

INTRODUCTION AND YIELD TRIALS ON *ALTHAEA OFFICINALIS* L. (RAISHA-KHATMI) AT MEDICINAL PLANTS FARM, PESHAWAR

Shakeel Haider Zaidi, Assistant Economic Botanist and **Anwar Ahmad Khan**, Medicinal Plants Botanist, Pakistan Forest Institute, Peshawar

ABSTRACT

Althaea officinalis L. plant is reputed for its healing and anti-inflammatory properties and is largely used in indigenous and allopathic medicines. To assess the possibility of its introduction and cultivation as a special crop, yield trials with various spacings were conducted for 3 consecutive years (1989 to 1992) at Medicinal Plants Farm, Peshawar. The plant has successfully adapted to the climatic conditions of Peshawar giving the highest yield when planted at 60 x 30 cm spacing. It can be easily cultivated under irrigated conditions at Peshawar and has good potential for supplementing the farmer's income even on marginal lands.

INTRODUCTION

Althaea officinalis L. (Khatmi) is an important medicinal plant known for the curative properties of its seeds and roots, locally known as Tukham-e-khatmi and Resha-khatmi respectively. The seeds and the roots form basic constituents of various cough mixtures prepared under ancient system of medicine. In the allopathic system the roots are used as an efficient emollient and in the preparation of absorbent pills and pastilles (1,3). The root mucilage is an astringent and commonly used as demulcent drink for the treatment of bronchitis in France (9). The leaves are applied in poultice and in fomentation to relieve pains and itching (6,8). Flower yield a red dye (anthocyanin) which is used as an indicator in acidimetry and alkalimetry. Seeds contain 12% drying oil

useful in kidney and bladder ailments (1, 10).

The plant belongs to the family "Malvaceae" and about 15 species of *Althaea* are distributed in the temperate regions of the world (2). Nasir and Ali (1972) have reported eight species of *Althaea* in various parts of Pakistan. *A. officinalis* plants are scantily found in the hilly and plain areas of Punjab, N.W.F.P. and Azad Kashmir from where small quantities of roots are collected during autumn and marketed. It is cultivated on small scale as minor cash crop by some farmers in the districts of Sialkot and Bahawalpur (4,5). The plants are also raised for ornamental purpose.

The seeds and roots are articles of commerce and have a steady demand in the drug market. Annual consumption in the country ranges from 30-50 tonnes, obtained from wild and cultivated sources. In view of its economic importance and variety of uses, cultivation trials were conducted for three consecutive years at Medicinal Plants Farm, Peshawar. The objectives were to ascertain its adaptability to local conditions and determination of the best plant spacing; to obtain the optimum seed and root yield. Being a perennial plant it has an added advantage to provide some additional income to the farmers with minimum inputs and care.

MATERIAL AND METHODS

Seeds of *Althaea officinalis* were collected from wild sources in August 1989, cleaned and stored in air-tight glass jars. Later on, seeds were sown in well prepared nursery

beds during the second week of January, 1990. First watering was provided immediately after sowing while subsequent watering were given daily. The seeds started germinating after 8 days and complete germination took place in 15 days. Seedlings were looked after properly for 3 months in the nursery.

To test the effect of various plant spacings (30x30, 45x30, 60x30 and 75x30 cms) on seed and root yield, an experiment was started in RCB design and replicated four times. The size of the plot was 20 square meters. During the second week of March, 1990, 221 seedlings were planted in 30x30 cm spacing, 136 in 45x30 cm, 102 in 60x30 cm and 85 in 75x30 cm spacing. First irrigation was provided immediately after planting and 12 subsequent irrigations, 8 cm each at an interval of 14 days, were given to the crop upto end of October every year. In addition, 250 mm average rain was received annually. To stimulate vegetative growth, urea fertilizer @ 217 kg/ha (100 kg N/ha) was applied as basal dose during the second week of April, 1990. During 2nd and 3rd year's growth the same dosage was applied as side dressing before sprouting (in January). Weeding and hoeing were carried out in April, May, July and August of each year. During first year's growth the

plant started flowering in acropetal succession in June and continued upto the end of August, 1990. On attaining brownish colour, fruits were plucked two times; in August and at the end of September, 1990. Seed yield was recorded (gm/plot) after drying and winnowing of harvested material. Later on the dried stem were cut 10 cm above the ground level to stimulate ratooning in winter season. New shoots appeared from second and third year's rooted stock and were given the same cultural treatment as applied in the first year. Flowering and fruit formation started earlier from two and three year's old plants than in the first year's trials. During the second year, 75 plants were selected at random and tagged to record the yield of fresh flowers per plant. The flowers were dried in shade for seven days and yield of dried flowers was recorded. Two pluckings of mature fruits were carried out during July and August of 1991 and 1992 and seed yield was recorded (gm/plot) after thrashing and winnowing. After three year's growth, roots were dug out from replicated plots in August, 1992, cleaned and weighed in kg/plot to determine the effect of various spacings.

RESULTS AND DISCUSSIONS

Effect of various spacings on the seed yield of *A. officinalis* during 3 consecutive years is presented as in Table 1.

Table 1. Effect of spacing on the yield of *A. officinalis*

Treatment spacings (cm)	No. of plants/plot	Mean seed yield (gms/20 m ² plot)			
		1990	1991	1992	Average
30x30	221	638	1091	1215	981
45x30	136	863	1131	1386	1126
60x30	102	1075	1454	1719	1416
75x30	85	988	1355	1408	1250
LSD (5%)		242	215	242	174

Results indicated that *A. officinalis* when planted at 60x30 cm spacings gave the highest seed yield (1416 gm/plot) as compared to narrow spacing of 30x30 cm (981 gm/plot). No significant difference was observed in the

mean seed yield of 60x30 cm and 75x30 cm spacings.

To determine the yield, blooming flowers were plucked twice from the 75 tagged plants selected earlier and yield is given in Table 2.

Table 2. Yield of flower obtained from 75 tagged plants

	Fresh weight (kg)	Dried weight (kg)
Flower yield from 75 tagged plants	13.125	2.500
Average flower yield/plant	0.175	0.032
Estimated yield of flower from 51000 plants/ha (spaced at 60x30 cm)	8900	1632

Flower plucking causes considerable decrease in seed yield and therefore interested growers have the choice to obtain the yield of seeds or flower depending upon the demand of the drug market.

The plant is perennial in nature and responded well to the climatic conditions of Peshawar. When raised by ratoons, it showed luxuriant growth and attained an average height of 1.50 meters during second and third year's growth as compared to 1 meter average

height recorded for the first year's growth. Secondly, plants raised from second and third year's rooted stocks produced early flowering which matured two months earlier than one year old plants. There was a 29% progressive increase in the seed yield during the second and third year's growth primarily due to formation of large number of new shoots that resulted in vigorous growth of the plant.

Data on fresh root yield harvested at the age of 3 year's growth is tabulated in Table 3.

Table 3. Mean fresh root yield (kg/20m²) as affected by various spacings

Spacing treatment (cm)	Replications				Average
	1	2	3	4	
30x30	3.000	4.500	4.000	5.000	4.125
45x30	2.670	5.250	4.125	4.125	4.636
60x30	6.750	6.000	6.000	6.000	6.062
75x30	6.000	6.745	6.745	5.850	5.923
LSD (5%)		1.099			
		kg/plot			

Yield results indicated that higher root yield was obtained in plants spaced at 60x30 cm (3.03 tonnes/ha) as compared to 30x30 cm spacing (2.06 tonnes/ha). No significant difference was observed in the mean root yield between 60x30 cm and 75x30 cm spacings.

Keeping in view the ease of cultural operations and an approximate economy of

25% in planting stock and fruit plucking operations, a spacing of 60x30 cm was found most suitable. Fresh roots lost 60% moisture after drying for eight days under shade. The stems were also weighed during the month of August, 1992. The average weight and proportion of seeds and roots in the total biomass under various spacing treatments is given in Table 4.

Table 4. Percentage of biomass with seed and root as affected by spacing treatments during third year (1992).

Spacing (cm)	Seed yield (kg/plot)	Dry root yield kg/plot	Dry weight of stem kg/plot	Seed %	Root %	Biomass %
30x30	1.215	1.650	10.065	9.40	12.76	77.84
45x30	1.386	1.854	12.412	8.86	11.85	79.29
60x30	1.719	2.425	11.625	10.90	15.38	73.72
75x30	1.408	2.369	10.975	9.54	16.06	74.40
Average	1.432	2.074	11.269	9.69	14.04	76.27

The percentage of biomass (dried stem and branches ranged from 74 to 79%, of which seed and root constituted 26 to 21%.

Economics of growing *A. officinalis*

Cumulative yield of seeds and roots of *Althaea officinalis* for three years were projected to be 2100 kg and 1000 kg/ha respectively. The cost of cultivation and income from the sale of seeds and roots is based on current market rates given below:

Cost of cultivation for three years	Rs. 16440
Land rent for three years @ Rs. 4000/annum	Rs. 12000
Total expenditure	Rs. 28440

Income from sale of 2100 kg of seeds and 1000 kg of roots @ Rs. 20 and Rs. 10/kg respectively Rs. 52000

Net income per hectare (3 years) Rs. 23560

Annual income per hectare Rs. 7853

CONCLUSION

Cultivation trials indicated that *A. officinalis* could be successfully cultivated in Peshawar valley. It can give highest seed yield when planted at 60x30 cm spacing (700 kg/ha per annum). Its roots need 3 years to attain marketable size. It can be cultivated on marginal lands under irrigated conditions. Being a perennial crop, it requires less cultural operations and comparatively low cost of

cultivation. It can also be planted along the borders of fields for protection and providing additional income to the farmers.

ACKNOWLEDGEMENT

The authors are indebted to Dr. K.M. Siddiqui, Director General for his guidance and providing all the facilities to carry out this work. Thanks are due to Mr. Abadullah Jan for typing the findings of this research work.

REFERENCES

Anonymous 1948. Wealth of India Raw Material Vol.1. Council of Scientific and Industrial Research, New Delhi.

Bailey, L.H. 1935. The Standard Cyclopedia of Horticulture Vol. 1 A-E Macmillan Company Ltd. London.

Bergefors, L. 1966. Svensk Farm. Tidkr 58, 184; C.A. 48, 8486 (1966).

Khan, A.A., M.Ashfaq and M.N. Ali 1979. Pharmacognostic studies of selected indigenous plants of Pakistan. Pakistan Forest Institute, Peshawar.

Khan, A.A., 1985. Survey of crude drug (Herbal) markets in Pakistan, Bulletin No.7. Biological Sciences Research Division, Pakistan Forest Institute, Peshawar.

Nadkarni, K.M. (1954). Indian Materia Medica. 3rd Edition. Popular Book Depot., Bombay, India.

Nasir, E. and S.I. Ali 1972. Flora of West Pakistan. Fakhri Printing Press, Karachi.

Said, Hakim Muhammad 1969. Hamdard Pharmacopeia of Eastern Medicine, Time Press, Karachi.

Watt, G. 1972. Dictionary of Economic Products of India Vol.1. Abaca to Buxus. Periodical Experts, 42-D Vivek Vihar, Shahdara, Delhi (India).

Youngken, H.W. 1943. Text Book of Pharmacognosy McGraw-Hill Book Company, Inc. New York (USA).