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*Is Rodriguezia lanceolata* Ruiz & Pavon a Traditional r-strategist?

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#### Abstract

The life cycle of *Rodriguezia lanceolata* is examined and compared to a traditional r-strategist to determine if it fits the model.

*Rodriguezia lanceolata* Ruiz & Pavon is a common species found from Panama to Bolivia. In Colombia, department of Quindio, it has become very common on hedges in residential complexes. It is especially common on a plant cultivated as a hedge plant, *Swinglea glutinosa* (Blanco) Merr., originally native to Asia. *Rodriguezia lanceolata* is also commonly found on trees or shrubs which are cultivated or part of secondary plant growth resulting from physical disturbance of the original habitat or abandonment after agricultural use, it is rarely found in primary forests.

Large specimens in healthy condition are rarely found. When large specimens are found, they are usually in a state of decline. A plant of *R. lanceolata* can reach flowering size in 18 months and flower from only a single growth. The plants will grow vigorously for 3 to 5 years and then begin a decline resulting in the eventual mortality of the plant in the ensuing 1-2 years. The plants demonstrate a lifespan of about 6-7 years. The decline begins as the host begins to change physically, increasing in size there by reducing the amount of light reaching the plants. This decrease in solar radiation reaching the plant could be a cause for the decline and eventual mortality of the plant. Specimens cultivated under controlled greenhouse conditions do not exhibit the decline or mortality.

Another cause of mortality commonly observed is not related to a change in environmental conditions. *Rodriguezia lanceolata* is a twig epiphyte almost always germinating on thin branches on the periphery of the host. As the plants grow in size and weight, the twigs tend to not be able to support the weight and break causing the plant to fall to the ground. The plants usually do not survive on the ground for any period of time again possibly due to the lack of solar energy.



*Rodriguezia lanceolata* 4-5 years old.



*Rodriguezia lanceolata* 4-5 years old.





*Rodriguezia lanceolata* 4-5 years old.



*Rodriguezia lanceolata* in advanced stage of decline.





*Rodriguezia lanceolata* in advanced stage of decline.



During the life cycle of the plant numerous seed capsules are produced. An average inflorescence will produce 18 flowers and an average of 3-4 seed capsules with hundreds of thousands of seeds resulting.



Immature *Rodriguezia lanceolata* seed capsules. Mature seed capsules, demonstrating the splitting of the capsules to forcibly expel the seeds.



*Trochilidae* hummingbirds pollinate the flowers. The birds visit the flowers for the nectar secreted by a gland at the base of the labellum, which is stored in a sepaline spur. The plants are self-sterile to prevent inbreeding and insure genetic variation. This variation is expressed in the variability of the shape, size and color of the flowers of the individuals.



Hummingbird pollinator of *Rodriguezia lanceolata*.



*Rodriguezia lanceolata*.





*Rodriguezia lanceolata* variation.

The theory of r/K strategist as presented by MacArthur & Wilson (1967) has been proposed as a theory to understand the life history of an organism. All that is important for an organism is the continuation of the species by the transfer of genes to the next generation. Sterns (1992) studied the past literature on r/K theory and concluded that the r/K theory was once useful but no longer served a purpose in life history theory. The theories of adaptive capacity and resilience promoted by Gunderson & Holling (2001) have revived interest in the theory, and use it as a way of integrating social systems, economics and ecology. Almost all of the studies involving r/K theory have been applied to animal life histories. The r/K theory appears to still have validity when applied to plant populations.

Traits that characterize an r-strategist are high fecundity, small size of the organism, early maturity, short generation time and ability to disperse offspring. These r-strategists play a role in the ecological succession that regenerates an ecosystem. Because of their higher reproductive rates and ecological opportunism they are primary colonizers followed by a succession of flora and fauna.

*Rodriguezia lanceolata* seems to fit the r-selection life history strategy of MacArthur & Wilson, (1967). These are species that produce a large number of offspring, which are easily distributed and live in an unstable or changing environment, which eventually results in their mortality.

These r-strategists produce large numbers of small low energy seeds in a short time that can be dispersed long distances by wind; many seeds are produced simultaneously to ensure that some reach a hospitable environment. Seed capsules reach maturity in 3-4 months and open forcibly expelling the seeds. Seeds that do not reach a hospitable environment have little chance for survival since the seeds have a low energy content but the large number of seeds produced insure some survival. *Rodriguezia lanceolata* has all these traits and thereby appears to be a model for the r-strategist theory. Although the r-K selection theory was accepted for decades and was used for groundbreaking research, many population biologists have abandoned or modified it. Several studies have attempted to confirm the theory but have been considered to have failed. However, *Rodriguezia lanceolata* clearly appears to fit the theory and incorporates the age-specific mortality of the population.

*Rodriguezia lanceolata* produces large numbers of seeds of low energy content simultaneously, which germinate and reach maturity in a short time (18 months) and in approximately 6 years the plants begin a stage of decline as the environment changes and eventually mortality. These plants will produce a large number of progeny, which will repeat the cycle. *Rodriguezia lanceolata* appears to be a primary colonizer but does not play a role in changing the habitat for the arrival of K-strategists. *Rodriguezia lanceolata* appears to have all of the characteristics of an r-strategist and follow all the steps in its life history of an r-strategist. However, when the environmental changes do not result from the presence of the species then its label as an r-strategist is in question because its presence in the habitat has no impact on that habitat. However, the plants do achieve the goal of every organism, to produce offspring transferring its genetic material to the next generation.





*Rodriguezia lanceolata* eight month old seedling.



*Rodriguezia lanceolata* 10 month old seedling.



*Rodriguezia lanceolata* 12-month-old seedling.



*Rodriguezia lanceolata* 12-14 month old seedling.



*Rodriguezia lanceolata* 18-month-old seedling flowering.



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