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EFFECT OF DIFFERENT METHODS OF DRYING ON QUALITY PARAMETERS IN PERIWINKLE (*CATHARANTHUS ROSEUS* L.)

Anindo Gopal, K.R. Dhiviya Bharathi, V. Sreemathi, M. & Krishnamoorthy, C.
Vanavarayar Institute of Agriculture (Affiliated to Tamil Nadu Agricultural University), Pollachi, Tamil Nadu, India – 642103.

ABSTRACT
A Lab experiment was conducted at Vanavarayar Institute of Agriculture, Pollachi, and Tamil Nadu during 2015 - 2016 with an objective of studying the effect of different drying methods on quality parameters in periwinkle. The experiment was carried out in a completely randomized design with eight treatments. The purple colour flower varieties of periwinkle leaves are envisaged in this study. Four different types of drying methods like Hot air oven drying method (30ºC, 40ºC, 50ºC, 60ºC, 70ºC), sun drying, solar drying, shade drying (control) and the percentage change in alkaloid content were investigated in this study. The study revealed that there were significant differences in drying of periwinkle leaves and it leads to change in the alkaloid content like Vincamine and Vinorelbine. The observations were recorded on various parameters like time duration of drying, colour change during drying and quality parameters. The drying time period varies from 2 hours to overnight. Results indicated that, the low drying period of 4 hours is noted in Hot air oven drying of 70^0C (T_5) and high drying period of 76 hours is noted in shade drying which is used as control (T_7). Colour change during drying of leaves varies from dark green to dark brown of different treatments (T_1 to T_8) has noted. The alkaloid content Vincamine and Vinorelbine were extracted from the dried leaves of different treatments. The Vincamine and Vinorelbine content was high in the treatment T_3 (0.075 and 0.434 %) and Vincamine content was low in T_5 (0.033 and 0.351 %). It was noted that increasing in drying temperature at hot air oven leads to decrease in alkaloid content in the dried leaf samples.

KEY WORDS: Leaves, drying, alkaloid, vincamine, vinorelbine.

INTRODUCTION

Periwinkle (*Catharanthus roseusL.*) belongs to Apocyanaceae family and is commonly known as "Nayantara" or "Sadabahar" is an erect bushy perennial herb and evergreen shrub. The species was formerly known as *Vinca rosea.* The native of "Periwinkle" is mainly Madagascar. This plant is grown commercially for its Medicial uses in Australia, Africa, India and Southern Europe. Except the highly alkaline or water logged soil, It does not require any special conditions of soil. It favorably grows in light sandy soil rich in humus. The rainfall of about 100 cm is most suitable for it. The leaf is simple, opposite, estipulate, petiolate (Boyadzhiev *et al*., 2002). Drying of periwinkle leaf is the most important second stage of quality control; most of them are exported to other countries without processing. In India about 0.12 lakh ha area of periwinkle is grown and in Tamil Nadu about 1000 ha of area it is grown and about 4500 metric tonnes of production is noted (Pandey Rai *et al*., 2006) periwinkle is exported to Australia, Africa, China from Southern district of Tuticorin port. The periwinkle importing countries are Hungary, West Germany, Italy, Netherland and UK. More than 100 alkaloids and related compounds have been so far isolated and characterized from the plant. The alkaloids contents is different parts shows large variations as roots (0.14-1.34%), stem (0.074-0.48%), leaves (0.32-1.16%), flowers (0.005-0.84%), fruits (0.04%), seeds (0.18%) and pericarp (1.14%). Dry leaves contain Vinblastine 0.00013-0.00063%, Vincristine 0.0000003-0.0000153% which have anticancerous activity (Ipp Joy *et al.,* 2008). Vinblastine, Vincristine was isolated in a pure form by Chromatographic technique. All isolated mixtures were evaluated by HPLC and HTLC (Liu *et al*., 2011).

The main alkaloids are Vincamine, Vinorelbine which are responsible for anticancerous activity. The present study deals with phytochemical screening standardization and drying of the plant leaf. The dried leaves of periwinkle were subjected for different standardization parameter (Brun *et al*., 2001). The phytochemical screening and standardization study is not only an important tool for identification of plant part but also it informs quality control and product formulation development. As *Catharanthus roseus* (L.) is medically important plants which possess anticancerous (Favali *et al*., 2004) and antioxidant properties (Idrees *et al*., 2010).

Any unnecessary parts are removed prior to drying to avoid wasting time and energy cleaning is often done by hand (Huda Faujan *et al*., 2007). The purpose of drying is to reduce the water content so that the plant can be stored. Plant must be dried for processed as soon as possible after harvest because they being to deteriorate immediately (Gajalakshmi *et al*., 2013). The type of plant or plant parts being used will determine the appropriate drying technique (Gireesh Kamath *et al*., 2015). Leaves are used in traditional medicine for a number of conditions and ailments helps to control excessive blood flow in wounds. Vinca minor used to improve circulation and for circulatory disorders. It also used for curing congestion, headache, depression, tinnitus, diabetes, stoke (Prasad *et al*., 2010). The use of periwinkle tinctures for chronic disease. Tannins present in the leaves are responsible for the astringent and antiseptic properties. It can also use to

treat urinary and digestive problems. It is also Rich in the chemical like Vincamine, an alkaloid that has positive effect on memory. It has 100 of alkaloids in this Ajmalicine has been used to cure hypertensive properties. Alstonine in Schizophrenia treatment control blood sugar. Vinblastine in Hodgkin's disease and letterer swine disease. Periwinkle tea cures scurvy, mouth ulcers, dermatitis and eczema hemorrhoids (Marcone *et al*., 1997).

From growing of periwinkle to the end of processing chain there are so many factors causes loses of yield and quality attributes. As periwinkle leaf contain many medicinal values and alkaloids. When there is no uniform drying of leaves, it leads to loss of concentration of alkaloid content and it is not preferred by market. The yield and chemical composition is essential for medicinal plants. Drying is the most common way to preserve the quality of medicinal plants. Optimal drying air temperature is central economic and ecological criteria. However, there are differences in temperature sensitivity between species; objective of this work is to develop a review of drying medicinal plants, with this background in consideration the research has been carried out.

MATERIALS & METHODS

The experiment was conducted at Vanavarayar Institute of Agriculture, Pollachi, Tamil Nadu during 2016. The experiment was conducted in horticulture lab, open sun, solar drier respectively. The materials like 75 grams periwinkle leaves, newspaper, brown cover, germination sheet, weighing balance, wiley mill, apparatus, thin layer chromatography and column chromatography were used in this study. The experiment was laid out in a Completely Randomized Design (CRD) with eight treatments replicated thrice. The different treatments were T_1 - Hot air oven at 30°C**,** T_2 - Hot air oven at 40°C, T_3 - Hot air oven at 50°C, T_4 - Hot air oven at 60°C, T_5 - Hot air oven at 70°C, T_6 - Sun drying (39^0C), T_7 - (Control) Shade drying (29^0C), T_8 - Solar drying (65^0C). Periwinkle leaves drying time period is calculated and every One hour the colour changes were observed. The alkaloid content Vincamine and Vinorelbine concentration was analyzed and utilized for recording observation and the mean values were tabulated. The experimental data were statistically analyzed as per the method suggested by Panse and Sukhatme (1978). The critical difference was worked out for 5 percent (0.05) probability.

RESULTS & DISCUSSION

Drying of periwinkle leaves at different temperature shows variations in the alkaloid content.

Time duration

Time duration of different drying methods in periwinkle leaves is presented in Table 1. The time duration of different drying methods in periwinkle leaves was observed that the duration varies from 2 hours to overnight. In the treatment T_5 (hot air oven drying at 70^0C), 4 hours has been noted that it has low time duration in drying of leaves and in the treatment T_7 (shade drying method (control) 29^0C), 76 hours has noted that it has high time duration in drying of leaves.

The sensitivity of the substance determine the temperature of drying process, because the plant temperature is increased during the drying and high temperature may promote loss by volatilization or degradation of principle alkaloids (Mahanom *et al*.,2006). The drying time of impregnated varies among the drying from 2 hour to overnight under various method (Patil and Ghosh, 2010).

TABLE 1. Time duration of different drying methods in periwinkle leaves

Treatment	Drying time (Hours)
T_1	29
T_2	10
T_3	6
T_4	5
T_5	4
T_6	10
T_7	76
T_8	13

Colour changes

The effect of different drying methods on colour change in periwinkle leaves was presented in Table 2. Colour changes during drying of leaves vary from dark green to dark brown has noted in different treatments (T_1 to T_8). Dark green colour was the constant throughout the drying process of leaves.

In the treatment T_6, (solar drying) the colour changed to light brown and inT_7 (shade drying- control) the colour changed to dark brown and in T_8 (sun drying) the colour changed to light green. Chemical changes play a major role in the post-harvest of medicinal plants and it can be influenced by drying (Mishra *et al*., 2001).

TABLE 2. Effect of different drying methods on colour change in periwinkle leaves

Treatment	Colour change
T_1	Dark green
T_2	Dark green
T_3	Dark green
T_4	Dark green
T_5	Dark green
T_6	Light brown
T_7	Dark brown
T_8	Light brown

Vincamine content

Effect of different drying methods on vincamine content in periwinkle leaves were presented in Table 3. The alkaloid content Vincamine was extracted from the dried leaves of different treatments. Vincamine content has analyzed using liquid chromatography. Vincamine content was found high in the treatment T_3 (0.075%) and low in T_5 (0.033%). It was noted that increasing in drying temperature at hot air oven leads to decrease in alkaloid content in the dried leaf samples. Traditional drying methods such as drying in shade or in sun have many drawbacks due to inability to handle the large capacity of mechanical harvesters and to achieve the high quality standards required for medicinal plants. Thus, traditional

natural drying in the sun or shade does not meet the required standards or consumers demand. To overcome these problems, hot air convective drying is widely used (Rocha *et al*., 2011).

TABLE 3. Effect of different drying methods on Vincamine content in periwinkle leaves

Treatment	Vincamine content (%)
T_1	0.041
T_2	0.069
T_3	0.075
T_4	0.038
T_5	0.033
T_6	0.054
T_7	0.048
T_8	0.061
Mean	0.419
SED	0.013
CD at 5%	2.66

Vinorelbine content

Effect of different drying methods on vinorelbine content in periwinkle leaves were presented in Table 4. Vinorelbine has extracted by Soxhlet method and the reading was noted using thin layer chromatography and column chromatography. The Vinorelbine content was found high in the treatment T_3 (0.434%) and low in T_5 (0.351%).

TABLE 4. Effect of different drying methods on Vinorelbine content in periwinkle leaves

Treatment	Vinorelbine content (%)
T_1	0.373
T_2	0.421
T_3	0.434
T_4	0.360
T_5	0.351
T_6	0.397
T_7	0.386
T_8	0.408
Mean	3.13
SED	8.566
CD at 5%	2.61

CONCLUSION

Periwinkle leaf drying at different temperature shows variations in alkaloid content. The study clearly reveals that, the optimum temperature for drying the periwinkle leaves was hot air oven drying at 50°C (T_3). The extraction of alkaloid Vincamine (0.075 %) and Vinorelbine (0.434%) were also recorded more in the treatment T_3 (Hot air oven at 50°C).

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