

like those of Govindpal, Kudripal, Mundval, Mundaguda and Domaguda in the south eastern region of the belt (with Tongpal as the centre of the belt) and columbite-tantalite predominates over cassiterite in pegmatites of the north-western region of the pegmatite belt.

Detailed surveys, estimation of ore reserves and recovery of columbite-tantalite by physical beneficiation methods have already been taken up in the area by Atomic Minerals Division of Department of Atomic Energy.

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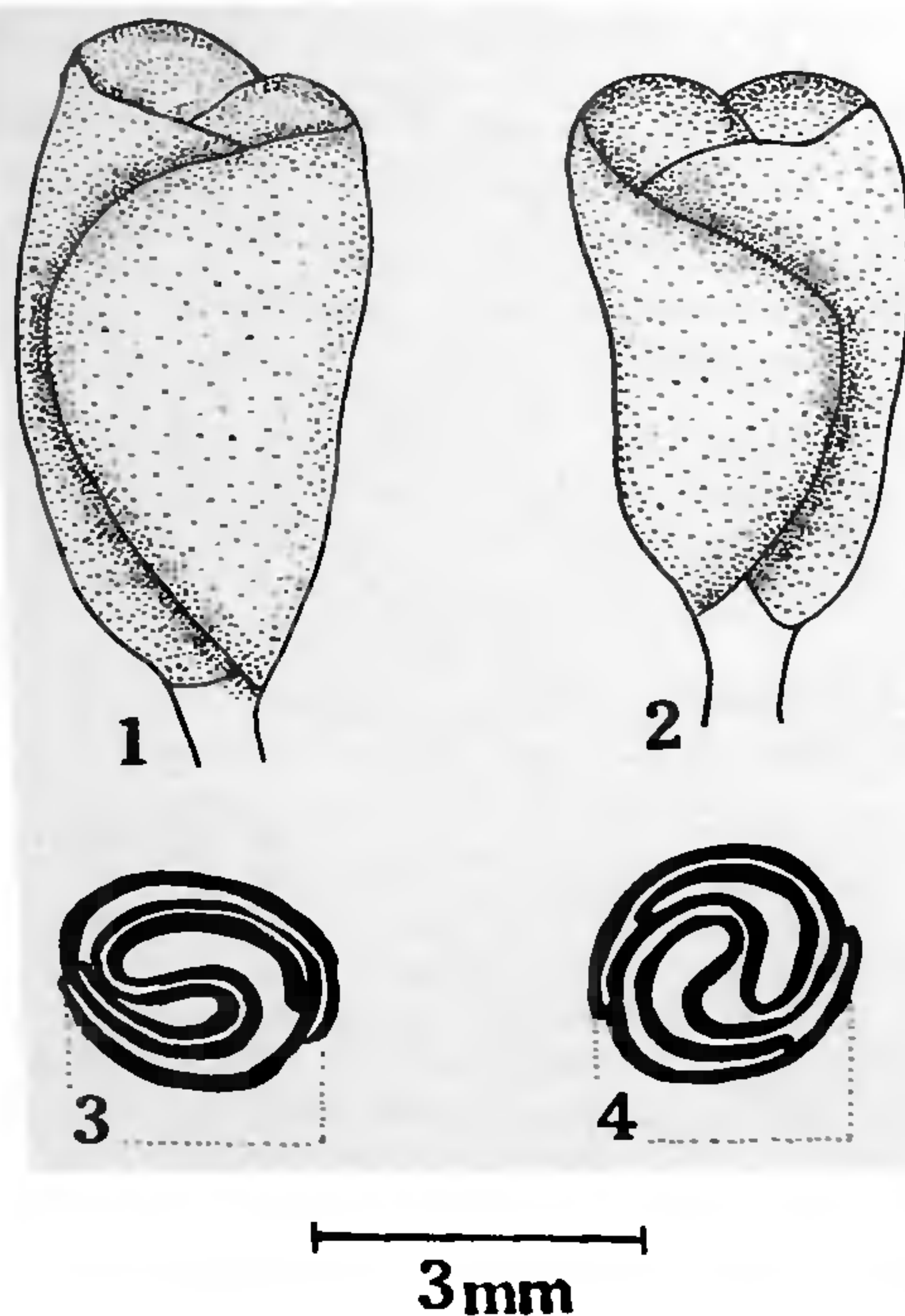
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SEEDLING ENANTIOMORPHISM IN BUCKWHEAT (POLYGONACEAE)

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ENANTIOMORPHISM or handedness in plants is based on the twisting of plant or organs forming mirror images and has been defined as stereobotany¹. Handedness with regard to leaf arrangements in clockwise or counter clockwise or manner has been studied in several plants²⁻⁵. The usefulness of seedling handedness in taxonomy has not been fully explored. Recently, Bahadur and Rao¹ and Bahadur *et al.*⁶, have shown the importance of seedling handedness in the taxonomy of Fabaceae and Gramineae, these are the only record in dicotyledons. The present report described seedling handedness in *Fagopyrum* Mill. (Buckwheat) Polygonaceae.

Fagopyrum esculentum Moench. (4 cvs.), *F. tataricum* (L.) Gaertn. (6 cvs.), *F. sagittatum* Gilibert. and *F. kashmirianum* have been investigated. Seeds of *F. esculentum* and *F. tataricum* were obtained from National Bureau of Plant Genetic Resources, New Delhi, and Botany Department, Kashmir University. Seeds were sown in petridishes on moistened filter paper. After germination the first pair of seedling leaves were carefully observed and on the basis of the vernalion the seedlings were scored as left and right



Figures 1-4. 1 & 2. Left and right handed seedlings of *Fagopyrum esculentum* showing overlapping of the first pair of leaves towards the left and right hand respectively. 3 & 4. The same shown in cross section showing vernalion in clockwise and counter clockwise direction.

handed following the procedure of Bahadur and Rao¹.

For the distribution of left and right handed seedlings in different species and cultivars of *Fagopyrum* (table 1), 730 seedlings were examined. Of these 358 (49%) were left and 372 (51%) right handed. Statistically significant differences among the left and right handed forms of seedlings were evident. However, the deviation from equality was observed when the various cultivars under each species were considered. A significant difference from equality in left and right handed seedlings was observed in *F. esculentum*, IC 16555 in which an excess was observed in left handed seedlings ($L/R = 2.2$). *F. kashmirianum* also showed similar feature ($L/R = 1.75$); so has been the one in *Psophocarpus tetragonolobus* and *Erythrina stricta*¹. In general, the various cultivars of *F. tataricum* exhibited more R-handed than L-handed see-

TABLE 1

The distribution of seedling handedness in buckwheat

Species/Cultivar	Left	Right	L+R	L-R	LH/RH	LH%	X ² 1:1	P-Value
<i>F. esculentum</i>								
IC 37289	154	141	295	13	1.09	52.2	0.57	>0.20
IC 17369	28	32	60	-4	0.88	46.6	0.27	>0.50
IC 16555	22	10	32	12	2.2	68.75	4.37	<0.05
IC 13411	18	14	32	4	1.3	56.25	0.5	>0.20
<i>F. sagittatum</i>	11	10	21	1	1.1	52.38	0.04	>0.20
<i>F. tataricum</i>								
IC 13145	40	54	94	-14	0.74	47.07	2.08	>0.05
IC 18889	34	47	81	-13	0.72	41.97	2.08	>0.05
IC 13376	9	11	20	-2	0.82	45.00	0.26	>0.50
IC 18043	11	15	26	-4	0.73	42.31	0.62	>0.20
IC 13374	12	12	24	0	1.0	50.0	0	>0.99
IC 18869	12	22	34	-10	0.54	35.2	2.9	>0.05
<i>F. kashmirianum</i>	7	4	11	3	1.75	63.6	0.82	>0.20
Total:	358	372	730	-14	0.96	49.04	0.35	>0.50

seedlings except cultivar IC 13374 in which equality of L- and R-handed seedlings was observed. If the combined data are considered, an excess of right handed seedlings is evident as also reported in some pulse crops⁷ and with regard to phyllotaxy handedness in *Corchorus capsularis*³

The seedling handedness in buckwheat may be a case of bio-isomerism or enantiomorphism and both the L- and R-handed forms may represent stereoisomeric structures. The casual factor for existence of isomeric forms is not known. However, the handedness in plants or plant organs may be due to the presence of levo- and dextro-rotatory or stereoisomeric compounds in the plant metabolism^{1,6} or the geomagnetic force may determine the bio-symmetric status of living objects⁸

Since the foliar arrangement is known to influence yield in certain crop plants⁶, and the seedling handedness in *Pigeonpea*⁹ further work is desirable in buckwheat.

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