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Growth Esponses of Various Chrysanthemum Cultivars Propagated Through Soft Wood Cuttings

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Abstract: Eight cultivars of chrysanthemum namely, 'Korean hybrid white', 'Single pink', 'Spready purple', Korean hybrid yellow', 'Anemone red', 'Single red', 'Reflex light yellow' and 'Single magenda' were evaluated for their responses to propagation through soft wood. Studies were carried at University College of Agriculture, Rawalakot during 2001-2002. Among these cultivars 'Single magenda' showed maximum survival percentages (100%). 'Reflex light yellow' and 'Anemone red' presented good survival percentages (83.33%). 'Single pink' showed survival percentages of (75.0). 'Single red' and 'Korean hybrid white' responded equally (66.66). 'Spready purple' and 'Korean hybrid yellow' presented survival percentages of 58.3 and 50.0 respectively. For other growth characteristics 'Reflex light yellow' produced maximum branches (10.66), maximum leaves (206.6) and maximum flowers (58.0) per plant. Keeping in view the survival percentages, vegetative and floral characteristics these cultivars and propagation through soft woodcutting is recommended for general cultivation.

Key words: Chrysanthemum, soft woodcuttings, vegetative Propagation, vegetative characteristics, cultivars, asexual propagation, *in vivo* propagation, rooting of cuttings

INTRODUCTION

Chrysanthemum *Chrysanthemum morifolium* belongs to family composite. As a cut flower chrysanthemum is commonly supposed to be a native of Japan and serves to the present day as the national flower of that country (Kwon, 1977). However, according to Chinese history, the flower was cultivated in China more than 2000 years ago. The first available record of its use in Japan dates back to A.D. 1186 (Woh and Tukey, 1967).

In Pakistan it is successfully cultivated in fall in big cities and used as a cut flower. It is grown in pots and as garden plant. Flowers of better quality with good stem length and large ray florets grown for exhibition.

The flower of this daisy like perennial contains six insecticide compounds collectively called perethenium. These compounds are extracted and used as natural insecticides i.e. relatively safe as for human and mammals. The United States Plant Biotechnology Company collaboration with World Health Organization has announced 3 million US $ in current year for rapid and high quality pyrethrum demand for the environment supply (Robest and Bokelmann, 1973).

Chrysanthemum is a medicinal plant. Teas made from leaves are useful to cure and cold, indigestion and diarrhea. Dried flowers are useful to induce menstrual flow and bring about abortion to treat intestinal worms and in digestion. Leaves are chewed to relieve colic and it is a popular remedy against fever (Paul and Leiser, 1968). Chrysanthemum is propagated through seeds, suckers and cuttings. Propagation through cuttings is usually preferred for the development of plant identical to parent, speedy propagation/ production, modifying habit of growth and perpetuate a particular form of plant (Erikren, 1986 and Hu *et al.*, 1989).

Jukey and Brase (1936) used propagation through soft woodcuttings and recommended it as a useful method of propagation for the plants having potential for rooting. Fukai *et el.* (1998). Propagated cultivars of chrysanthemum native to Japan through stem cuttings and observed variation in rooting and survival percentages for different cultivars. Tite and Allen (1969) used soft woodcuttings for propagation of roses. Wang, *et el.* (1997) Successfully propagated plants through soft woodcuttings.

The ability of chrysanthemum cuttings to regenerate roots varies with plant species and cultivars (Vatte and Block, 1990). Some species regenerate easily, while some other regenerate with difficulty and still other do not regenerate at all (Roabe and Valimis, 1966).

Present studies were carried to find out suitable cultivars to the area in relation to easier and cheaper propagation techniques.

MATERIALS AND METHODS

These studies were carried at University College of Agriculture Rawalakot, during May 2001-2002. Area was cultivated and prepared by incorporating well-rotten farmyard manure four weeks before planting. The experiment was laid out according to Randomized Complete Block Design (RCBD) having 8 treatments with 3 replications per treatment. Plants were kept at 30 cm in rows, which were 45 cm apart.

Cuttings were taken from healthy mother plants of various cultivars. Uniform healthy cuttings were planted on 15th May 2001.

Proper shading materials were provided until the cuttings begin to grow. Urea, Ammonium Phosphate and Sulphate of Potash were applied at the rate of 1 kg plot^{-1}. Irrigation was applied just after planting of cuttings. Cultural practices such as weeding and hoeing were done regularly. Single variety was considered as a treatment which were as given below:

T_0 = Korean hybrid white
T_1 = Single pink
T_2 = Spready purple
T_3 = Korean hybrid yellow
T_4 = Anemone red.
T_5 = Single red
T_6 = Reflex light yellow
T_7 = Single magenda

Data collected: Data were collected for the following parameters:

Survivals percentages: Data were collected by counting the number of plants survived for each replication per treatment.

Number of branches per plant: Data were collected by counting the number of branches per plant for each replication per treatment.

Number of leaves per plant: Data were collected by counting leaves per plant.

Number of flowers per plant: Data were collected by counting the number of flowers per plant.

Statistical analysis: Data collected were statistically analyzed. The treatment exhibiting significant differences were subjected to Duncan's Multiple Range (DMR) test for comparison of their means (Steel and Torrie, 1980).

RESULTS AND DISCUSSIONS

Results on survival percentages given in Table 1, showed that 'Single Magenda' exhibited maximum survival percentages, i.e., (100%) as compared to other cultivars. 'Anemone Red' and "Reflex light yellow' showed equal response for survival percentages, (83.33%). Similarly 'Single red' and 'Korean hybrid white' responded equally (66.66%). 'Korean hybrid yellow' showed minimum survival percentages (50%) compared to other cultivars. The above results showed that 'Single Magenda' have maximum survival percentages and have the ability to survive better by propagated through soft wood cuttings under given climatic conditions compared to other cultivars. These differences in survival percentages were might be due to the different genetic make up of the cultivars, which interact differently to the given environment. Stankove and Panetsos (1997) stated that genotype was the major factor influencing the survival and rooting percentages of plants. Environmental factors like temperature, humidity and diseases also affect rooting of chrysanthemum cuttings (Roabe and Valimis, 1966).

Results for number of branches per plant (Table 1) showed that 'Reflex light yellow' produced maximum branches (10.66) per plant. Cultivars 'Single pink' also produced better shoots (10.33) per plant. 'Single magenda' produced minimum branches (4.33) per plant. Other cultivars showed non-significant differences. Cultivars 'Spready purple', 'Korean hybrid white', 'Anemone red', 'Korean hybrid yellow' and 'single red' showed non-significant differences for number of branches. From these results, it can be concluded that 'Reflex light yellow' which produced maximum branches (10.66) per plant have ability to respond positively with propagation techniques and also have potential to adopt themselves under given environmental conditions.. These differences for branches among cultivars might be due to their genetic composition. Charles (1995) observed variations in number of branches, leaves and height of plants for various chrysanthemum cultivars.

Results for number of leaves (Table 1) showed that 'Reflex light yellow' produced maximum leaves (206.6) per plant ,whereas, 'Korean hybrid yellow' produced (199.0) leaves per plant. Non-significant differences were observed between 'Single magenda' (126.0) and 'Korean hybrid white' (116.6). 'Single red' produced minimum leaves (99.3) compared to other cultivars. Results for number of flowers showed that 'Reflex light yellow' produced maximum flowers (58.0). 'Reflex light yellow' (58.0) and 'Single pink' (53.66) produced comparatively

Table 1: Growth responses of chrysanthemum cultivars propagated through soft woodcuttings

	Growth characteristics			
Cultivars	Survival percentages	Branches/ plant	Leaves/ plant	Flowers/ plant
T_0 (Korean hybrid white)	66.66d	5.33d	116.6df	26.33d
T_1 (Single pink)	75.00c	10.33b	133.3d	53.66b
T_2 (Spready purple)	58.33de	10.00bc	115.6f	42.00c
T_3 (Korean hybrid yellow)	50.00e	8.00c	199.0b	21.00de
T_4 (Anemone red)	83.33d	7.00c	175.3c	27.00cd
T_5 (Single red)	66.66d	5.00e	99.3g	26.33d
T_6 (Reflex light yellow)	83.33b	10.66a	206.6a	58.00a
T_7 (Single Magenda)	100.00a	4.33fe	126.0de	43.33bc

Means sharing same letters do not differ significantly.

more flowers than 'Anemone red' (27.0), 'Single red' (26.33) and 'Korean hybrid white' (26.33). 'Korean hybrid yellow' produced minimum number of flowers (21.0) per plant. Methods and type of part used for propagation affected reproductive growth of plants. Prokhorov and Adrianov (1981) observed that methods and time of propagation determine the quantity and quality of flowers produced by Chrysanthemum cultivars. Manke, (1985) observed relationship of chrysanthemum flowering characteristics with propagation time, methods, light intensity and day length. Similar results were also found by Mathias (1963).

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