

Role of Growing Media for Ornamental Pot Plants

Preeti Gohil*, Mulji Gohil, Jignasa Rajatiya, Farheen Halepotara,
Meera Solanki, V. R. Malam and Roshni Barad

College of Horticulture, Junagadh Agricultural University, Junagadh, Gujarat-362245, India

*Corresponding Author E-mail: preetigohil01@gmail.com

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ABSTRACT

The aim of the review is to present an overview of the effects of different potting mixtures and their function to ascertain which factors are responsible for the growth of an ornamental potted plant that growing media are found effective for flowering, foliage beauty, compacting of size and ability to survive. The findings from the literature suggest normal field soils are not suitable for container media unless the structure is modified by adding other forms of physical conditioners. Number of authors have reported that Potting media containing cocopeat + sand + vermicompost in 2:1:1 v/v ratio result in best growth parameters and improved quality in aglaonema. several authors have recommended that Rice husk medium in transparent pot enhance optimum growth, aesthetic quality and soil + vermicompost (1:1 v/v) exerted maximum number of sprouts/plant in potted dieffenbachia for house beautification. Chrysanthemum pot mum plants grown in medium of cocopeat, soil, sand and vermicompost significantly gave the best results pertaining to growth and flowering. Combination of cocopeat + rice husk + vermicompost (1:2:1 v/v) as media increase the vegetative growth and enriched cocopeat increase flower yield and improve the quality of gerbera. Orchid performed best in media of cocopeat which enhance the flower yield and quality. Anthurium enhance the vegetative growth in media combination of sand and coir pith compost while cocofiber, FYM and neemcake improve the flower parameters. Treatment combination of vermicompost and coarse sand (3:2 v/v) as media recommended to promote the flower yield of zinnia.

Key words: Potting mixtures, Flowering, Foliage beauty, Rice husk, Cocopeat, Vermicompost.

INTRODUCTION

The major role of a potting media is to support the plant, while holding water and nutrients for the plant to use during growth⁴. Top ten pot plants in the world is Ficus, Dracaena, Kalanchoe, Dendranthema, Begonia, Hedera, Azalea, African Violet, Hydrangea and Spathiphyllum. The components selected to make the growing mix will have an impact on

its physical and chemical properties (with emphasis on physical properties). We will look at the most common components added to growing media and their impact on properties of the medium produced. There are two types of growing media for Potted Plants A) Soil media and B) Soilless media (They are combined in various amounts as a percentage of the mix).

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A) Soil Media

Soil is the basic material/ingredient of the media. It forms the major portion in the combination of different media. Cheaply available and easy to handle. Most soils on the average are composed of 50% air and water 46-49% mineral particles and 1-6% organic matter. The mineral particles of soil are sand (0.05-2 mm), silt (0.002-0.05 mm) and clay (less than 0.002 mm).

B) Soilless media:

i) **Organic growing media:** Peat, Shredded bark, Cocopeat, Compost, Vermicompost and Leaf mould

1) **Peat:** Peat is one of the most common components of potting mixes, and can be quite variable. The upper and younger layers of a peat land is called “white peat” and the lower layers of peat are called “black peat”.

Advantages: High water holding capacity, Uniform, attractive, safe to handle and is generally free of weeds and pathogens. Some Disadvantages is difficult to re-wet.

2) **Sphagnum moss:** Dehydrated acid bog plants from the genus *Sphagnum* (i.e. *Spapillosum*). It is light in weight and has the ability to absorb water by 10 to 20 times of its weight. Sphagnum moss contains specific fungistatic substances which accounts for its ability to inhibit dampingoff of seedlings. Used to cover seeds because it is lightweight and controls disease.

3) **Shredded bark:** This kind of plant materials obtained from cedar, fir, pine and red wood can be used in potting mixture for raising ornamental plants. A few terrestrial orchids can be successfully raised in a medium consisting of pine bark. The plants derive

nutrients from the breakdown products of these organic materials.

4) **Cocopeat:** A byproduct of processing coconut husks is known as coir dust, coco peat, coir pith or simply coir. Coir is a versatile natural fiber extracted from mesocarp tissue, or husk of the coconut. The husk contains 20% to 30% fiber of varying length and holds 8-9 times its weight in water. Can be reused for up to 4 years. The properties of Coco Peat make it resistant to bacterial and fungal growth, easy to handle and great oxygenation properties which is important for healthy root development. Environment friendly. Coir is low in nitrogen, calcium, and magnesium but relatively high in phosphorus and potassium. But Cocopeat has natural salts so it is not suitable for recycling hydroponic systems.

5) **Compost:** Well decomposed organic matter obtained by aerobic/anaerobic condition. Composting is a process in which biodegradable organic wastes are converted to stable humus by indigenous microflora including bacteria, fungi and actinomycetes. Provides a rich potting medium, or a porous, absorbent material that holds moisture and soluble minerals. Provides the support and nutrients to the plants. Disadvantage of compost is weighty and bulky, making it expensive to transport. The nutrient value of compost is low compared with that of chemical fertilizers

6) **Vermicompost:** Also known as worm castings, worm humus or worm manure. End-product of the breakdown of organic matter by the earthworm. This compost is an odorless, clean, organic material containing adequate quantities of N, P, K and several micronutrients essential for plant growth.

Table 1: Different Nutrient status of vermicompost¹⁴

Major nutrients (%)			Minor nutrients (ppm)			Micro-organisms (per gram)		
N	P	K	Cu	Fe	Zn	Fungi	Bacteria	Actinomycetes
2.5-3.0	1.0-1.5	1.5-2.0	52.0	930.0	186.6	2.65x10 ⁴	11.37x10 ⁷	10.43x10 ⁴

Vermicompost is rich in all essential plant nutrients. It improves pot structure, texture, aeration, and water holding capacity. Vermicompost is rich in beneficial micro flora

such as a fixers, P- solubilizers, cellulose decomposing micro-flora etc in addition to improve soil environment. It prevents nutrient losses and increases the use efficiency of

chemical fertilizers. only vermicompost contain plant growth regulators like auxin and Gibberellins so its important for sprouting and germination of bulb and seed respectively.

7) Leaf mould: Form of compost produced by the fungal breakdown of shrub and tree leaves. The addition of leaf mould increases water retention in pot by over 50%. Oak maple like tree species are suitable for leaf mould. It has very low bulk density 0.1-0.25 g/cm³

ii) Inorganic growing media: Sand, Charcoal, Perlite, Vermiculite, Rockwool and Jiffy.

1) Sand: The particle sizes of sand used in potting mix have important effects on the mix. Naturally occurring granular material composed of finely divided rock and mineral particles. Diameter ranges from 0.06 mm to 2 mm. Most common constituent of sand is silica (silicon dioxide, SiO₂), usually in the form of quartz. Increase the water holding capacity and aeration of the mix. Sand may also be used to provide weight to the mix.

2) Charcoal : Charcoal is the product of slow burning natural wood in the absence of oxygen to prevent combustion. The burning occurs at temperatures of 400°C – 500°C (750°F – 930°F). Filter impurities. Keep nutrients in the soil and that way increase soil fertility. Prevent decay and can endure in soil for thousands of years. Allow the flow of air through the potting mix.

3) Perlite: Perlite is a grayish-white siliceous volcanic rock in origin, mined from lava flows. Improves Aeration and drainage. It is free of weeds and disease. It is clean, odorless and safe to handle. Perlite is almost pH neutral. Disadvantage of perlite is Very low cation exchange capacity. and contains very less nutrient.

4) Vermiculite: Vermiculite is a natural micaceous mineral that expands with the application of heat. Chemically it is hydrated magnesium, aluminium-iron silicate. Growing medium for hydroponics. Increases water and nutrient retention. Vermiculite is very lightweight and sterile. When used in hydroponics, vermiculite is often mixed with perlite. A huge disadvantage is that there may be asbestos in it. Asbestos causes cancer and disease.

5) Rock wool: Horticultural growing medium made from natural ingredients - basalt rock and chalk. Rock-wool for hydroponics is formed when heated at 1600⁰ C, into lava. After the rock-wool fibers are spun, they are compressed into mats that can be cut into slabs or cubes for hydro growing. Maintains its physical properties over time and with successive crops. Is light weight and thus easy to handle and shift into place, once fully irrigated however it becomes heavy and provides stability to the crop. Products and growing slabs come ready to use, the substrate only needs to be thoroughly wetted before planting.

6) Jiffy: Now a day's specially prepared growing media packed in a self biodegradable netting is available. It is generally a circular block of 3 to 4 cm diameter and 1/2 to 1 cm thickness enclosed in a net which is not visible at the first glance. This is usually olive green to brown in colour and has a good capacity to absorb moisture.

Properties of good soilless growth media : High porosity, Stability of organic matter, Good water holding capacity, Low salt concentration (Na, Ca, Cl ions), Must retain sufficient moisture and aeration, Optimum pH (5.0-6.5) and EC (0.6 dms/cm²) for pot plants.

Table 2: List of flower crops that can be grown on commercial level using soil-less culture¹⁸

Flower / Ornamental crops	Tagetes patula (Marigold), Rosa berberifolia (Roses), Dianthus caryophyllus (Carnations), Chrysanthemum indicum (Chrysanthemum)
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REVIEW

A) Ornamental foliage

1) Dieffenbachia

In dieffenbachia media and pot gave the best result in treatment of Rice husk in transparent pot vegetative growth, chlorophyll content, colour ranking, dry matter and root growth.¹¹ And Sand + Soil (1:1v/v) gave maximum result in dieffenbachia plant height (cm), number of leaves / plant and diameter of shoots (cm).while Soil + Vermicompost (1:1v/v) gave maximum result in case of number of sprouts/plant²¹.

Several studies evaluated that Cocopeat + Sand + Vermicompost (2:1:1, v/v) gave maximum result in no. of leaves, width (cm), dry weight of root (g), visual plant grade*, visual colour grade**, visual root grade***, and it's give a significant result in plant height (cm), leaf length (cm), leaf area (cm²), plant growth index and fresh weight of root (g) in *aglaonema*²².

B) Ornamental flower

1) Orchid

Many reviewed studies have measured the influence of cocopeat + 3pc coconut husk gave significant result in plant height (cm), no of root/plant and survival % and gave maximum result in case of no of leaf and length of root (cm).⁸ However, in some cases *Castanopsis Hysterix* bark + Leaf mould gave maximum result in no. of flowers per spike, spike length (cm) and spike per m² and Rotten log + Sand + Coconut husk + Brick pieces gave highest result in flower diameter(cm)¹.

2) Chrysanthemum pot mum

Findings of studies conducted that Cocopeat only gave maximum result in plant spread (cm) N-S, plant spread (cm) E-W, average plant spread (cm), duration of flowering (days) and no. of flower per plant while Soil + Sand + FYM (2:1:1v/v) required minimum days taken for flowering (days).⁹ Moreover, others have observed that Cocopeat + Sand + FYM + Vermicompost (2:1:0.5:0.5 v/v) gave maximum result in duration of flowering (days), spray length (cm) and no. of flowers per plant while Soil + Sand + FYM + Vermicompost (2:1:0.5:0.5 v/v) gave maximum result in flower diameter (cm).⁷ Soil + Sand + Vermicompost (1:1:1 v/v) gave maximum result in case of height of plant (cm) (90 DAP), no. of branches/plant (90 DAP), length of branches (cm) (90 DAP) and duration of flowering while Soil + Sand + FYM (1:1:1 v/v) its required minimums No. of days taken for flower bud initiation¹³.

3) Anthurium

Investigating the studied showed that Sand + coirpith compost 3:1 v/v gave significant result in case of plant height (cm), leaf area (cm²), fresh weight of leaf (g), dry weight of leaf (g)

(At 225 Days after transplanting) and petiole length (cm) (4 Week after emergence)¹⁷. Other findings show that Saw dust: Brick pieces: Wooden charcoal: Soil: Sand: FYM (2:1:1:1:1 v/v) gave maximum result in case of no. of leaves/ plant, leaf area (cm²), no. of suckers/ plant, no. of flowers/ plant and it required minimum to flowering (days)²⁰. In some cases Coco fibre + FYM (1:1 v/v) gave significant result in number of leaves, length of new leaf sheath (cm), plant height (cm), number of flowers/plant, size of flower (cm²) and required minimum days required for first flowering (Days) while Coco fibre + Neem cake (1:1 v/v) gave maximum result in length of flower stalk (cm) and vase life (days)¹⁹.

4) Rose

In most studies Soil + FYM + Sawdust 2:1:1 v/v + Water soluble fertilizers 1% gave maximum result in Plant height at the time of first flower harvest (cm), leaf area (cm²), size of flower (cm), number of flowers per plant and flower yield per hectare while Soil + FYM + Sand 2:1:1 v/v + Commercial straight fertilizers 1% gave maximum result in weight of flower stem (g)³.

5) Dahlia

Several studies reviewed that Cocopeat + FYM (1:1 v/v) gave maximum result in case of vegetative parameter, flowering parameter, dry matter of leaf and tuber while Vermiculite + FYM (1:1 v/v) gave maximum result in no. of tubers /plant and fresh weight of tuber/ plant (g)¹⁰.

6) Gerbera

Some investigator suggested that Coco peat: Rice husk: Vermicompost (1:2:1 v/v) gave highest result in no. of leaves per plant, plant spread (cm), suckers per plant and flowers per plant¹² and Enriched cocopeat gave significant result in flower parameters of gerbera⁶.

7) Zinnia

In accordance with other studies found that Vermicompost + Coarse sand + Soil (3:2:0 v/v) gave best result in vegetative and flower parameters of zinnia¹⁵.

8) Primula

Findings of studies conducted that Cocopeat: FYM: Sand (1:1:1, v/v) gave significant result

in case of branches/plant, shoot length (cm), length of inflorescence stalk (cm), inflorescence diameter (cm), flowers/inflorescence and its required minimum days to flower bud formation(Days) and days to first flower opening (Days)⁵.

9) Cock's comb

In Cock's comb 70 cocopeat: 30 burnt rice hull gave best result in plant height (cm), leaf no., leaf area (cm²), dry weight of flower, leaves, stem, roots and 70 cocopeat: 30 perlite gave significant result in Canopy diameter (cm) while 100 cocopeat gave best result in flower length (cm) and its required minimum days to flowering (days)²³.

10) Carnation

combination of media Red earth + Cocopeat (1:1 v/v) gave significant result in rooting parameters in carnation cutting¹⁶.

11) Adenium

evaluated in several studies Vermiculite + Cocopeat Fibre (1:1 v/v) gave highest result in fresh weight of stem and roots, dry weight of leaves, stem, root and caudex diameter (mm)².

CONCLUSION

Ornamental pot plant will be increasingly demanding with respect to its requirements for the highest quality of growing media. Soilless Culture is the growing of plants that imitate soil- base gardening by using many kinds of growing media as for example inorganic substance, organic substance. Growing media and supply of essential nutrients are the most important encouragement of pot plants in respect to growth as well as quality. Potting media containing cocopeat + sand + vermicompost in 2:1:1 v/v ratio result in best growth parameters and improved quality in aglaonema. Orchid performed best in media of cocopeat which enhance the flower yield and quality. Anthurium enhance the vegetative growth in media combination of sand and coir pith compost while cocofiber, FYM and neemcake improve the flower parameters. The potting media using artificial or natural substrates would result in efficient and effective use of water and fertilizers.

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