Table 1. Numbers of ovules and seeds per pod for germplasm entries evaluated.

Name	Ovules/pod	Seeds/pod
HMS-5	2.52 ± 0.268	1.81 ± 0.201
HMS-6	2.13 ± 0.100	1.93 ± 0.106
HMS-8	3.11 ± 0.179	2.40 ± 0.219
HMS-12	3.05 ± 0.149	2.01 ± 0.111
HMS-13	3.14 ± 0.277	2.75 ± 0.209
HMS-22	2.50 ± 0.166	2.28 ± 0.125
HMS-23	2.10 ± 0.100	2.10 ± 0.000
P-314-1	2.82 ± 0.200	1.72 ± 0.125
P-452-1	2.10 ± 0.102	1.70 ± 0.120
P-479	2.19 ± 0.100	1.38 ± 0.104
P-623	2.66 ± 0.221	2.13 ± 0.214
P-923	2.14 ± 0.103	1.62 ± 0.103
P-1111	2.18 ± 0.107	1.44 ± 0.100
P-1268	2.91 ± 0.179	2.11 ± 0.214
P-1557	2.19 ± 0.100	1.73 ± 0.103
P-1577-1	2.10 ± 0.102	1.90 ± 0.106
P-1994	2.73 ± 0.153	2.12 ± 0.189
P-2140	3.16 ± 0.105	1.64 ± 0.191
P-2587	2.21 ± 0.133	2.01 ± 0.000
P-4426	2.55 ± 0.167	2.40 ± 0.143
P-4546	2.17 ± 0.100	2.01 ± 0.129
L-2	2.24 ± 0.104	1.53 ± 0.107
JG-109	2.28 ± 0.133	1.51 ± 0.117
NEC-584	2.42 ± 0.159	1.80 ± 0.133
NEC-1258	2.26 ± 0.202	2.12 ± 0.125
NEC-391	2.20 ± 0.133	1.20 ± 0.100
NEC-1431	2.23 ± 0.133	2.01 ± 0.211
Annigeri	1.76 ± 0.153	1.42 ± 0.164

Figure 1. Chickpea pods with six seeds.

There was a good positive correlation ($r = 0.53$, $P < 0.01$) between the numbers of ovules and seeds per pod. However, P-2140, with the most ovules, had few seeds due to a very high rate of ovule abortion. In contrast, the rate of ovule abortion was zero in case of HMS-23. It would be interesting to examine the reasons for the differences in ovule abortion. Combination of low rate of ovule abortion with many ovules per pod could help to improve and stabilize the multiseeded character.

The seeds of these lines are available from the Genetic Resources Unit of ICRISAT on request. Several others that produced as many as six seeds per pod in 1982-83 have been developed by breeding and are undergoing yield tests (Figure 1).

-- **Onkar Singh (ICRISAT)**

P-1329 - a Superior Chickpea Cultivar Adapted to Early Sowing in Peninsular India

In normal circumstances, chickpea seed yields can be expected to be proportional to the duration of the crop. In northern India, where crop duration is 5 months, potential seed yields of 5 tonnes per hectare are quoted. In peninsular India, where crop duration is curtailed to only 3 months, by increasing temperatures and moisture stress in early February, potential seed yields in rainfed conditions are only about 2.5 tonnes per hectare. In this situation, there are possibilities of improving yields by extending the growing season and advancing sowing from mid-October to mid-September, which also would have the advantage of improved soil moisture conditions in years when the monsoon ends early.

Since 1978-79, more than 1000 germplasm accessions have been evaluated in mid-September sown, replicated trials on the research farm of ICRISAT Center at Patancheru, in peninsular India. The most promising entries in the earlier trials (notably P-1329, P-18, P-1067-1, and P-4089-1) have also been evaluated in trials sown early and at the normal time to identify genotypes that are adapted to a range of

sowing dates and with plant characteristics conditioning adaptation to early sowing.

Where comparisons have been possible, early-sown chickpeas have produced larger yields than those sown at the normal time. Interactions between entries and sowing dates have been significant, notably because medium- and long-duration genotypes produce relatively better yields when sown early than when they are sown at the normal time. In general it is the medium-duration types that perform best when sown in mid-September. High-yielding entries also tended to have large seeds and long flowering periods and produced many branches, pods, and seeds per plant.

Table 1. Seed yields (kg/ha) of P-1329 and Annigeri in early and normal sown trials at ICRISAT Center.

Cultivar	1979-80	1980-81		1982-83		
	Early sown	Early sown	Normal sown	Early sown	Normal sown	Mean
P-1329	1635	1461	1633	3016	2414	2032
Annigeri	992	924	1313	2464	2275	1594
SE ±	125.5	121.3	112.9	131.5	140.1	

Over three seasons, P-1329 has performed best, producing over 2 tonnes grain per hectare, some 25% better than Annigeri (Table 1). When sown early it has been significantly better yielding than Annigeri in every comparison. In 1982-83, early-sown P-1329 produced more than 3 tonnes grain per hectare. When sown at the normal time its seed yield has not been less than that of Annigeri. P-1329 flowers 1 week later than Annigeri, 7 to 8 weeks after sowing, and matures in about 100 days. Its seeds are yellow-brown and average 18 g per 100 in weight.

In peninsular India, the sowing time for chickpea varies considerably with the time of ending of the monsoon. Clearly, a cultivar is needed that can be sown early or late, depending on the situation. P-1329, which has yielded better than Annigeri when sown early and produced similar yields in normal sowings, is an obvious candidate. This cultivar has been contributed to All India Coordinated Pulse Improvement Project Trials; other promising lines are currently being tested and are being utilized in breeding programs.

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Chickpea Improvement in Nepal

Chickpea is the third most important pulse crop in Nepal, after *Lathyrus* and lentils. About 34 000 tonnes of grain are produced from 69 000 ha (FAO, 1980) mostly in the **tarai** region (800 km by 15-30 km) bordering India. Average seed yields (489 kg/ha) are well below world average. The most important districts for chickpea are, Sirha, Dhanusha, Sarlahi, Rautahat, Bara, Parsa, Nawalpur, Banke, Bardia, and Kailali. Because of proximity to high mountainous terrain the climate is generally cool but has very hot daytime temperatures in summer, which brings stress during the pod filling stage and may be one of the causes of low productivity.

Soils are clayey loam, rainfall about 1100 mm, mostly from June to September, latitude 27°N and altitude 100 m. Farmers generally grow local cultivars, which are dwarf, umbrella type with small, yellow seeds and have achieved yields of up to 2.5 tonnes/ha. Fusarium wilt, root rots, chickpea stunt and rust are most prevalent in central **tarai**, although rust may not cause severe losses as it appears late. Pod borer damage is also substantial.

Unlike other important crops, pulses are not part of a coordinated improvement program; therefore, little concentrated effort has been afforded to varietal improvement. Variability at present is derived mainly from ICRISAT trials and nurseries. Two selections from local material, Dhanush and Trishul, have been released. They are small seeded (about 10 g/100 seeds) but their germinability is very good. At Parwanipur (Rice Research Station), one scientist is responsible for several pulses including chickpea, with little technical support. A wilt-sick plot