

# Plant substrate

Gilmar Schafer<sup>1,2\*</sup> <sup>1</sup> Universidade Federal do Rio Grande do Sul, Rio Grande do Sul, Brazil.<sup>2</sup> Plant Science Area-Editor, Ornamental Horticulture, Viçosa-MG, Brazil.

The term “plant substrate” was initially adopted by the International Society for Horticultural Science (ISHS) in the mid-20th century. In Brazil, the term was proposed approximately 20 years ago, being officially recognized by the Ministry of Agriculture in 2004, regarding the product which replaces the soil in soilless cultivation.

In Brazil, the use of plant substrate takes place in several areas of agricultural production. Ornamental horticulture is the third ranking area that most consumes substrates, being surpassed by horticulture and the production of forest seedlings. The consumption in the production of seedlings such as tobacco, coffee, fruit trees, sugar cane and, to a lesser extent, aquaponics and mushroom production, is also subject of highlight. According to Abisolo (2021), in a survey carried out among its members, sales of substrates for plants in the country had a volume of 605,000 cubic meters and a value of 290 million Reais (average Dollar value of R\$ 5.18).

Plant substrate can be defined as any porous material, used alone or mixed, which, placed in a container, provides anchorage and sufficient levels of water and oxygen for optimal plant development (Vence, 2008). The proper conditions for the correct development of plants in containers are different from those observed in the field, mainly due to the restriction of space for root development, gas exchange and water dynamics in these containers. The main functions of a plant substrate are to provide fixation, retain and make available water, have aeration space, even in a state of water saturation, have structural stability, have adsorption capacity, have buffering capacity against pH changes, have predictable nutrient dynamics and electrical conductivity, show behavior similar to the same management, have little biological activity, have an absence of diseases and substances that can reduce or damage plant development, have good rehydration capacity after drying and that allow storage. The main properties of substrates refer to physical, chemical and biological characteristics, among which, the physical and chemical characteristics play an important role (Schafer et al., 2015). As physical characteristics go, they are considered the most important

as they are difficult to change after the cultivation has been established, and we can refer density on a wet and dry basis, total porosity, air space and water retention (easily available, buffering capacity and remaining water) as examples. The most important chemical characteristics in substrates include pH, electrical conductivity and/or total soluble salt and available nutrient content.

It is difficult to find a plant substrate with only one component fulfilling all the desirable characteristics, so it is common to use mixtures of materials, in variable proportions, in order to achieve the desirable physical, chemical and biological properties. In general terms, the materials that give structure to the substrate are called “basic materials”. Other than that, we have the “complements”, which have the function of improving the structure of said basic materials, such as porosity and drainage and density. Finally, we can refer the “additives”, which control the chemical and biological functions of the substrates. As the most used basic materials, we can mention coconut fiber, pine and eucalyptus bark and peat, as complements we can mention vermiculite, perlite, carbonized rice husk and expanded clay. As conditioners, we can mention fertilizers, moisturizers, growth promoters, microorganisms (antagonists). There are still many studies with the use of regional alternative materials, such as composted sugarcane bagasse, winemaking residues, pine needles, acacia bark, peanut husks, pruning residues from large cities, among others.

In ornamental horticulture, plant substrates are used in the most diverse areas of production. Its use is consolidated in the production of seedlings (propagation), cultivation of potted flowers and foliage and annual and perennial plants. It is also used in lesser quantity in the production of garden plants and cut flowers.

Therefore, studies with plant substrate are essential for the development of ornamental horticulture. We invite you to read about this topic in the special issue “Substrates, fertilization, efficient use of water and soilless cultivation for ornamental pot plant production” published in *Ornamental Horticulture*.

---

\*Corresponding author: [schafer@ufrgs.br](mailto:schafer@ufrgs.br)

<https://doi.org/10.1590/2447-536X.v28i2.2459>

Licensed by CC BY 4.0 (<https://creativecommons.org/licenses/by/4.0/>)

---

## References

ABISOLO, 2021. **Anuário Brasileiro de Tecnologia em Nutrição Vegetal**. Available at: < <https://www.abisolo.com.br/anuario/> > Accessed on November 29<sup>th</sup>, 2021.

SCHAFFER, G.; SOUZA, P.V.D.; FIOR, C.S. An overview of the physical and chemical properties of substrates used in horticulture at southern Brazil. **Ornamental Horticulture**, v.21, n.3, p.299-306, 2015. <https://doi.org/10.14295/oh.v21i3.735>.

VENCE, L.B. Disponibilidad de agua-aire en sustratos para plantas. **Ciencia del suelo**, v.26, n.2, p.105-114, 2008.