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1) Potential of an off-season soybean nursery.

In India, soybean is generally sown during summer (June-October). However, due to tremendous variability in climatic conditions of the country, there is a scope for growing soybean in more than one season. The efficacy of yield improvement projects could be substantially enhanced by rapid generation turnover. Theoretically, it is possible to achieve an annual turnover of three generations using a winter crop sown in late October or early November (short day conditions), followed by a spring crop in March and a normal summer crop planted in June. At the onset, we wish to make it very apparent that our objective is generation advancement only, and selection should invariably be practiced in normal season. Assuming an annual turnover of three generations, this system will allow yield testing of F_3-derived F_6 families only two years after making the initial cross.

In winter, 1982, we initiated feasibility studies of an off-season nursery at Ranchi, Bihar, in the main plateau region of India, at an altitude of 635 meters. Average rainfall and temperature during this season varies from 6.9 mm to 79.5 mm and 16°C to 19°C, respectively. Four varieties, i.e., 'Birsa Soy 1', 'N-22', 'Seminal', and 'Cockerstewart', were selected for the experiments. Crop was sown on 20 December onwards at a regular interval of 10 days. The data for various characters are presented in Table 1. As compared with the normal season, the germination was substantially lower, onset of blooming and maturity were considerably delayed. Overnight presoaking of seeds prior to sowing significantly improved germination. Plants, in general, were short-statured as compared with normal season. Pollen fertility was reduced, but female fertility (expressed as natural seed set as a percent of ovule number) was normal. Due to very delayed maturity under winter-sown conditions, theoretical target of three generations per year may be difficult to achieve. However, at a limited scale, the winter crop may be sown immediately after harvesting the summer crop in mid-October. In addition, some hormonal treatments could be thought of to achieve an early onset of maturity. It will be interesting to evaluate sowing schedule for spring sowing in March, as the onset of high temperature condition during May and June might hasten the maturity.

Table 1. Average performance of four soybean cultivars in the off-season nursery

Date of sowing	Character				
	Germination (%)	Days to bloom	Days to maturity	Pollen fertility (%)	Female fertility (%)
20.11.1982	48	80	148	67	73
30.11.1982	57	75	138	72	66
10.12.1982	46	75	146	59	69
20.12.1982	30	67	135	60	67
30.12.1981	26	70	139	63	65
10.1.1983	38	64	138	67	66
20.1.1983	45	70	136	60	70
Summer crop	67	45	110	--	--

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2) Mutation breeding research in soybean in India.

Systematic mutation breeding research in India was started at Ranchi Agricultural College, Kanke, Bihar, India, around 1971 by Haque and his co-workers. Choudhary (1972) studied induced polygenic variability in the R-II generation in the variety of 'Sepaya Black' of soybean. Choudhary (1972) reported that 10 Kr radiation treatment of gamma rays was effective in shifting the mean values in positive direction for various quantitative characters including seed yield. During the course of investigation, one spontaneous mutant was observed in the variety Sepaya Black and further selection in the spontaneous mutant has led to the release of a new variety of soybean known as 'Birsa Soybean-1'. This variety has been recommended for release for the plateau region of Bihar state in India.

In order to change the black color of Birsa Soybean-1, seeds were treated with different doses of γ-rays at FCI Sindri (Bihar) in the year 1979. In M1 generation, superior plants were selected and their progenies were raised in 1980. From the M2 generation, promising progenies, as well as single plants, were selected and in 1981, the M3 generation was raised.

Progeny of a yellow seeded 50-Kr M2 plant in M3 gave very promising and interesting plant types. Sixteen of these were selected and the characteristics of these promising plants are as follows.

Table 1. Characteristics of M3 segregation of Birsa Soy-1 of a yellow-seeded mutant line of Kr 50

Segregate plant no.	Height (cm)	No. branches	No. pods	No. seeds	Seed color	Hilum color	Seed weight/ plant (g)	Test-weight (100 seed weight) (g)
1	54.5	6	250	517	Y	Black	59.18	11.45
2	43.5	6	110	158	Dull brown	White	18.04	11.40
3	46.0	9	149	260	B	B	50.70	19.50
4	40.0	11	114	238	B	B	29.27	12.30
5	43.0	11	148	226	Y	B	30.74	13.60
6	45.0	5	125	227	Y	B	23.80	10.49
7	40.0	9	112	216	Y	B	25.12	11.63
8	32.0	10	111	221	Y	B	31.03	14.04
9	33.0	13	80	164	Y	Dull brown	18.63	11.36
10	33.0	6	87	175	Y	B	22.76	13.00
11	30.0	11	115	217	Y	B	21.67	9.90
12	36.0	8	42	73	B	B	6.82	9.34
13	35.0	9	78	118	Y	Dull brown	11.60	9.83
14	119.0	9	167	357	B	B	51.90	14.54
15	80.0	9	338	558	Y	Dull brown	54.99	9.85
16	79.0	7	259	405	Y	B	56.09	13.84
Birsa Soy-1 (parent var)	52.1	5.4	44.5	115	B	White	10.42	13.33

The changes in color of the Birsa Soybean-1 from black to yellow, dull brown, brown have been established. Further screening of the material for yield potential is in progress.

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