Influence of Benzyladenine on Longevity of *Heliconia latispatha* Benth.

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**Abstract**
Heliconia species have great potential to be used as cut flower due to their beauty, rusticity and in general good postharvest longevity, however premature wilting of the bracts and sepals, and failure of flower opening may occur. Furthermore, there are only a limited number of recommendations, as *Heliconia latispatha* should be handled at and after harvesting. The goal of this work was to examine the influence of benzyladenine on vase life of heliconia inflorescences harvested at two different stages of development. The inflorescences were sprayed with 0, 100, 200 and 300 mg/L benzyladenine harvested at stage showing one to two fully opened bracts (stage 1) and from three to four fully opened bracts (stage 2). The experiment was arranged in a random block design comprising nine stalks per treatment. The growth regulator was sprayed twice until the stalks were completely wet applied within the first hour after harvest. The average of opened bracts throughout vase life was not affected by the benzyladenine treatment, which were 2.5 for the stage 1 and 4.2 open bracts for the stage 2. Treatment with benzyladenine extended the longevity compared to control flowers in both stages of development. A positive correlation was observed between benzyladenine concentration and increase in the vase life. Spraying the stalks with 300 mg/L benzyladenine increased the longevity by at least 1.85-fold compared to the untreated flowers.

**INTRODUCTION**
*Heliconia latispatha* is an herbaceous musaceae native from the American tropics, containing large leaves, long flower-stems (1.5 to 2.0 m) and exuberant flowers. The flower stems are long and erect with boat-shaped bracts and flowers red-orange, with yellow tone at the base. Among the large heliconia flowers, *Heliconia latispatha* may be considered the species with the shortest longevity in vase. At room temperature, its longevity in vase of is not longer than 3 to 5 days, compared with species like *H. caribaea* and *H. wagneriana* where the longevity may reach up to 15 days considering similar conditions of temperature and humidity (Criley and Paull, 1993).

Cytokinins have been identified as growth regulators that delay leaf senescence by slowing chlorophyll degradation and maintaining protein and RNA levels (Arteca, 1996). When cytokinins are supplied at correct time and dosage, flower longevity of many species may be extended. Chlorophyll degradation of Easter lily leaves was delayed by spraying the whole plant with benzyladenine (Han, 1995). Also, the vase life of anthurium, *Heliconia psittacorum* and red or pink ginger inflorescence was improved by dipping or spraying benzyladenine, but there was no apparent effect on vase life of bird-of-paradise (Paull and Chantrachit, 2001). In other species of heliconias like *H. lapistatha* there is no information available regarding the influence of cytokinin like substances on flower longevity.

The objective of this experiment was to determine the response of *H. latispatha* flower to treatment with benzyladenine applied immediately after harvesting.

**MATERIAL AND METHODS**
Flower stems of *Heliconia latispatha* cv. Red-Yellow were harvested at garden field of Federal University of Viçosa (642 m alt., 20°45’ lat. S and 42°51’ long. W) in
January 2001, always between 7 -8 a.m. The stems were cut close to the soil level and immediately put in boxes and transported to the laboratory. It was established the following stages of development at harvest: 1 = one to two open bracts and 2 = three to four open bracts (Fig. 1). Flower stems were cut to 1.0 m long and then placed in vases containing distilled water. The inflorescences were sprayed with 0, 100, 200 and 300 mg/L benzyladenine (6-benzylaminopurine) twice until the stalks were completely wet applied within the first hour after harvest.

Vases were placed at temperature of 25 °C under 12 hours of 1,500 lux of white fluorescent light and 60-80% relative humidity. The water in the vases was replaced at frequency of every two days until the end of the experiment.

Daily was evaluated the opening of the bracts and quality, which was based on the description made by Castro (1993), as the following grades: 3 = excellent general aspect (freshly harvested flowers); 2 = good general aspect (loss of brightness and few signals of senescence) and 1 = fair general aspect (presence of wilting and discoloration spots). The end of flower longevity was considered when grade 1 achieved.

The data were analyzed as a randomized block design with three replications and three flower stems per treatment in each vase. Data were subjected to analysis of variance and regression analysis utilizing F test at 5% probability.

RESULTS

Regardless the stage of development of the bracts at harvest, stage 1 or 2 (Fig. 1), the longevity in vase for the control flowers of *Heliconia latispatha* was 7.5 days. Spraying the cut flowers with benzyladenine, in both stages 1 or 2 of the bract development, improved linearly the flower longevity (Fig. 2). By treating the stems with 100, 200 and 300 mg L\(^{-1}\) benzyladenine, longevity was increased by 1.29, 1.57 and 1.87 fold, respectively compared to untreated cut flowers.

Spraying the flowers with benzyladenine did not influence the opening of the bracts, regardless if the stems were harvested at stage 1 or 2 of development. The averages of opened bracts through vase live were 2.5 and 4.25 for the stage 1 and 2, respectively (Fig. 3).

DISCUSSION

There is a general believe that flowers harvest at later phases of development have shorter vase life (Nowak and Rudnicki, 1990). However, little is know about the influence of the stage of development at harvest on postharvest life of flowers from the genus *Heliconia*. For the species *Heliconia latispatha* flower longevity was not affected by the stage of development at harvest. Crilley and Paull (1993) recommended that for *H. psittacorum* the harvest should be done when one to two bracts are open and for larger heliconias one-half to two-thirds fully open. The authors also mention that inflorescences of heliconia species do not open once harvest, as found in this experiment. But further studies are needed to address the possible influence of pulsing with sugar containing solutions on the opening of bracts and longevity of the flowers.

Cytokinin are effective in delaying bract darkening and abscission of *H. psittacorum* regardless if they were dipped or sprayed with 200 mg L\(^{-1}\) benzyladenine, increasing by three fold the vase life (Paull and Chantrachit, 2001). The current results showed that the increase in the vase life of *H. latispatha* was dependent on the benzyladenine concentration, and a linear effect was observed up to 300 mg L\(^{-1}\) sprayed at the stems immediately after harvest. Future experiments with *H. latispatha* should focus on the increase of cytokinin concentration beyond 300 mg L\(^{-1}\), trying to establish the saturation point of response. Also, the effectiveness of cytokinin as flower senescence retardant may relay on the rate of the substance uptake by the flower, as well as the tissue sensitivity to the hormone.

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Literature Cited
Fig. 1. Stages of development at harvest of *Heliconia latispatha* flower stems.
Fig. 2. Longevity of *Heliconia latistpatha* cv. Red-Yellow flowers sprayed with 0, 100, 200 and 300 mg L\(^{-1}\) benzyladenine harvested at different stages of development.

\[ y = 0.0217x + 7.5 \]
\[ R^2 = 0.97 \]

Fig. 3. Number of open bracts of *Heliconia latistpatha* cv. Red-Yellow flowers sprayed with 0, 100, 200 and 300 mg L\(^{-1}\) benzyladenine harvested at different stages of development.