

EFFECT OF PLANTING DIFFERENT PORTIONS OF CORMS (DAUGHTER, MOTHER & FULL CORMS) OF *COLCHICUM LUTEUM* ON THE REGENERATION OF CORMS AT PESHAWAR

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ABSTRACT

Colchicum luteum (Surajan talkh) has tuberous root system, oval in shape and bears a dark brown colour. Leaves are 6–12" in length. It is round in shape and small when it flowers. Flowers are 1–2" in length and 1.5" broad. The flowers are hermaphrodite. Fruit is 0.5–1" in length and bear seeds. Seeds are 2–3 mm in diameter and are ovate in shape. These are light brown in colour and are bitter to taste. A trial of *Colchicum luteum* was laid out in March, 2003 at Medicinal Plants Farm, Pakistan Forest Institute, Peshawar. Various portions of corms i.e., Daughter, Full and Mother corms (DFM) were planted on ridges 30cm apart with a plant to plant distance of 15cm. The treatments are highly significant at 95% and 99% level of confidence. LSD at 5% shows that all the treatments are highly significant among themselves while the T₁ (Daughter) corm is highly significant. Furthermore, it is recommended that the cultivation of *Colchicum luteum* should be done by one year old corm i.e., Daughter corm.

INTRODUCTION

Colchicum luteum (Liliaceae) locally known as (Surajan talkh) is a famous remedy for gout, rheumatism and diseases of liver and spleen. It contains an alkaloid named colchicines which is 0.21 to 0.25%. Besides this it contains starch in limited amount. Colchicum extract was first described as a treatment for gout in *De Materia Medica* by [Pedanius Dioscorides](#) in the first century CE. Colchicine, an [alkaloid](#), was first isolated in 1820 by the two French chemists P.S. Pelletier and J. Caventon. Colchicines extracted from corms and seeds are of great utility to induce chromosomal aberration and ployploidy for cyto-genetical studies. It is a good pain reliever and helps in healing of wounds. It helps in preventing indigestion. It is also a mild laxative and helps inn relieving from constipation. It is helpful in liver and spleen related ailments. It is also a good blood purifier. *Colchicum luteum* also acts as diuretic, thus is helpful in urine related problems. The plants are distributed in Hazara, Swat, Dir, Chitral and adjoining areas at an elevation from 2000-9000 feet. The corms and seeds are being collected in sizeable quantities and supplied to Karachi and other markets for consumption and export for the last many years. Regeneration and propagation technique needs development for the conservation and propagation of the species.

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Dewick, P. M. (2009) and Maier, U. H. & H. Z. Meinhart (1997) stated that the [tropolone](#) ring of colchicine resulted essentially from the expansion of the tyrosine ring.

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Further radioactive feeding experiments of *Colchicum autumnale* revealed that Colchicine can be synthesized biosynthetically from (S)-Autumnaline. That biosynthetic pathway occurs primarily through a para-para phenolic coupling reaction involving the intermediate isoandrocymbine. The resulting molecule undergoes O-methylation directed by S-Adenosylmethionine (SAM). Two oxidation steps followed by the cleavage of the cyclopropane ring leads to the formation of the [tropolone](#) ring contained by N-formyldemecolcine. N-formyldemecolcine hydrolyzes then to generate the molecule demecolcine which also goes through an oxidative demethylation that generates deacetylcolchicine. The molecule of colchicines appears finally after addition of acetyl-Coenzyme A to deacetylcolchicine. Bano. A (2001) described the uses of *Colchicum luteum* in veterinary sciences. Deppe and Carol (1993) stated that to induce [polyploidy](#) in plants, Colchicine is usually applied to the plant as a cream. It has to be applied to a growth point of the plant, such as an apical tip, shoot or sucker. Seeds can be presoaked in a Colchicine solution before planting. As Colchicine is so dangerous, it is worth noting that doubling of chromosome numbers can occur spontaneously in nature, and not infrequently. The best place to look is in regenerating tissue. One way to induce it is to chop off the tops of plants and carefully examine the lateral shoots and suckers to see if any look different. Denston (1945) documented techniques of cultivation, harvesting and drying of *colchicum luteum* and reported that corms contained 0.2 to 0.4% colchicines. Khan (1951) recorded a new disease; black scab caused by *Rhizoctonia* for the first time on the corm of *C. luteum*. In the same year, Chaudhry observed blue flower *colchicum* plants growing at Lowari Top (3500m) and conducted that it might be a new species or a new record for Pakistan. Chopra (1958) conducted extensive studies on ecological distribution of *colchicum luteum* in temperate Himalayan regions and further stated that 2.5 tonnes of corms could be collected annually from natural resources in Kashmir valley. Further he stated that it grows extensively in the western temperate Himalayas and is met within open pasture lands of forest extending from the Murree hills to Kashmir. Khan (1959) reported two diseases, namely, leaf smut and leaf rust which caused great damage and affected regeneration in its natural habitat. Williams (1960) described methods of cultivation of *C. autumnale* to supplement cash income of the farmers in United States, Scheschmedjiew (1966) conducted cyto-taxonomic studies in *C. diampoles* in Bulgaria, made ideogram and reported that diploid chromosome number was 18, Wallis (1967) described techniques of harvesting and garbling of *C. luteum* and *C. autumnale* and further reported that European *Colchicum* contained 0.6% colchicines while it was low in Indian *colchicum* which ranged from 0.21 to 0.25%. Trease (1966) reported that seeds of *C. autumnale* contained more alkaloids as compared to corms which varied from 0.6 to 1.25%. Gasic and Popovic (1980) extracted alkaloid from *C. arenarium* in the form of neutral, phenolic and alkaline alkaloids. They later isolated, and identified these alkaloids by means of chromatography and physico-chemical methods.

MATERIAL AND METHODS

Corms of *Colchicum luteum* were collected from Abbottabad in the last week of February 2003 when the plants were in seed ripening stage. An experiment was setup in Randomized Complete Block Design with five replications at Medicinal Plants Farm, PFI, Peshawar. Prior to laying out the trials, experimental plots were thoroughly prepared by ploughing and later on leveled the area. The size of the sub-plot was kept 32m² and fifteen sub-plots were made. Various portions of corms i.e. Daughter, Full and Mother corms (DFM) were planted on ridges 30cm apart with a plant to plant distance of 15cm

on March 5, 2003. Thus 3750 corms were planted according to the experimental design. The plots were irrigated after planting. Four weeding and hoeing were carried out during May, July and September, 2003. Irrigation was provided to the plots when required. *Colchicum* plots remained under constant observation and sprouting of corms started in the first week of January which continued up to the end of February, 2004. The criteria for recording sprouting were kept, the appearance of flower in bud condition on the soil surface.

RESULTS AND DISCUSSION

A trial of *Colchicum luteum* species was established in March, 2003 at Pakistan Forest Institute, Peshawar having 350m altitude. Meteorological data was collected at PFI, Observatory and data on sprouting percentage of *Colchicum luteum* are given as under:

Meteorology data collected at PFI observatory during 2003

Month	Temp C°			R.H (%)	Evap. (mm)	Sunshine (hrs)	R. Fall (mm)	Wind	
	Max.	Min.	Daily					(8)	(2)
January	17.72	2.2	NA	53.6	0.98	4	0	12.2	0.16
February	21.2	5.63	-do-	43.76	2.94	5.68	36.07	14.06	0.16
March	22	10.7	-do-	58.33	5.06	2.96	91.57	18.67	0.65
April	25.61	14.23	-do-	56	3.74	5.85	89.28	20.96	0.38
May	35.63	19.42	-do-	54.78	6.1	9.65	9.65	42	2.33
June	39.5	22.4	-do-	53.95	8.94	9.6	0	41.76	4.48
July	37	26.7	-do-	78	5.6	7	46.3	36.6	1.5
August	30.4	25.7	-do-	71	5.2	4.75	0	22.1	1.2
September	32.7	23.4	-do-	72	4.2	5	0	28.3	1
October	27.5	15.7	-do-	73	6.9	4.5	30	16.6	0.5
November	23.1	8.4	-do-	63	1.4	5	2.2	8.5	0
December	17.1	4.6	-do-	82	1.6	4.5	25.4	8.1	0
Total	329.46	179.08	-do-	759.42	52.66	68.49	330.47	269.8	12.36
Mean	27.5	14.9	-do-	63.3	4.4	5.7		24.5	1.03

Meteorology data collected at PFI observatory during 2004

Month	Temp C°			R.H (%)	Evap. (mm)	Sunshine (hrs)	R. Fall (mm)	Wind	
	Max.	Min.	Daily					(8)	(2)
January	15.8	2.5	8.7	80	10.38	4.5	170	41.71	17.56
February	15.1	5.8	10.5	78	3.61	3	159	50.35	18.97
March	22.8	11.4	17.9	77	4.37	5.5	212.5	54.82	13.93
April	30.5	13.5	25	65	5.54	7.25	28	64	19.03
May	33.1	17.5	27.4	54	6.84	8.5	49	64	26.26
June	38.1	23.2	0	54	9.17	9.75	0	17.2	2.42
July	38.1	25	31.5	60	8.18	8	10.16	10.37	1.27
August	35.8	24.9	29.8	69	7.32	7	33.27	16.17	5.75
September	35.9	21.2	28.1	72	5.53	8	33.53	31.59	26.25
October	27.2	14.3	22.6	18	3.4	6	20.32	40.8	23.13
November	24	9.6	16.9	75	2.93	6	19.3	32.6	10.44
December	19.4	6	13.2	76	2.1	5	29.72	27.14	11.96
Total	335.8	174.9	231.6	778	69.37	78.5	764.8	450.75	17.69
Mean	28	14.6	19.3	64.8	5.78	6.5		37.6	1.5

Data on sprouting percentage of *Colchicum luteum* corms is tabulated as under:

Replications	T ₁ (Daughter)	T ₂ (Full)	T ₃ (Mother)	Total
R1	109	80	55	244
R2	120	63	59	242
R3	105	75	65	245
R4	89	70	59	218
R5	93	79	62	234
Total	516	367	300	1183
Mean	103.2	73.4	60.0	
Sprouting %	41.28	29.36	24.0	

D= Daughter, F=Full and M=Mother

Mean sprouting percentage in T₁ (Daughter) 103.2, T₂ (Full) 73.4 and T₃ (Mother) 60.0 was recorded respectively. Highly significant differences were observed in mean sprouting of treatments T₁ (Daughter), T₂ (Full) and T₃ (Mother) respectively. Therefore T₁ (Daughter) corms are more suitable for cultivation of corms of *C. luteum*. *F* calculated value 27.58 is greater than *F* tabulated value of 6.44 level of confidence at 95% and 8.65 level of confidence at 99% respectively. It indicates that the treatments are highly significant at 99% and 95% level of confidence. LSD at 5% shows that all the treatments are highly significant among themselves while the T₁ (Daughter), is highly significant. Furthermore, it is recommended that the cultivation of *Colchicum luteum* should be done by one year old corm i.e., Daughter corm.

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