

## VARIEGATION IN BROMELIADS

*(by Luiz Felipe Nevares de Carvalho)*

Editorial comment (Bob Reilly) Reprinted, with permission of the Bromeliad Society International, from the Journal of The Bromeliad Society, 2000, volume 50 (4), pp. 182-185. Variegated bromeliads are often keenly sought after by collectors. In this article, the author discusses the causes and types of variegation, as well as the propagation of variegated bromeliads. Note that the process of naming a particular variegated plant can sometimes be more complex than might be inferred from the article.

Variegation is a rather common phenomenon in the plant kingdom, and is found in many plant families. It is especially pronounced in Bromeliaceae.

The word “variegata” comes from Latin – variegatus, variegata, variegatum – meaning variable coloration with patches of different colors. A bromeliad is known as “variegata” when it has two or more different colors. Over 60% of cultivated bromeliads have bands, dots, lines, and streaks, and can therefore be considered variegated. However, the term is accepted in horticulture, when applied to bromeliads that have lines, streaks and longitudinal bands of contrasting colors, especially those that show differences in pigmentation between the green chlorophyll-containing tissues and albino tissues.

On the other hand, if we look at the many bromeliads that grow in the wild, it appears that variegation is a rare phenomenon. As a general rule, patently variegated plants are less hardy and slower growing than normal, and those that arise spontaneously in nature normally survive the competition for space and light only when man intervenes, taking them from the wild for cultivation.

Variegation is rarely found in the subfamily Pitcairnioideae, and is not particularly common in Tillandsioideae. It does occur, however, in the genera *Guzmania*, *Vriesea*, *Alcantarea*, and in a few species of *Tillandsia*. In the subfamily Bromelioideae, variegation is quite common, especially in the genera *Aechmea*, *Ananas*, *Billbergia*, *Cryptanthus*, *Neoregelia*, and *Nidularium*.

### CAUSES OF VARIEGATION

Although there has been much progress in scientific research on bromeliads, comparatively little is known about the causes of variegation. As a general rule, botanists agree that bromeliads have a rather mutable genetic structure, and therefore, several different theories are possible. The first of these link variegation to virus infection.

Viruses are common in plants and animals and may cause many harmful and debilitating illnesses. In nature, they provide a quality control system for living organisms. These viroids have the capacity to alter the genetic programming of plant cells by molecular inclusion or extraction of chromosomes. Bromeliads are known to host viruses, but the physiological mechanisms of virus infection in plants is poorly known.

Viruses may attack the plant meristem or main vascular system. Bromeliads are monocotyledons and as such, they mostly have parallel veins running lengthwise along the leaves. Beginning from a tissue with infected cells, as the plant grows, the “problem” is

transmitted down the entire leaf, producing clearly defined lines or bands. Variegation that appears in plants grown from seed can be explained by previous infection of the seed producing plant, even before ovule fertilization, or by infection of the pollen grains. The viruses are often no longer present when the symptoms – variegation – manifest themselves.

Variegation is also thought to be frequently associated with environmental factors, but there is no scientific proof to back up this assumption. Some investigators support the hypothesis that natural radiation may cause genetic mutation. Laboratory experiments show that B- and X- rays lower the number of meristem cells, which may cause variegation.

Chemical substances are also capable of producing variegation in plants. It is a well known fact that flower inducing substances produce lateral buds of the “variegata” type in adult plants.

Factors relating to microclimate, temperature, humidity and light are also sometimes mentioned as influencing variegation. Biological stress, such as prolonged dehydration or poor nutrition, is said to bring on variegation, as are ecological disturbances such as fire, freezing, cyclones, etc.

In short, variegation may be caused by genetic mutation or by virus infection, but it seems probable that a number of causes can potentially bring on this phenomenon.

## TYPES OF VARIEGATION

Plants with two different types of tissues – albino and chlorophyll-pigmented (diploid and tetraploid) – are called chimeras. This definition can be applied to the “variegatas”. Variegation may be fixed or mutable, temporary or permanent. Tissues with fewer chloroplasts are light green or yellowish in color. A total lack of chloroplasts leads to white or cream-colored tissues.

There are certain visible forms of variegation that are recognized botanically, although the naming of forms is not always consistent or precise, and some are treated as synonyms:

- *variegata* The white or yellow bands have no clear organization, and usually do not extend to the margin of the leaf. As was mentioned above, the term “variegata” refers generically to any form of variegation (i.e. [sic] *Vriesea platynmea* var. *variegata*). The term *striata* is also used here (i.e. [sic] *Nidularium innocentii* var. *striatum*).
- *marginata* The leaf margins are white (*albomarginata*) or yellow (*flavomarginata*) and the central part of the leaf is green (i.e. [sic] *Aechmea nudicaulis* var. *flavomarginata*).
- *lineata* – Thin white or yellow lines running along the leaf (i.e. (sic) *Nidularium innocentii* var. *lineatum*).
- *medio-picta* meaning “painted center”, this type is similar to “variegata” but with green stripes in the centre of the leaf.
- *tricolor* three-colored; usually green, cream and rose (ex. *Neoregelia carolinae* forma *tricolor*).
- *quadricolor* –four colored; usually white, yellow, red, and green (*Aechmea magdalenae* var. *quadricolor*)

The pigment group known as the anthocyanins is present in many bromeliads; it is found in the epidermal cells and may hide both chlorophyll-pigmented and albino tissues. In *Aechmea*

orlandiana var. 'Ensign', anthocyanin produces a very beautiful red or rose color in the albino tissue.

Reddish brown stripes and bands are found in several hybrids such as Aechmea 'Red Ribbon' and Neoregelia 'Amazing Grace'.

Variation is also found sometimes in inflorescences, and in primary and floral bracts, such as happens in some Guzmania hybrids.

## PROPAGATION OF VARIEGATES

Theoretically, vegetative reproduction will lead to the replication of the mother plant, but this method is not totally reliable when dealing with variegates. Even the best lines, the so-called fixed clones, may occasionally show some alteration. Some however, have survived for decades without mutations, generation after generation.

As a rule, variegated plants are harder to grow than all-green plants. Inflorescences are smaller than normal and the tendency to bud laterally is also reduced. Some have definitely slower growth rates than normal plants. This is especially true of vrieseas and guzmanias, which are also slower to root.

It is advisable to leave lateral shoots (pups - Editor) on the mother plant for a longer time than with normal plants. Experience has shown that shoots about half the size of the mother plant can be detached with no problem. An important sign of shoot maturity is root emergence. To promote increased production of lateral shoots, the removal of the newly formed inflorescence is recommended, so that the plant can channel its energy into the lateral shoots.

Multiple variegate plants tend to produce either albino shoots or all-green shoots. True albinos are apt to die when separated from the mother plant, thus wasting precious reproductive energy. It is therefore recommended that they be removed as soon as they appear.

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