

**Table 1** Comparative C-mitotic activities of aqueous tuber extracts of different *Gloriosa* Spp.

Species	Concentration (%)			
	0.5	1	1.5	2
<i>G. lutea</i>	1.41 (276)	1.23 (266)	1.11 (344)	1.07 (336)
<i>G. plantii</i>	0.49 (410)	0.65 (202)	0.56 (236)	0.57 (168)
<i>G. Masterpiece</i>	— (339)	— (283)	— (420)	— (305)
<i>G. carsonii</i>	1.2 (450)	1.33 (610)	1.57 (420)	1.38 (360)
<i>G. Shrimati-Bhima</i>	0.68 (248)	0.59 (368)	0.51 (208)	0.57 (172)
<i>G. rothschildiana</i>	1.04 (464)	1.14 (492)	1.16 (450)	1.21 (304)

Figures in parenthesis indicate total number of somatic cells analysed.

increasing concentration. Nevertheless, the value obtained at lowest concentration i.e. at 0.5% was highest of all. Except *G. Masterpiece* all others, irrespective of their ploidy, exhibit C-mitotic effect; and it increases with increasing concentration. Among the polyploids highest effect could be seen in *G. rothschildiana*.

The cytological assay carried out in *G. superba* L<sup>2</sup> and a similar study in *Iphigenia* Kunth<sup>5</sup> confirmed that both these plants contain colchicine which disrupts metaphase spindle. Similar work reported earlier had shown that water extract of tuber of *Gloriosa superba* L is able to induce a number of chromosomal anomalies<sup>3</sup>. But the present study reveals that most other species of *Gloriosa* L are able to induce only endomitosis and chromosomal disjunction similar to that caused by isolated colchicine and no other anomalies such as chromosomal breakage, bridge formation etc. The degree of C-mitotic effect that could be seen appears to be positively correlated with the colchicine content.

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## BIOLOGICAL CONTROL OF CHICKPEA WILT

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THE use of mixed stands or multilines, and the use of a trap or inhibitory plants for host resistance are forms of biological control<sup>1</sup>. Using this technique, plant pathologists control many soil-borne pathogens. Biological control of wilt of pigeonpea is a long established practice in some parts of India<sup>2,3</sup>. However, wilt of chickpea is a problem in West Bengal. The disease is caused by *Fusarium oxysporum* f sp *ciceri*, a soil-borne pathogen. The infection occurs through fine rootlets or any wound. From rootlets the fungus passes on to the larger roots. The fungus confines itself to the vascular tissue. The wilting is characterized by gradual or sudden drying of leaves, followed by drying of entire plants or some of its branches.

Mixed cropping of chickpea with other crops is popular with the farmers in some areas of West Bengal. It was noticed that the incidence of chickpea wilt was lower whenever chickpea was grown admixed with linseed. The present investigation was undertaken to find out whether there is any role of linseed as a mixed crop with chickpea in the control of chickpea wilt.

With the above object a trial was conducted at the Pulses and Oilseeds Research Station, Berhampore (W.B.) during 1981-82, 1982-83 and 1983-84 in randomized block design with three replications. The plot size was 5 m × 3 m. The variety included in the study was B-67 for linseed and B-108 (sus) for chickpea. There were eight treatments viz (1) chickpea (pure) line sowing, (2) chickpea (pure) broadcasting, (3) chickpea + linseed (50:50) mixture broadcasting, (4) chickpea + linseed (66:33) mixture broadcasting, (5) chickpea + linseed (75:25) mixture broadcasting, (6) chickpea + linseed (1:1) alternate row, (7) chickpea + linseed (2:1) two rows of chickpea followed by one row of linseed, and (8) chickpea + linseed (50:50) intra row mixture. The ratio was calculated according to seed rate of both the crops. The seed rates of chickpea and

Table 1 Effect of linseed mixed/inter-cropping on incidence of chickpea wilt

Treatments	Wilt incidence (%)			Average	% reduction over control
	1981-82	1982-83	1983-84		
Chickpea (pure) line	49.8 (44.89)	22.01 (27.97)	19.2 (25.99)	30.3 (33.4)	—
Chickpea (pure) broadcasting	33.4 (35.3)	18.7 (25.62)	17.0 (24.35)	23.0 (28.66)	14.19
Chickpea + linseed (50:50) broadcasting	19.0 (25.84)	14.3 (22.22)	14.1 (22.06)	15.7 (23.34)	30.11
Chickpea + linseed (66:33) broadcasting	15.3 (23.03)	11.7 (20.00)	9.7 (18.15)	12.2 (20.44)	38.8
Chickpea + linseed (75:25) broadcasting	24.9 (29.93)	15.1 (22.87)	15.8 (23.42)	18.6 (25.55)	23.5
Chickpea + linseed (1:1) alternate row	23.1 (28.73)	15.6 (23.26)	15.4 (23.11)	18.0 (25.1)	24.85
Chickpea + linseed (2:1) line	17.8 (24.95)	13.7 (21.72)	13.8 (21.81)	15.1 (22.87)	31.5
Chickpea + linseed (50:50) intra row mixture	17.1 (24.43)	12.1 (20.36)	11.4 (19.73)	13.5 (21.56)	35.44
L.S.D. at 5%	8.64	3.16	2.96	5.0	

Figures in the parentheses are angular transformed values

linseed were 50 kg/ha and 15 kg/ha respectively.

Results (table 1) of consecutive three years show that the chickpea and linseed mixed cultivation effectively controlled the incidence of chickpea wilt. The incidence of chickpea wilt was lower whenever chickpea was grown admixed with linseed irrespective of treatments. Considering pure cropping of chickpea (in lines) as control, which showed 33.4% of wilt (average), the other treatments showed 14.19% to 38.8%, a decrease in wilt incidence over the control. Maximum reduction (38.8%) of wilt was observed when chickpea was broadcast-sown with linseed, with a seed rate of 66 chickpea : 33 linseed, which is followed by intra-row mixture (35.44%). Another interesting observation that emerged was that even pure cropping of chickpea with broadcast method of sowing, showed lesser incidence of wilt as compared to line sowing. In 1981-82, the mortality percentage was higher due to the high moisture content of the soil.

Roots are reported to exude toxic substances<sup>4,5</sup>. According to Timonin<sup>6</sup> some cultivars of flax releases HCN from its roots. In this case it may have so happened that the toxic root exudates of linseed acted as barriers to infection to cause decreased wilt incidence. The other possibility is, as defined by Cook<sup>1</sup>, the linseed root exudates may increase the population of microbes in the rhizosphere which is antagonistic to *F. oxysporum* f sp *ciceri*. The biochemical aspects of this

study is under investigation and will be reported later.

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