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CONTRASTING CATEGORY OF GROWING POTS AND MEDIA FOR PROPAGATION

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Introduction:

Plants grown in containers offer homeowners flexibility, whether the plants are houseplants indoors or colourful annuals on an outdoor patio. Planting in containers allows a gardener to easily make changes in location if sunlight or temperatures do not encourage plant growth. All plants need the same basic environmental conditions to survive. Correct management of growth factors-light, water, temperature, air movement, relative humidity, and fertilization and the proper growing medium are the keys to success with container-grown plants. Indoor and outdoor container-grown plants share many characteristics, but each situation also has some unique needs.

Clay Pots

The familiar red clay flower pots, long used for growing young plants, are heavy and porous and lose moisture readily. They are easily broken, and their round shape is not economical for storage space. After continued use, toxic salt accumulations build up, requiring soaking in water before reuse. Clay pots are rarely used today in commercial propagation, except with specialized crops.

Plastic Pots

Plastic containers, round and square, have numerous advantages: they are nonporous, reusable, lightweight, and use little storage space because they will nest. Some types are fragile, however, and require careful handling, although other types, made from polyethylene, are flexible and quite sturdy Small liner pots for direct rooting of cuttings, seedling propagation, and tissue culture plantlet acclimatization and production have gained considerable popularity. Many of these small containers have rib-like structures to redirect root growth and prevent girdling. In forestry seedling production, ribbed book or sleeve containers are used, which consist of two matched sections of molded plastic that fit together to form a row of rectangular cells.

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The inner walls of small propagation containers and liner pots can also be treated with chemical root pruning agents, such as copper hydroxide, which chemically prune liner roots at the root-wall interface. The chemically pruned lateral roots become suberized but will begin to grow again after trans- planting, which results in a well-distributed root system that helps minimize transplant shock.

Fiber Pots

Various sizes, round or square shape of containers, are pressed into shape from peat plus wood fiber with fertilizer added. Dry, they will keep indefinitely. Since these pots are biodegradable, they are set in the soil along with the plants.

Peat pots find their best use where plants are to be held for a relatively short time and then put in a larger container or in the field. During out planting in the field, any portion of the fiber pot transplanted above the surface of the soil will act like a wick and quickly dry out the transplant.

Paper Pots

Paper pots or paper tube pots are more popular with seedling propagation of ornamental and forestry species. They allow for greater mechanization with pot filling machines, automatic seeders, and wire benches that allow air pruning of the root system. Typically, paper pots consist of a series on interconnected paper cells that are arranged in a honeycomb pattern that can be separated before out planting. An advantage of the paper pot system is that pots are biodegradable, and the seedling plug can be planted intact into a larger container or into the ground without disturbing the root system. Some papier Mache pots (paper, wax, asphalt) come treated with copper hydroxide, which enhances root development and retards deterioration of the pot In Europe.

Paper tube pots with predictable degradation rates are produced by machine.

The propagation medium is formed into a continuous cylinder and wrapped with a length of paper or cellulose skin.

Peat, Expanded Foam, and Rockwool Blocks

Blocks of solid material, sometimes with a pre-punched hole have become popular as a germinating medium for seeds and as a rooting medium for cuttings, especially for such plants as chrysanthemums and poinsettias. Fertilizers are sometimes incorporated into the material. One type is made of highly compressed peat which, when water is added, swells to its usable size and is soft enough for the cutting or seed to be inserted. Such blocks become a part of the plant unit and are set in the soil along with the plant. These blocks replace not only the pot but also the propagating mix.

Synthetic rooting blocks are becoming more widely used in the nursery industry (and forestry industry for seed propagation), and are well adapted to automation. Other advantages are their light weight, consistent quality, reproducibility, and clean condition. Watering must be carefully controlled to provide constant moisture, while maintaining adequate aeration.

Plastic Growing Containers for Post-Liner Production

Many millions of nursery plants are grown and marketed each year small and larger containers. They are tapered for nesting and all have drainage holes. However, heavy-wall, injection-molded plastic containers have replaced the older-type metal containers.

Machine planters have been developed utilizing containers in which rooted cuttings or seedlings can be transplanted as rapidly as 10,000 or more a day. Plants are easily removed from tapered containers by inverting and tapping. Some plastic containers are made of preformed, hinged plastic sheets that can be separated for easy removal of the liner. In areas with high summer temperatures, use of light-colored (white or silver) containers may improve root growth by reducing heat damage to the roots, which is often encountered in dark-colored containers that absorb considerable heat when exposed to the sun.

Wood Containers

Big size wood containers or boxes are used for growing large specimen trees and shrubs to provide instant landscaping for the customer. The plant material may be kept in such containers for several years or the plants are initially field grown and then "boxed" for

six months to a year to let the root system acclimatize before being sold. Heavy moving equipment is required for handling such large nursery stock.

Polyethylene Bags and Plant Rolls

Polyethylene bags are widely used in Europe, Australia, New Zealand, and in India, but rarely in North America-for growing rooted cuttings or seedling liners to a salable size. They are considerably less expensive than rigid plastic containers and seem to be satisfactory, but some types deteriorate rapidly. They are usually black, but some are black on the inside and light-colored on the outside. The lighter color reflects heat and lowers the root temperature. Polybags do not prohibit root spiraling or allow air pruning, which is a drawback to their use in propagation and liner production; however, poly tubes are open-ended, which reduces girdling problems.

A low-cost method of propagating some easy-to-root species is with a polyethylene plant roll. The basal ends of the cuttings are inserted in damp peat moss or sphagnum and rolled into the doubled-over plastic sheeting. The roll of cuttings is then set upright

Media

Various substrates and mixtures of materials are used for germinating seeds and rooting of cuttings is known as media. Media should be highly decomposed and stable (20 C: 1 N Ratio) to prevent N immobilization and excessive shrinkage during production. Media must be free from pests. The medium must be sufficiently firm and dense to hold the cutting or Seeds in place during rooting or germination.

The propagation media used in Horticulture Consist a mixture of organic and inorganic compounds that have different but Complementary properties.

A variety of mineral components include sand, grit, pumice, perlite, scoria, expanded shale, vermiculite, rock-wool, clay granules, and polystyrene.

Soil

Soil is composed of materials like 50% solid, 25% liquid and 25% air or gaseous states. The solid parts of soil is consist both organic and inorganic components and the texture of the soil being determined by the relative proportions of these particle sizes. Colloidal clay fractions of the soil serve as storehouse for nutrients that are released and absorbed by plants. The organic compound consist both of dead and leaving organisms. The texture of a mineral soil depends upon the relative proportions of sand (0.05 to 2mm), silt (0.05 to 0.002mm particle diameter) and clay (less than 0.002mm).

Sand

Sand consist of small rock particles 0.05 to 2mm diameter, developed from weathering of various rock. Sand contains virtually no mineral nutrients and has no buffering capacity or cation exchange capacity. Sand is used mostly in combination with organic materials.

Peat

The partially decomposed remains of aquatic, marsh, bog or swamp vegetation that have been pre-treated underwater are known as peat. The bog's low oxygen content inhibits the plant material's bacterial and chemical breakdown. The origin of the vegetation, the level of decomposition, the amount of minerals present, and the acidity all affect the composition of distinct peat deposits, which vary greatly from one another.

The U.S. Bureau of Mines has classified peat into three categories: moss peat, reed sedge, and peat humus. The least broken down of the three types, moss peat is made from sphagnum or other mosses and is commonly referred to as peat or peat moss in the market. Its hue ranges from pale tan to deep brown. It has a high acidity (pH of 3.2 to 4.5), a high moisture-holding capacity of approximately 15 times its dry weight, and low nitrogen (about 1%), but no phosphorus or potassium. Typically, this kind of peat is sourced from Germany, Canada, Ireland, and certain parts of the northern United States. The most popular type of peat in horticulture is peat moss, with coarse grade being the best. In order to incorporate peat moss into mixtures, it must first be broken up and moistened. At first, wettability may decrease with continued addition of coarse organic materials to greenhouse media, such as peat moss or sphagnum moss. Many of the peat particles will stay dry even after watering because water will not easily penetrate them.

Sphagnum Moss Peat

Sphagnum moss peat, also known as commercial sphagnum peat is the living, dehydrated young residue of acid-bog plants. Although it is the most ideal peat for horticultural applications, its high cost makes

it unsuitable for widespread commercial use. With a water-holding capacity of 10 to 20 times its weight, it is lightweight, relatively free of pathogens, and quite water-soluble. Usually, this material is mechanically or manually shred before being added to a growing or propagating medium. Although it has some minerals in small amounts but if plants grown in it for any length of time need additional nutrients. The pH of sphagnum moss ranges from 3.5- 4.0. Certain fungistatic agents, such as a strain of Streptomyces bacteria, may be present.

Vermiculite

A micaceous mineral that significantly expands when heated is vermiculite. There are sizable deposits in South Africa, North Carolina, and Montana. It is a hydrated magnesium-aluminium-iron silicate chemically. Expanded, vermiculite weighs only 90 to 150 kg per cubic metre (6 to 10 lb per cubic foot), is insoluble in water, and has a neutral reaction with good buffering properties. Large amounts of water can be absorbed by it, ranging from 40 to 54 litres per cubic metre (3 to 4 gal per cubic foot). Because of its comparatively high capacity for cation exchange, vermiculite can store nutrients for later release. Although it contains potassium and magnesium, additional amounts must come from other fertiliser sources.

There are numerous thin, distinct layers with microscopic amounts of water trapped between them that make up the particles of crude vermiculite ore. The water turns to steam and splits into tiny, porous, sponge-like kernels when it is heated to temperatures close to 1090°C (2000°F). Horticultural vermiculite is sorted into four sizes: 5-8 mm, regular horticultural grade 2–3 mm, third 1–2 mm, and last, which is best used as a medium for seed germination, from 0.75–1 mm. Compacting expanded vermiculite while wet is not a good idea as it will ruin its desired porous structure.

Perlite

Mined from lava flows, perlite is a gray-white silicaceous material with a volcanic origin. After being crushed and screened, the crude ore is heated to 760° C (1400° F) in furnaces. At this temperature, the small

amount of moisture in the particles expands into steam, transforming them into tiny, sponge-like kernels that weigh only 80 to 100 kg per cubic metre. A sterile product is produced due to the high processing temperature. In horticulture, particles with a diameter of 1.6 to 3.0 mm are typically employed. Three to four times the weight of water can be held in perlite.

With a pH of 6.0 to 8.0, it is practically neutral but lacks buffering ability. It lacks mineral nutrients and has no cation exchange capacity, in contrast to vermiculite. Plants that are sensitive to fluoride may have some issues with perlite, but excessive watering can cause fluoride to be leached out. It works best when adding more aeration to a mixture. Combining perlite and peat moss is a widely used rooting medium for cuttings. Dust from perlite irritates respiratory systems. To reduce dust, perlite should be moistened, and respirators should be worn by employees.

Calcined Clay and Other Aggregates

Stable aggregates can be produced when minerals such as clay, shales, and pulverized fuel ash are heated (calcined) at high temperatures. They have no fertilizer value, are porous, resistant to breakdown, and absorb water. The main purpose of these materials is to change the physical characteristics of a propagation or liner potting mix.

Examples of commercial materials made from clay include Leca, Terragreen, and Turfice. Haydite is a combination of clay and shale, while Hortag is made from pulverized fuel ash.

Pumice

Chemically, pumice is mostly silicon dioxide and aluminum oxide, with small amounts of iron, calcium, magnesium, and sodium in the otide form and volcanic origin. It increases aeration and drainage in a propagation mix and can be used alone or mixed with peat moss.

Coconut Fiber/Coir

Coconut fiber (coir) is an economical peat substitute that can be mixed with a mineral component as propagation media. It is derived from coconut husks.

Rockwool (Mineral Wool)

This material is used as a rooting and growing medium. It is prepared from various rock sources, such as basalt rock, melted at a temperature of about 1600°C, then, as it cools, is spun into fibers and pressed into blocks with a binder added. Horticultural rockwool is available in several forms- pellets, slabs, blocks, cubes, or combined with peat moss as a mixture. Rockwool will hold a considerable amount of water, yet retains good oxygen levels. With the addition of fertilizers it can be used in place of the Peat-Lite mixes. Before switching from more traditional media mixes,

it is best to initially conduct small-scale propagation trials with rockwool and other new media components as they become commercially available.

Shredded Bark

Shredded or pulverized softwood bark from redwood, cedar, fir, pine, hemlock, or various hardwood bark species, such as oaks and maples can be used as a component in growing and propagating mixes, serving much the same purposes as peat moss and at a lower cost. Before it is used as a growing medium, pine bark is hammer-milled into smaller component pieces, stockpiled in the open and often composted by turning the piles and watering as needed.

Composting for 11 to 13.5 weeks before using reduces phenolic levels in bark improves its wettability as media and the higher bark pile temperatures help reduce insect and pathogen levels. Because of their relatively low cost, light weight, and availability, barks are very popular and widely used in mixes for propagation and container-grown plants.

Compost

Compost (composting) as a product produced from the biological decomposition of bulk organic wastes under controlled conditions, which takes place in piles or bins. Microorganisms include bacteria, fungi, and nematodes: larger organisms, such as millipedes, soil mites, beetles, springtails, earthworms, carwigs, slugs, and sowbugs can often be found in compost piles in great numbers. Compost prepared largely from leaves. The use of composted yard wastes, chicken and cow manure, organic sludge from municipal sewage treatment plants, and so on will play a greater role as media components in the propagation and production of small liner plants. Composted sewage sludge not only provides organic matter, but nearly all the essential trace elements and a large percentage of major elements needed by plants in a slowly available form. The usual recommended rate is that compost not comprise more than 30 percent of the volume of the mix.

Synthetic Plastic Aggregates

These materials were used as substitutes for sand or perlite. Expanded polystyrene flakes improve drainage and aeration and decrease bulk density. They are chemically neutral, do not absorb water, and do not decay, but they can be difficult to incorporate uniformly in the media. The environmental problems in the production and disposal of these materials limit their commercial usage as propagation media. There are many combinations of soilless potting mix components that make great growing mixes. Common mixtures consist of these proportions:

- 50% peat and 50% perlite
- 60% peat, 20% perlite, and 20% vermiculite
- 60% pine bark, 20% peat, and 20% sand

Conclusion

New types of containers for propagating and growing young liner plants are continually being developed, usually with a goal of reducing handling costs. Direct sticking of unrooted cuttings into small finer containers, as opposed to sticking into conventional propagation trays, saves a production step and later avoids root disturbance of cuttings, which can lead to transplant stock. Different type containers are used for different purpose, which are suitable for young liner plants as well as favorable for environment. Used container are easy to handling and transport from one place to another place. If we use of light-colored (white or silver) containers may improve root growth by reducing heat damage to the roots, which is often encountered in dark-colored containers that absorb considerable heat when exposed to the sun. Information about various substrates and mixtures of materials are used for preparing propagation media, should be highly decomposed and Carbon and Nitrogen ratio (20: 1) to prevent Nitrogen immobilization and excessive shrinkage during production. Pest free media must be used. The medium must be sufficiently firm and dense to hold the cutting or Seeds in place during rooting or germination. The propagation media used for different purpose consist a mixture of organic and inorganic compounds that have different but Complementary properties. Information about the ratio of sand, perlite, compost, and coco-peat etc.