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EFFECT OF IAA ON THE PHYTOCHEMICAL CONSTITUENTS OF *Catharanthus Roseus* (L).G. DON

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Abstract:

Catharanthus roseus (L).G. Don is an important anticancerous plant belonging to the family Apocyanaceae. This plant may be considered as a famous chemical factory for biosynthesis of a huge array of phytochemical constituents and many of these chemicals are utilized as medicines. The effect of IAA on phytochemical content of *Catharanthus roseus* was studied. IAA was applied as foliar spray at different concentrations viz 50, 100, 150, and 200ppm for 30days. The phytochemical constituents were significantly maximum at 150 and 200ppm concentration of IAA when compared to other concentrations and control. Hence it is concluded that practice of application of IAA to *Catharanthus roseus* can be recommended for attaining better biomass production.

Key Words: Alkaloid, Foliar Spray, IAA & Phytochemical Constituents.

Introduction:

The medicinal plants are useful for healing as well as for curing of human diseases because of the presence of phytochemical constituents (Nostro *et al*., 2000). Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables and roots that have defense mechanism and protect from various diseases. Phytochemicals are primary and secondary compounds. Chlorophyll, proteins and common sugars are included in primary constituents and secondary compounds have terpenoid, alkaloids and phenolic compounds (Krishnaiah *et al*., 2007). Terpenoids exhibit various important pharmacological activities i.e., anti-inflammatory, anticancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and anti-bacterial activities (Mahato and Sen 1997). Terpenoids are very important in attracting useful mites and consume the herbivorous insects (Kappers *et al*., 2005). Alkaloids are used as anaesthetic agents and are found in medicinal Plants (Hérouart *et al*., 1998). *Catharanthus roseus* (L.) G. Don (Apocynaceae) derives its economic importance from its highly valued anticancer alkaloids vincristine and vinblastine, and its antihypertensive root alkaloid ajmalcine (Jaleel *et al*., 2007). All parts of the plants are rich in alkaloids, with maximum concentrations found in the root All parts of the plant are credited with hypoglycaemic properties and are used to treat diabetes (Jaleel *et al*., 2006). Thus it is over all a miracle plant which is having the more number of alkaloids used in pharmaceutical industries. (Edeoga and Eriata 2001). The main objective of our research work was to analyze the presence or absence of different phytochemicals in the selected medicinal plants.

Materials and Methods:

Cultivation of Plants:

The seeds of *Catharanthus roseus* were collected from the local stores, Sivakasi. The seeds were surface sterilized in 0.2% $MgCl_2$ solution for 5 minutes and pots were filled with a soil mixture containing red soil, sand and farm yard manure (1:1:1 ratio). The seeds were soaked in running water for 12-18 hours and allowed to germinate in pots.

Foliar Application of IAA:

Indole - 3 Acetic Acid was initially dissolved in 100 ml of ethanol and a stock solution of 5 mM was made up with distilled water containing 0.02% Tween-20 (Polyoxyethylene sorbitan). Selected concentrations viz., 50, 100, 150, and 200ppm were prepared. After 6 months the leaves were sprayed with different concentration of IAA (50, 100, 150, and 200ppm) using sprayer for a continuous period of 30 days care was taken to wet both the surfaces completely to ensure maximum application. The control plants were sprayed with distilled water. The phytochemical parameters were analysed after 30 days treatment of various concentrations of IAA.

Results and Discussion:

Growth promoting hormones have obviously been used owing to their beneficial effects on growth and yield of plants. Plants are completely dependent on hormonal co-ordination mechanism. Hormones occur in traces and are constantly maintained at low levels. Growth hormones are chemical messengers, which direct cell to carryout various functions of growth and differentiation.

In this study has revealed the presence of phytochemicals constituents considered as active components for medicine. Thus important phytochemicals constituents such as total alkaloids, Phenol, tannin, and saponin

were present in the samples. In our study the total alkaloid, tannin, and saponin content were increased under hormonal treatments showed in the Fig. 1.

Effect of IAA on Phytochemical Constituents:

IAA is believed to regulate plant physiological processes, because IAA can increase protein synthesis and regulation of enzyme activity. An increase in protein synthesis as raw material constituent enzymes in plant metabolic processes would enhance growth. This process can enhance the future growth which would increase the biosynthesis of secondary metabolites (Taiz and Zeiger 2006). The total alkaloid, tannin, saponin and vincristine content increased under hormonal treatment. But at high concentration an increase in the phenolic content was noticed. Borse and Dhumal (2001) observed that foliar application of IAA and GA_3 at different concentrations to *Solanum khasianum* enhanced the content of solasodine which supports our findings. IAA stimulated a considerable increase in alkaloids, saponins and tannins contents of *Balanites aegyptiaca* plants Araby *et al*. (2006). Alkaloid contents in the leaves of *Balanites aegyptiaca* plants were increased significantly by using different concentrations of IAA as compared with the control (Mostafa, e*t al*., 2011). Phytoregulators might modulate the expression of secondary compounds of a terpenic (Ortuno *et al*., 1993) and alkaloid (Cho *et al*., 1988). High concentration of IAA has brought about induction of alkaloids than the control.

High rates of Ethrel tended to increase total alkaloid with little effect on alkaloid profile. Ethrel treatment has produced similar effects in other studies with opium (Ramanathan 1978; Buzuk *et al.*, 2005). It has also increased alkaloid content in *Catharanthus roseus* (Pan *et al*., 2010) and *Chrysanthemum cinerariaefolium* Vis. (Haque *et al*., 2007). Which is consistent with the results of our present study. However, Ethrel also increased alkaloid content in young opium seedlings and is suggested to enhance translocation (Buzuk *et al*., 2005) or increase flux of secondary metabolites (Haque *et al*., 2007).

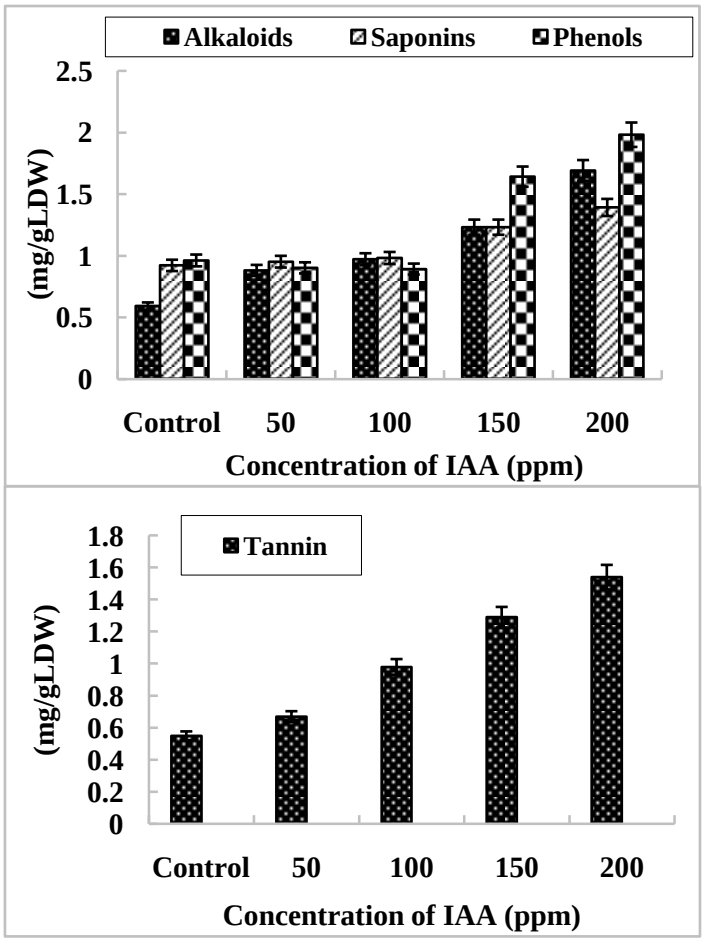

Figure 1: Typical changes in total alkaloids, phenols, saponin and tannin content of *Catharanthus* treated with various concentrations of IAA. The values are an average of 5 independent measurements. Mean ± SE, n=5.

Conclusion:

The phytochemical analysis of the medicinal plants are also important and have commercial interest in both research institutes and pharmaceuticals companies for the manufacturing of the new drugs for treatment of various diseases. Thus we hope that the *Catharanthus* have important phytochemical properties.

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