Pradesh; besides chickpea, it also attacks a wide range of other crops from April to October (Garg 1987). Many natural enemies have been reported to regulate its population density. Among them is an ichneumonid, *Campoletis chlorideae* Uchida, a larval parasite (Achan et al. 1968; Rao 1968; Yadav et al. 1982; Omkar et al. 1984). So far, this parasite has not been recorded from the Kumaon Hills of Uttar Pradesh.

During laboratory rearing of *H. armigera* from chickpea in April-May at Hawalbagh (1250 m above sea level), I found many parasitized larvae, and the parasite that emerged was identified as *Campoletis chlorideae* Uchida (*Hymenoptera : Ichneumonidae*) by the Commonwealth Agricultural Bureaux International Institute of Entomology, London. In subsequent field observations of chickpea, 25% of the larvae were found thus parasitized. In the simultaneous observations on green pea, which is another suitable host for *H. armigera*, many *C. chlorideae* parasitized larvae were also noticed. Parasitization of first- and second-instar larvae was much higher than that of later instars. Initial parasitization was recorded from the third week of April; it gradually increased and reached its maximum in the first week of May, when the *H. armigera* infestation was also at its peak. It seems that, due to the late appearance of *C. chlorideae*, its impact on the population increase of *H. armigera* was restricted. However, its occurrence in fairly high proportions on chickpea and green pea highlights the contribution of this ichneumonid to the natural control of this major pest in this part of Uttar Pradesh.

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Genetic Resources

Collection of Chickpea Germplasm in Morocco

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Chickpea is an important crop in the Morocccan agriculture, ranking second among the food legumes--after faba bean--in area and production. It is often grown in pure stands, the average yield being 770 kg ha^{-1}. Most of the chickpea grown is a large-seeded kabuli type, which Moroccan consumers prefer to the desi type, and which also has potential for export to European countries.

Chickpea is usually grown as a spring crop (March-June/July), unlike the majority of the other crops, which are sown in November, when the rainy and winter season starts. This is because chickpea cannot withstand excessive moisture and low temperatures, and also suffers from ascochyta blight disease during that season. The crop is cultivated on Vertisols. Seed is generally broadcast, but in some cases sown in rows at a spacing of 75-100 cm. In our survey we found the plant stand was generally low and we were told that it was optimal for moisture-deficient cultivation. Ascochyta blight, stunt disease, and leaf miner can be potential yield reducers in particular years. During our mission, however, we also noticed damage due to fusarium wilt in some fields.

Chickpea was cultivated on 158 000 ha in 1974, but this area had gradually declined to 49 000 ha by 1985 (FAO 1974-85), showing a shift in cropping patterns. This shift is partly due to the introduction of sunflower in recent years and a marginal increase in area under the barley crop.

Such a shift in cropping patterns and the decline in chickpea area represents a threat to chickpea landraces. Morocco being part of the Mediterranean region that is the center of origin of chickpea, there should be considerable genetic diversity in the Moroccan germplasm. However, no systematic collection of chickpea germplasm is known to have been done in Morocco; nor does there exist anywhere in the world an adequately representative collection of chickpea germplasm of Moroccan origin.

In view of these facts, a chickpea-collecting mission was organized, 27 Jun-13 Jul 1987, jointly sponsored by the Institut National de la Recherche Agronomique (INRA), Morocco; ICARDA; and ICRISAT. Figure 1 shows the route followed during the mission.

The germplasm samples were collected by picking pods from about 100 plants in a field, with collection sites at intervals of about 5 km. Where the crop was harvested, about 0.5 kg seed samples were obtained from threshing floors. One hundred and twenty-two seed samples were collected and shared among the

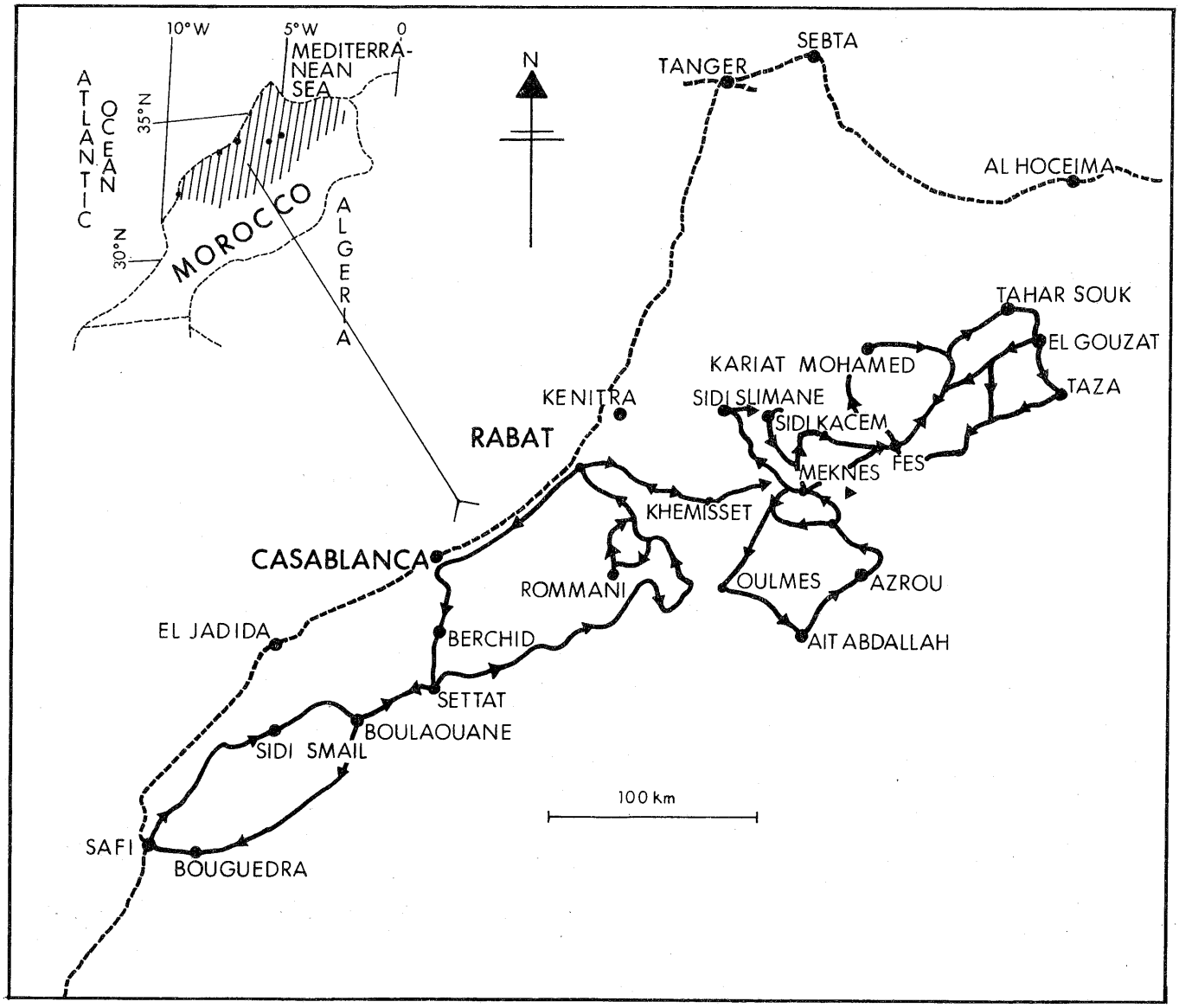

Figure 1. Route map of chickpea germplasm collection mission in Morocco, 27 Jun-31 Jul 1987.

institutes of INRA, ICARDA, and ICRISAT.

As mentioned earlier, mostly large-seeded kabuli chickpeas are cultivated in Morocco. This is partly due to the market demand. Desi type chickpeas have been neglected. Nevertheless, desi types as admixture were seen in farmers' fields, generally, in a proportion of 1-2%, but in some cases up to 10%. Among the seed samples collected, 100-seed mass ranged from 18.8 to 53.7 g, with a mean value of 35.7 g (Fig. 2a). The variability in seeds within a field as well as between fields was also large (Fig. 2b). The twin-podded characteristic is a potential seed-yield component of chickpea. One such genotype with large kabuli seed was identified in the fields and collected.

The new germplasm samples have enriched the diversity of the world chickpea collection, particularly for the large-seeded kabuli type. The mission was vital in salvaging the chickpea landraces from some regions where they would otherwise have become extinct due to the fast spread of sunflower cultivation.

These lines are maintained in the gene banks of ICRISAT and ICARDA and are being evaluated for agronomic characters and for resistance against various biotic and abiotic stresses. Seed can be obtained by anyone for research use on request from the Genetic Resources Units of these institutes.

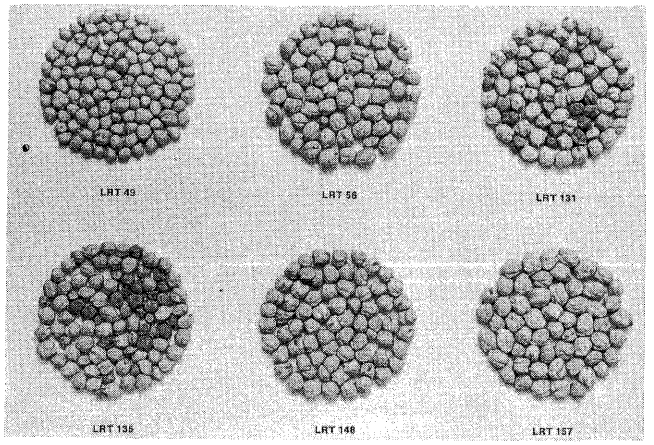

Figure 2a. Variability of seeds within and between the samples of chickpea landraces collected in Morocco.

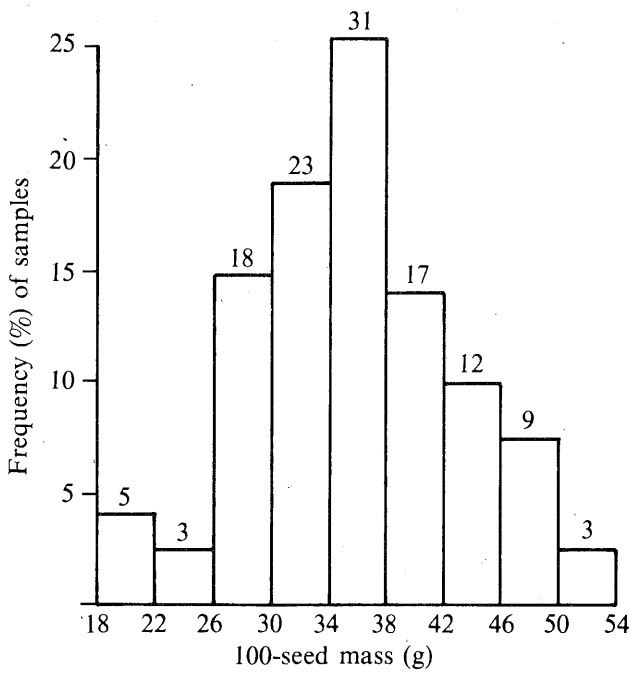

Figure 2b. Seed size variation between the chickpea seed samples collected in Morocco. Values on top of the bars indicate number of samples.

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Collection of Germplasm of Chickpea Landraces in Madhya Pradesh, India

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Chickpea ranks first among pulses and ranks third among all food crops grown in Madhya Pradesh (M.P.), India. During 1985, this crop was cultivated on 2.07 million ha, which is about 20% of the world chickpea area. The state being large, with varied agroecological conditions, many diverse types of chickpea are known to exist there. At ICRISAT, efforts were made to assemble all chickpea germplasm available, in collaboration with different national and international institutes, which resulted in 251 accessions of M.P. origin. However, the majority of these lacked full passport information. Also, considering the large area under chickpea, the number of accessions was low. Therefore, high priority was accorded to systematic collection of chickpea landraces in M.P.

The work was accomplished in two missions, 5-20 Mar 1986, and 6-21 Mar 1987. The missions were jointly conducted by ICRISAT; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur; and the National Bureau of Plant Genetic Resources, New Delhi. The route followed during the mission is shown in Figure 1. The mission times coincided well with the maturity of the chickpea crop, and we were able to obtain germplasm samples from crops in the fields. Samples were taken by picking a few pods from each of about 100 plants chosen randomly at each site. Whenever we found unique plant or plants with many desirable characteristics; e.g., large pods or large number of pods, we kept seed from such plants separately, as selective samples. The two missions resulted in the collection of 351 samples of chickpea, which were shared among the collaborating institutes.

The state of M.P. lies between 17°48' and 26°52'N latitude. Soils are mostly black loam or clay, but alluvial sandy soils are found towards the north of the state. In general, the altitude varies from 200 to 500 m. Average annual rainfall is about 1000 mm, most of it falling between June and September. These features provide three distinct seasons: the rainy season, winter, and summer.

In the majority of the fields, chickpea was sown as a sole crop. However, in some cases it was mixed with linseed, brassica (*sarson*) or wheat. Seed is generally broadcast in the field, with a moderate level of tillage. In most cases, chickpea is sown in October, after the rains recede, and the crop is harvested from February to April; i.e., in about 110 to 140 days in different regions. Whenever feasible, the crop is