

The Effect of Slits of Circle Slit Cancel Pot (CS POT)[®]

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Simply speaking, the characteristics of circle slit cancel pot (called CS POT or “Ton-demonai Pot”) is that the slits at the bottom of the container stimulate the growth of many new healthy roots, for the slits allow the excess water from watering to drain out of the container soundly and the main root to receive sufficient air to grow well. I think my containers (Table 1) are superior to others on the point of fostering root growth.

The excessive moisture in the container causes circling of the roots, which is considered to be one of the biggest concerns when we produce containerized plants. On the inside of containers water moves along the following courses mentioned below

Table 1. The lineup of CS containers (containers with slits).

Type	Japanese Name	Size
Circle slit cancel pot for breeding	CS Plug-tray	406-40 holes & 128 holes (for machinery)
Circle slit cancel pot for producing, breeding, gardening and planting	CS POT	6.5 ϕ – 30 cm and 50 cm
Circle slit cancel pot for breeding and producing	Polyester-pot	9 cm ϕ – 15 cm ϕ
Circle slit cancel pot for gardening	Kesyo-pot	9 ϕ – 21 ϕ
Circle slit cancel pot for gardening	Kengai-pot	18 ϕ – 30 ϕ

Table 2. A difference of both the flow of water and root development of plants between three types of containers (In the Polyester Pots, you can grow the roots like that are fostered in the CS POT with the greatest care). You will be able to make excellent growth in polyester pots if you wish.

Polyester Pot	
Dry Suitable humidity	The roots easily tend to circulate by themselves.
Nonwovens Pot	
The middle of the soil is dry. The water evaporates through the stitches. The bottom of the soil becomes humid because of the clogging water.	Although the main roots grow well with new roots, it is extremely difficult to grow them in the middle of the container.
CS POT	
Excess water from watering will be able to drain out of the container and water is dispersed evenly in the soil.	When meeting the slits, the roots stop growing temporarily. Also, the number of new roots increases.



Figure 1. Camphor tree (*Cinnamomum camphora*), 1.8 m in height, in polyester container. The roots have become woody and are circling the container.

(Table 2). The containers made from polyester, vinyl chloride, or plastic drain out most of the excess water after watering; however, some water remains between the container and soil because of surface tension. In addition, the circle holes prevent the soil from getting sufficient air because the water fills such holes owing to surface tension. Also, dew forms inside of the containers because of a difference between the day and night temperatures. This condensation produces too much humidity in the containers. As a result, the roots start circling along the container wall to get sufficient air. Circling roots have two bad influences on the growth of plants. First, plants usually absorb nutrition or water from their root tips. If circling happens, the number of these tips absorbing sufficient nutrition and water decreases. Thus, circling causes the plants to have a reduced absorption power. Second, the circling roots, which become woody because of accumulated lignin, prevent the formation of new roots and cause a plant to age (Fig. 1).

Because of the slits, CS POT can drain excess water following watering owing to surface tension and condensation. Because containers do not have any excess water after watering, water is dispersed evenly in the soil. As a result you can control watering more easily because you can check how the soil is drying by observing the



Figure 2. Circle Slit Cancel pot (CS POT).

soil surface. Also, if the soil is given excess water, it is rare for the soil to become waterlogged. The projections, 1 mm in height, and slant of the CS POT wall lead the roots downward without circling (Figs. 2 and 3). Additionally, these projections work as a radiator. The temperature in the container drops faster, because these projections make the surface area of the container bigger.

As mentioned earlier, the construction of the container leads the roots downward. These roots stop growing temporarily when they come in contact with the air. This stopping does not mean that the roots are dead. When sufficient air is given to the roots, the cells of the root tips become smaller and smaller, and undergoing hormonal stress, the roots cease growing temporarily. When ceasing the growth, the roots have mulberry spots. These spots indicate that growth hormones are produced at those root tips. Because of the translocation of these growth hormones to the aboveground plant parts, leaves, buds, and fruits become bigger. Due to a



Figure 3. Camphor tree (*Cinnamomum camphora*) 1.8 m in height, in CS POT (24 cm in diameter). After 1½ years of culture in CS POT many new roots are formed down from the proximal part of the root. When viewing the growing points you will note that many of the root tips have ceased growth.

translocation of growth hormones produced from the aboveground to roots, it can become possible for the main root to have new roots not only at the lower but also at the upper part. Thus, it is clear that the main root has new roots at the middle part (Figs. 4 and 5).

The CS POT has slits at each corner of the hexagonal or octagonal bottom of the container (Fig. 2). The roots by nature gather around the corners. Therefore, all the roots ceasing growth gather around each slit. As a result, it becomes possible that the roots produced in the CS POT do not circle and the main root has new healthy roots from the top to the bottom. Thus, you can grow plants for a long time



Figure 4. Camphor tree. A washed view of Fig. 3 showing a lot of new roots in the middle of the pot.



Figure 5. A sectioned diagram of the root mass of *Gardenia jasminoides* (Cape jasmine) (50 cm) in CS POT (24 cm in diameter). There are lots of new live roots at not only the middle and lower levels but also the upper part of the main root mass.



Figure 6. Conifer (ball bird). Right: CS POT (15 cm in diameter). The main roots have lots of new live roots growing downward evenly. Left: Typical pot (15 cm in diameter). The root rot has been caused by excessive water.



Figure 7. Udo (*Aralia cordata*) in CS POT (24 cm in diameter).



Figure 8. *Loropetalum chinense* (white, pink, red selection) in CS POT (50 cm in diameter).



Figure 9. Stands of planted trees making the use of CS POT (50 cm in diameter). These CS POT containers are edged with hyaku-monogatari (a kind of fence made from thinning trees).

without changing the container because the slits delay root aging (Figs. 6 and 7). Also, when transplanting from CS POT into a landscape site or the next larger container the plant immediately roots into the soil and their growth at the next pot size or place is very good. The reason this occurs is because the roots that had stopped growing immediately become active and start growing following transplanting.

The CS POT is useful for the production of trees, flowers, vegetables, and fruits. As often shown in the popular gardening publications in Japan such as *Amateur Gardening* and *The Guide to Gardening*, CS POT containers have nationwide popularity among gardeners growing plants such as blueberries, chrysanthemums, roses, and Christmas roses. Now, we would like to introduce our newest use for the CS POT (especially the CS POT 50 cm in diameter)—tree planting on roof gardens and stands of planted trees making the use of CS POT (Fig. 8).

In the currently used containers the roots begin circling and aging in 1 or 2 years. Therefore, a change in containers is needed because they are not suitable for such tree plantings. Our CS POT containers allow the trees to grow for a longer time because new healthy roots are produced in the whole soil mass of the container. Because of this feature, the plants are not aging and the changing of containers is not needed for a longer time. This broadens the use of CS POT to tree plantings around houses, buildings, parks, and exhibitions (Fig. 9).