Biological Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 20, No. 3, June 1977

STUDIES IN ROOT PROMOTING SUBSTANCES FOUND IN TRADESCANTIA FLUMIENSIS VELL

MRS. SADDIQA MALIK, MEHMOOD AKRAM and NAZIR AHMED

PCSIR Laboratories, Peshawar

(Received March 8, 1977; revised December 26, 1977)

Abstract. Fresh sap of the stem cuttings was fractioned by descending paper chromatography and assayed. One zone of blue colour under UV florescence at 0.8 R_f was found to be active in root initiation and promotion when tried on mung bean stem-cutting.

The stem of majority of plant species are generally considered to be an ideal rooting part, as they have the undifferentiated tissues in sufficient quantity to be easily differentiated into root primordia. In nature stem cuttings of some plants are easy rooters while others are difficult to root. This is a known fact that root initiation is governed by specific naturally occurring rooting hormones[1,2]. These hormones, could be one of the reason that stem cuttings of some of the plant species are easily rooted. These hormones when extracted from easy to root plants can stimulate rooting in difficult to root plant cuttings, if applied exogenously.[3] The present work covers the studies on naturally occuring root promoting substances found in stem cuttings of *T. flumiensis;* a common ornamental plant valued for its shade loving habit. *T. flumiensis* is very well propagated vegetatively by the stem cuttings. During the rainy months of July and August the plant is in active vegetative growth. The nodes touching the soil issue adventitious roots. The plant requires high temperature and humidity to initiate rooting at nodes.

Material and Method

Stem cuttings, 15-20 cm., long and 7-10 leaved with the apical leaf bud intact were obtained during the periods of active vegetative growth (July-August) from the potted plants at the experimental farms of PCSIR Laboratories,Peshawar.

These cuttings when placed in water under ordinary room conditions and prevailing day's maximum room temperature range between 31.5-34.5° roots were visible at their nodes after 10 hr of soaking (1-2% rooting) and after about 48 hr 100% rooting at the nodes was observed (Fig. 1).

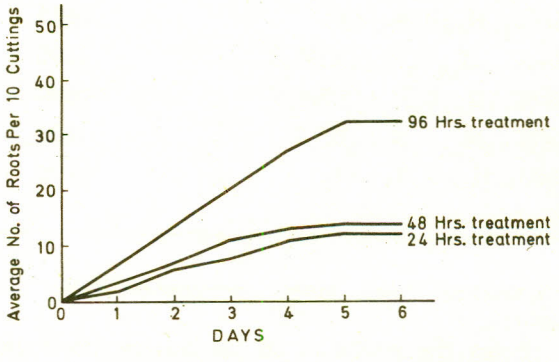

Fig. 1. *T. flumiensis* - root initiation in etiolated mung bean seedlings.

Specific root forming substances are considered to be formed in the leaves and move towards the base of the stem and are accumulated near the basal cut surface of the stem cuttings[1,3].

In the light of the above results the 6th hr (after soaking in water) was considered to be the safe time at which the accumulation of root forming substances near the basal cut surface of the cutting is complete and still unused by the plant cuttings to initiate the visible rooting.

Fresh sap was forced to ooze out by smearing the cut lower internodal portion including the adjoining node of the stem cuttings with the help of smooth pointed glass rod to apply direct on the paper chromatogram. 50 stem cuttings were used for each chromatogram made. Before each application of the fresh sap the preceding sap was dried on the chromatogram by evaporation, using ordinary air from an electric air blower.

Whatman's number one chromatographic paper was used. Absorption streak for the fresh sap was 1

cm wide. Paper width was 14.5 cm. Unidirectional area for the development of the substance was 28 cm. Chromatograms were made, stored and developed in controlled temperature range of 24.5-25.0°. Chromatograms were developed unidirectionally with isopropyl alcohol: Water (4:1, v/v) as solvent. Dried chromatograms were examined under UV florescence.

For qualitative determination of root initiating and root promoting activity of the substance extracted by descending chromatography from *T. flumiensis* stem cuttings the mung bean bioassay techniques as described by Hess[4] were employed. The procedure of this bioassy was a little modified as no indole acetic acid (*AA) was supplied exogenously to the cuttings. Mung bean seeds were washed thoroughly in the absolute alcohol and sown in petri-dishes on water saturated filter papers. These petri-dishes were placed in the seed germinator at controlled temperature of 27° and 85% relative humidity under dark conditions. When the seeds germinated and the seedlings were large enough to pushaway the lid of the petri-dishes, these etiolated seedling were placed in small beakers with a little water at the bottom of the beaker. In five days from the day the seeds were put in the petri-dishes these seedlings were ready for use for the bioassay. The cotyledons were cut off and the remainings of the seedlings were allowed to stand for 24 hr. During this time the internal root promoting substances dissipated, leaving the mung bean cuttings more sensitive. At the end of the 24 hr period 7 cm cuttings from mung bean seedlings were taken.

Thirty such cuttings (three replications of 10 cuttings lot) were put with the whole piece from a chromatogram corresponding to 0.8 R_f in distilled water in each beaker, for 24 hr, 48 hr and 96 hr. After 24 to 96 hr these cuttings were transferred to the distilled water. The root on these cuttings were ready to count in 5 days from the time the cuttings were first made.

Results and Discussion

The developed chromatograms of *T. flumiensis* gave the florescence of blue colour under UV light at R_f value of 0.8, (actual R_f value being 0.7975, an average of 5 replications).

The rooting activity of this substance on mung bean cuttings gave the following results (Table 1) 96 hr treatment to the etiolated cuttings of mung bean with this substance in distilled water gave the maximum numbers of roots. Average number of roots/10 cuttings lot in this case is 32. While it is only 14 and 12 in the treatments with the same substance when supplied for 48 and 24 hr respectively. The root initiation is at the basal portion of the mung bean cuttings and is regular in all the treatments. In all the control experiments there was no rooting of etiolated mung bean cuttings.

TABLE 1. PERCENTAGE OF ROOTING IN *T. flumiensis* STEM CUTTINGS; MAXIMUM ROOM TEMPERATURE 31.5 – 34.5° C.

Time Period (in hours)	Percentage of visible roots
06	Nil
10	1 - 2 %
12	5 - 10 %
24	20 - 40 %
36	80 %
48	100 %

This substance found at 0.8 R_f in *T. flumiensis* could be used to induce vegetative propagation in otherwise difficult to root species of medicinal and economic plants. Further work is in progress.

Acknowledgement. The authors wish to thank Dr. S.F. Hussain and Dr. N.A. Malik for the valuable suggestions. Our thanks are also due to Messrs. S.A. Shah, Moeen-u-din and Orangzeb Khan for helping in various ways.

References

1. H. Harribon, *Vistas in Botany* (Pergamon, New York, 1963), vol.III.
2. S. Mostofa, T. Hudsion and Hartman, Plant Physiol., 42, 541 (1967).
3. N. S. Parihar, *Hormonal Control of Plant Growth* (Asia Pubilshing House, India, 1964).
4. C. E. Hess, Plant Propagators Society, Combined Proceedings of 12th Ann. Meeting (Eastern Region, Dec. 6-8, 1962, Ohio) and 3rd. Ann. Meeting (Western Region, Oct. 18-20, 1962, California), p. 267.
5. L. M. Bailey, *Manual of Cultivated Plants,* (Macmillan and Co., N. Y., 1954), p. 198.