, Jammu and Kashmir, India

MQ Sheikh
Associate Professor Division of Floriculture & Landscaping, SKUAST –Kashmir, Jammu and Kashmir, India

Shah Asif
Faculty of forestry, SKUAST-K Shalimar, Jammu and Kashmir, India

Correspondence
Mushtaq Ali
Division of Floriculture & Landscaping, SKUAST-K Shalimar, Jammu and Kashmir, India

Effect of different media combinations on vegetative traits, percent established plants and rhizome traits of *Dioscorea deltoidea* Wall

Mushtaq Ali, MQ Sheikh and Shah Asif

Abstract
It has been observed that the *Dioscorea deltoidea* is full with medicinal values so far as its ethno-botonical properties are concerned and it would not be injustice to say that the species is power house among all other comparative properties of medicinal plants. The species has multi-dimensional wanted uses as it is embedded with various biochemical contents having great beneficial impacts to cure the long resting ailments in human bodies proved after the clinical examinations carried out over homo-sapiens for a long period of time. The major uses of this species are for body muscle mass, infertility, antimicrobial, antiallergic, diarrhea, anaemia, abdominal pain, increase testosterone level and detergents and soaps for killing lice. Present study was carried out in the Division of Floriculture, Medicinal and Aromatic Plants, SKUAST-K, Shalimar Campus, Srinagar. The maximum values were recorded in the propagation media M_6=soil +sand+forest litter (1:1:2) with respect to the studied parameters viz; number of vegetative shoots, percent established plants, average length shoot, fresh rhizome biomass, dry rhizome biomass and dry rhizome content with recorded values, 1.83,2.33 and 3.11 at 30, 45, and 60 DAP,88.89%, 166.12cm, 37.50g,13.23g and 39.69% respectively. Media formulations containing forest litter as one of the constituents performed better with respect to other media in terms of better vegetative growth as well as better development of rhizomes in *Dioscorea deltoidea.* Growing media soil + sand + forest litter (1:1:2) and soil + sand + cocopeat (1:1:2) are best for vegetative propagation.

Keywords: root cutting, *Dioscorea deltoidea*, medicinal plants, vegetative growth, media combination

Introduction
The state of Jammu and Kashmir constituting 67.5 per cent of North Himalayan region which is a rich reservoir of biodiversity with 36 per cent of taxa being endemic. More than 500 plants have medicinal value, out of which nearly 132 plants are exclusively used in Unani System of Medicine. More then 70 per cent of herbs are harvested from alpine and subalpine forest zones, while rest is obtained through farming (Masoodi, 2003) [1].

Because of the non-judicious exploitation of resources from natural habitats and near absence of commercial cultivation, many medicinal plants have reached brink of extinction, thus there is an urgent need to domesticate such species so that they can be introduced into regular farming system. However, the domestication process envisages propagation of the germplasm as the initial step. Also the medicinal plants await commercialisation owing to non-availability of propagation protocols. India is one of the 12-mega biodiversity centres of the world having about 10 per cent of the world's biodiversity wealth, which is distributed across 16 agro-climatic zones. Out of the 17,000 species of higher plants reported to occur within India, 7500 are known to have medicinal uses. Ayurveda, the oldest medicinal system in the Indian subcontinent has alone reported approximately 2,000 medicinal plant species, followed by Siddha and Unani medical systems. Currently about 25 per cent of the drugs are derived from plants and many others are synthetic analogues built on prototype compounds isolated from plant species in modern pharmacopoeia (Kala and Sajwan, 2007) [2].

World Health Organization (WHO) has compiled a list of 20,000 medicinal plants used in different parts of the globe (Fransworth and Soejarto, 1985) [3]. WHO also estimates that 80 per cent of population of developing countries rely on traditional medicines, mostly plant drugs, for their primary health care needs. Demand for medicinal plant is increasing in both developing and developed countries due to growing recognition of natural products, being non-narcotic, having no side-effects, easily available at affordable prices and sometime the only source of health care available to the poor (Verma, 2008) [4].

International trade in medicinal plants is 60 billion US$ per year, increase at the rate of 7-15 per cent and is projected 6 trillion US$ by the 2050 (Shawal *et al*., 2004) [5]. In terms of volume and value of medicinal plants exported, an average annual export of 32,600 tonnes valued at

45.95 million US$ was reported (Bhalla *et al*., 2002) [6]. It is a twining herb, which grows at an altitude of 1000-3000 m. the glabrous and left twining stem bears alternate petiolate leaves. The flowers are born on axillary spikes, male spikes 8-40 cm long and stamens 6 cm. Female spikes are 15 cm long with 4-6 seeded. Seeds are winged all round. Rhizome is lodged (in soil) superficial, horizontal, tuberous, digitate and chestnut brown in colour. Its tubers contain purest available source of diosgenin.

Materials and Methods

The experiment site falls in the district Srinagar. The district has an area of 2228 sq. km and is located between 35.5°-34.7° N latitude and 74.8°-74.9° E longitude at an attitude of 1730 meters a.s.l. Materials used and methods employed for the present investigation : Ten growing media viz., soil; soil + FYM (1:1); Soil + Cocopeat (1:1); Soil + Forest litter (1:1); Soil + Sand + Forest litter (1:1:1); Soil + Sand + Forest litter (1:1:2); Soil + Sand + Cocopeat (1:1:1); Soil + Sand + Cocopeat (1:1:2); Soil + Sand + FYM (1:1:1); Soil + Sand + FYM (1:1:2) were prepared after thorough mixing of the ingredients at the experimental farm. Decomposed forest litter were collected from the Experimental Field of the Division. Cocopeat bricks were procured from the market. FYM collected from the Experimental Field of the Division. The experiment was laid out in Completely Randomized Design (CRD) with six polybags per treatment per replication. The experiment was conducted under 35 per cent shade nets. All other cultural operations were adopted uniformly. All observations were recorded after planting and data was subjected to the statistical analysis.

Results and Discussion

Data regarding vegetative growth is presented in Table-1 and -2. Number of shoots counted at various intervals after planting is significantly more in media combinations having soil in addition to sand and organic matter as ingredients. At 30 days after planting lowest average number of vegetative shoots was recorded in medium containing soil only. Similar trend was recorded at 45 and 60 days after planting. As the experiment was conducted in containers, performance of the propagules in media comprising soil was expectedly poor. As drainage is directly proportional to the depth of the media and containers having limited depth, means drainage is severely impaired. Poor drainage in turn adversely affects the air content in the media and hence the growth of the propagule. Soil has the highest water retention (% of vol.) and hence very low air content when irrigated to saturation. Therefore, propagules grown in soil did not perform well. However, vegetative performance of propagules in media containing one part soil and one part organic matter (forest litter/cocopeat/FYM) though superior was statistically at par with propagules grown in soil only. This illustrates the importance of sand in the propagation media. Sand improves drainage and aeration of the growing medium which might be responsible for improved performance of propagules in terms of number of vegetative shoots counted at specific intervals. Maximum number of vegetative shoots counted at different intervals after planting was recorded in media containing 1 part soil, 1 part sand and 2 parts organic matter. Organic matter increases the cation exchange capacity (CEC) of the media and hence makes the nutrients available to the growing plants. Moreover, organic matter improves structure and texture of propagation media, hence balancing drainage and aeration which otherwise vary in opposite direction. Organic matter increases water retention without impairing aeration within the media. This might be the reason for improved performance of propagules in media containing 50 per cent organic matter by volume (soil + sand + forest litter, 1:1:2). These results are in conformity with the findings of Dinova *et al*. (1988) [7] in Alstroemeria. Nautiyal *et al*. (2003) [8] reported that forest litter amended media gave maximum vegetative growth of *Rheum emodi*.Trends in length of shoots of propagules in different media can also be explained on above lines. These results are further supported by the findings reported by Martorell *et al*. (1993) [9] in lettuce seedlings.

Data regarding per cent established plants varies significantly with the increase in organic matter content in the medium. However, media combinations containing FYM resulted in significantly lower plant establishment. FYM is known to harbour disease causing agents unless it is totally decomposed which might be the reason for lower plant establishment in FYM containing media. Highest plant establishment was recorded in media containing soil, sand and organic matter. Organic matter and sand improve water and air balance in the media and hence present a favourable environment for plant establishment. Thus, this improved environment might be the reason for improved plant establishment in sand and organic matter containing media.

Dioscorea being a geophyte requires loose and friable media for maximum development of under ground storage organs. As is evident from Table-3 lowest biomass of rhizomes (both fresh and dry) was recorded in propagules grown in soil. As the foregoing study indicates soil is the least suited media for containerized cultivation which might be the reason for poor performance. Addition of one part organic matter (M2, M3 and M4) resulted in marginal improvement in biomass of rhizomes. However, inclusion of sand as one of the ingredients resulted in significant improvement of growth of the underground rhizome. This again illustrates the importance of right mixture of soil/sand/organic matter in any propagation medium. Sand improves the bulk density and drainage of the medium. Organic matter enhances structural and textural properties. In addition, it also improves the CEC thus making nutrients added as growth supplements available to growing plant. Moreover, a good medium allows a head start for growth of plants. This entails a more efficient above ground growth and hence more photosynthates which are translocated to the growing underground structure. This might explain better performance of propagules in terms of biomass accumulation of underground rhizomes. Similar findings have been recorded by Martorell *et al*. (1993) [9] in root dry weight accumulation of lettuce.

Again lower biomass accumulation in media containing 50 per cent FYM (M_{10}) can be explained on the basis of immobilization of nutrients in slightly undecomposed FYM.

Table 1: Effect of different media combinations on vegetative traits of *Dioscorea deltoidea* Wall

Treatment	Number of vegetative shoots		
	30 DAP	45 DAP	60 DAP
Soil	1.06	1.28	1.61
Soil + FYM (1:1)	1.11	1.44	1.78
Soil + Cocopeat (1:1)	1.17	1.50	1.94
Soil + Forest litter (1:1)	1.28	1.39	2.00
Soil + Sand + Forest litter (1:1:1)	1.61	1.78	2.83
Soil + Sand + Forest litter (1:1:2)	1.83	2.33	3.11
Soil + Sand + Cocopeat (1:1:1)	1.33	1.72	2.06
Soil + Sand + Cocopeat (1:1:2)	1.78	2.06	2.89
Soil + Sand + FYM (1:1:1)	1.72	1.89	2.67
Soil + Sand + FYM (1:1:2)	1.39	1.56	1.83
$LSD_{(p=0.05)}$	0.27	0.43	0.52

Table 2: Effect of different media combinations on percent established plants and length of shoot of *Dioscorea deltoidea* Wall

Treatment	Per cent established plants	Average length of shoot (cm)
Soil	66.67 (54.72)	129.78
Soil + FYM (1:1)	72.22 (58.44)	135.60
Soil + Cocopeat (1:1)	72.22 (58.94)	137.07
Soil + Forest litter (1:1)	77.78 (62.18)	136.50
Soil + Sand + Forest litter (1:1:1)	83.33 (70.21)	152.58
Soil + Sand + Forest litter (1:1:2)	88.89 (73.94)	166.12
Soil + Sand + Cocopeat (1:1:1)	77.78 (62.54)	141.90
Soil + Sand + Cocopeat (1:1:2)	83.33 (65.90)	155.25
Soil + Sand + FYM (1:1:1)	77.78 (62.18)	146.67
Soil + Sand + FYM (1:1:2)	72.22 (58.46)	138.09
$LSD_{(p=0.05)}$	7.24	7.87

Figures in parentheses are arc sine transformed values

Table 3: Effect of different media combinations on rhizome traits of *Dioscorea deltoidea* Wall.

Treatments	Fresh biomass of rhizomes (g)	Dry biomass of rhizomes (g)	Dry matter content of rhizomes (%)
Soil	27.85	8.98	32.19
Soil + FYM (1:1)	28.40	9.79	32.71
Soil + Cocopeat (1:1)	29.69	9.84	33.15
Soil + Forest litter (1:1)	30.27	10.00	33.05
Soil + Sand + Forest litter (1:1:1)	31.17	12.38	35.24
Soil + Sand + Forest litter (1:1:2)	37.50	13.23	39.69
Soil + Sand + Cocopeat (1:1:1)	31.74	11.13	35.05
Soil + Sand + Cocopeat (1:1:2)	33.51	11.08	33.02
Soil + Sand + FYM (1:1:1)	32.08	12.05	37.50
Soil + Sand + FYM (1:1:2)	29.87	10.30	36.11
$LSD_{(p=0.05)}$	1.90	2.19	NS

Plate 1: Effect of different media on the vegetative growth of *Dioscorea deltoidea*

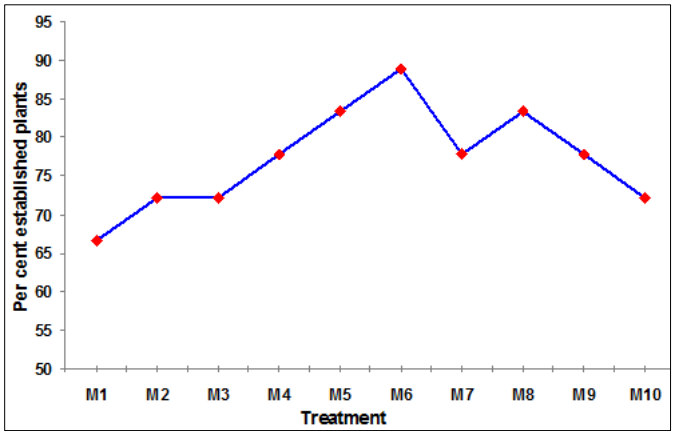

Fig 1: Effect of different media combinations on per cent established plants of *Dioscorea deltoidea* Wall

M1 = Soil; M2 = Soil + FYM (1:1); M3 = Soil + cocopeat (1:1);
M4 = Soil + forest litter (1:1); M5 = Soil + sand + forest litter (1:1:1);
M6 = Soil + sand + forest litter (1:1:2); M7 = Soil + sand + cocopeat (1:1:1);
M8 = Soil + sand + cocopeat (1:1:2); M9 = Soil + sand + FYM (1:1:1);
M10 = Soil + sand + FYM (1:1:2)

Conclusion

Media formulations containing forest litter as one of the constituents performed better with respect to other media in terms of better vegetative growth as well as better development of rhizomes in *Dioscorea deltoidea*. Growing media soil + sand + forest litter (1:1:2) and soil + sand + cocopeat (1:1:2) are best for vegetative propagation.

References

1. Masoodi MA. Medicinal Plants. Agriculture in Jammu and Kashmir- A Perspective Mohisarw Book Series, Rawalpora, Srinagar, 2003, 129-143.
2. Kala CP, Sajwan BS. Revitalizing Indian systems of herbal medicine by the National Medicinal Plants Board through institutional networking and capacity building. Current Science. 2007; 93(6):797-806.
3. Farnsworth NR, Soejarto DD. Potential sequence of plant extinction in the United States on the current and future availability of prescription drugs. Economic Botany. 1985; 39:231-240.
4. Verma V. Introduction to Medicinal Plants. International Encyclopaedia of Medicinal Plants. Vol. 1. Anmol Publications Pvt. Ltd., New Delhi, 2008, 1-8.
5. Shawl AS, Qazi GN. Production and trade of medicinal plants in India - An overview. SKUAST Journal of Research. 2004; 6:1012.
6. Bhalla JK, Shailaya V, Harita. Medicinal plant with special reference to their commercial value and export potential. Recent progress in medicinal plants, SCI. TECH. Publishing LLC. 2002; 5:387-402.
7. Dinova M, Boboshewska D, Racheva Y. Accumulation of nutrients in *Alstroemeria hybrid* (I). Acta Horticulturae. 1988; 226(2):563-566.
8. Nautiyal BP, Prakash V, Maithani VC, Chauhan RS, Purohit H, Nautiyal MC. Germinability, productivity and economic viability of *Rheum emodi* Wall. ex Meissn. cultivated at lower altitude. Current Science. 2003; 84(2):143-148.
9. Martorell M, Soliva M, Canameras N, Martinez FX, Reis MD. Lettuce seedling growth on substrate mixes using peat, cork, forest litter and sand. Acta Horticulturae. 1993; 342:167-173.