

TRIP REPORT - Phaseolus Germplasm Collection in  
Nuevo León - Mexico

September 1 - September 25, 1985

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Summary

In a Phaseolus germplasm collection carried out in southern Nuevo León, Mexico, with the Facultad de Agronomía, Universidad Autónoma de Nuevo León and the Instituto Nacional de Investigaciones Agrícolas de México, a total of 141 samples representing 8 different species were studied and collected. A brief description of each sample is presented as well as some implications to understand the Phaseolus germplasm in that part of Mexico.

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Phaseolus neglectus Hermann, from Zaragoza, Nuevo Leon, Mexico,  
# 1510, alt. 2060 m, long.  $99^{\circ}47'W$ , lat.  $23^{\circ}56'N$ , 08/IX/1985.

## C O N T E N T S

	<u>Page</u>
1. Introduction . . . . .	1
2. Pending questions at the beginning of the work . . . . .	2
3. Status of the collections in the resepctive GRU's . . . . .	3
4. Physical and climatic characteristics of the area of work . .	5
5. Timing . . . . .	7
6. Results . . . . .	11
7. Conclusions . . . . .	33
8. Literature cited . . . . .	36
9. Acknowlegements . . . . .	37

Annexes 1 to 6

## 1. Introduction

Phaseolus vulgaris L. has often been reported as a drought susceptible species. Drought has been frequently considered as a difficult concept, since it can include not only strict aspects of drought, but also interactive effects of high temperatures (to which only a few accessions from the Caribbean zone are more tolerant), and of salinity problems (high osmotic pressure and/or lack of balance between the major ions and/or presence of a toxic ion).

One can observe that:

1. the reactions of the germplasm of common bean at least, to these multiple interactions were generally poorly studied,
2. in terms of tolerance to these interactive effects, the number of accessions is low: either because this species has really just a few genotypes tolerant to these factors and/or their interactions (for instance P. vulgaris has been classified as a glyco-phytic plant), or because the regions offering those physical and climatic constraints were poorly or too delayed in being explored, or because of both factors. As potential areas of interest as to find those constraints, one can cite: north of Mexico, Arizona and New Mexico in the US, coast of Peru, north of Africa, Turkey, the Middle East up to Afganistan.

To sum up, there is an increasing interest to collect and study the germplasm of P. vulgaris from arid zones, mainly as to improve the productivity of the crop in those regions where it is already grown - and facing hard competition from other crops, - but also to promote the crop as both dry and green beans in new marginal areas.

The present work took place after a series of contacts between the Facultad de Agronomía of the Universidad Autónoma de Nuevo León (UANL), the Unidad de Recursos Genéticos (URG) of the Instituto Nacional de Investigaciones Agrícolas (INIA-SARH-Mexico) and the URG of the Centro Internacional de Agricultura Tropical (CIAT, Colombia). This is a part

of the current efforts devoted by the International Board for Plant Genetic Resources (IBPGR) to collect genetic diversity of Phaseolus in the three american centers.

This work was carried out from September 1 to September 22, 1985, in the southern part of the state to Nuevo Leon, Mexico, by a team of five scientists of UANL, INIA and CIAT.

## 2. Pending questions at the beginning of the work

Speaking about the representativity of the germplasm of Phaseolus in northeastern Mexico, one can list the following questions:

1. Which are the land races of P. vulgaris grown in Nuevo Leon now and before? Are they present in the respective GRU's?
2. How far do the other cultivated species (lunatus, coccineus, polyanthus, acutifolius) penetrate into Nuevo Leon? If affirmative, are they present in the GRU's? For P. lunatus, it is doubtful that the Hopi Branch described by Mackie (1943) could ever have penetrated into northeastern Mexico. As far as the writer knows, it has not been reported growing wild in Nuevo Leon nor Tamaulipas, giving little chance for local domestication. The same could be said for P. polyanthus. However, after excavating caves in Ocampo, Tamaulipas, Kaplan and McNeish (1960) reported the presence of P. vulgaris (3 domesticated types), of P. coccineus (gathered as wild) and of P. lunatus (1 sieva type) and the absence of P. acutifolius. P. vulgaris appears as early as 6000 years ago, P. coccineus remains were dated 9000 years ago, and P. lunatus appears only 1800 years ago. Those findings in southwestern Tamaulipas left open the possibility to find P. lunatus and P. coccineus, the last at least growing wild, though some climatic changes affecting its distribution could well have occurred (Kaplan & McNeish , op. cit.). Though the tepary bean in both its cultivated and wild forms was widely distributed on the western flank of the Mesoamerican Center, its extension eastwards still needs to be explored.

3. Some wild species as anisotrichus, microcarpus do have a wide distribution through the Mesoamerican Center. Are they present in Nuevo Leon?
  4. Nabhan et al. (1980) investigated the distribution of P. metcalfei and P. ritensis in southern North America and reported the presence of the former in western Texas. The distribution of this section of Phaseolus eastwards in Mexico still needs to be documented.
  5. P. polystachyus has repeatedly been found in the southeastern US (e.g. J.K. Small, 1903). The thicket bean extends westwards, but apparently not beyond northeastern Texas (B.L. Turner, 1959; D.S. Correll & M.C. Johnston, 1970). Maréchal et al. (1978) mentioned two materials NI 402 and NI 560 found in Morelos, Central Mexico, as being close to polystachyus, but they did not name the materials. A possible transition must therefore be looked for through the northeastern Mexican States.
  6. A difficult group of species - the section of pedicellatus - has its main distribution in the Sierra Madre Oriental. Although the relationships of this group with the one in the Eje Volcánico and southwards to Oaxaca has been recently investigated by Delgado Salinas (1985, personal communication), the limits of distribution for each species towards the Mexico-US border are still unclear.
  7. Several species have been found in Nuevo Leon, but apparently at very low rates of occurrence: plagioclylix, neglectus. As it is the case for several wild species, they do not exist in seed banks and their potential use if any is unknown.
3. Status of the collections in the Respective GRU s

Since duplicates is by now one of the most difficult problems in handling germplasm, one must take into account the present collections and make an appropriate inventory before collecting.

When the writer had the opportunity to see the files of INIA-GRU

in 1978 in Chapingo, the situation for the northeastern Mexican states was the following:

<u>State</u>	<u>No. of accessions</u>	<u>Remarks</u>
Coahuila	18	numbered COAH 1-17, from 9 localities, collected in 1948-52
Nuevo León	0	-
Tamaulipas	11	numbered TAMPS 1-11, from 4 localities, collected in 1948/52/54.

Apparently, all of them were cultivated P. vulgaris.

The same year, the National Coordinator of the INIA Bean Program, Dr. R. Lepiz I. wrote a report ("Análisis de los recursos genéticos de frijol en México") in which:

1. The status of the collections held in Chapingo in both INIA and Colegio de Postgraduados was:  
 for Coahuila: 17 accessions in INIA and 42 accessions in CP  
 for Nuevo Leon: 0 accessions in INIA and 1 accession in CP  
 for Tamaulipas: 0 accessions in INIA and 10 accessions in CP
2. it was said (p. 17): ..."de algunos otros (estados) es muy reducido o nulo el número de colectas. De acuerdo a la información anterior, es evidente que muchos de los estados están muy lejos de tener una buena representación."

The same data were produced by E. Hernández X. in his report to FAO on the "Genetic resources of primitive varieties of Mesoamerica Zea spp., Phaseolus spp., Capsicum spp, and Cucurbita spp." (1972) with some discrepancies about Tamaulipas.

In 1979, a collection work was carried out by Ing. José S. Murruaga M. of INIA-URG in Nuevo León, and a total of 22 materials of P. vulgaris were collected (see annex 1) and deposited in Chapingo.

In 1982, INIA-URG printed an updated list of the accessions held

at Chapingo, a part of which is reproduced in Annex 2. The list of the materials from San Luis Potosi is too long to be reproduced here, but the results of the comparisons with the materials of Nuevo León will be discussed later on.

Ultimately, a collection of 20 regional varieties of *P. vulgaris* was assembled and maintained by the INIA Experiment Station at La Ascensión, Aramberri. As far as the writer knows, it has not been transmitted yet to the GRU-Chapingo. None of these materials from Nuevo Leon existed in GRU-CIAT. Generally, the basic passport data were missing.

#### 4. Physical and climatic characteristics of the area of work

The area of work (see map in Annex 3) is included in the Mexican State of Nuevo León, south from the parallel of Monterrey. It extends from 23°20' to 25°50' of latitude N and from 99°50' to 100°30' longitude west. Altitudes covered in this expedition range from 450 m.a.s.l. in the district of Linares up to 3000 m.a.s.l. in the districts of the Cerro El Potosí (3635 m.a.s.l.) and Cerro Peña Nevada (3660 m.a.s.l.). Thus, on the basis of differences of 300 m in altitude, this would define some 8 ecological zones or "pisos térmicos" for the collection of wild populations.

The orographic characters of the area of work can briefly be summarized as follows. Let us consider a high rectangle with one diagonal oriented NW-SE occupied by the undulations of the Sierra Madre Oriental. Eastwards, starting at the foothills at about 350-500 m.a.s.l., there are the flatlands of Nuevo León and Tamaulipas going down smoothly to the Gulf of Mexico, with just a few hills of low elevation (e.g. Sierra de Papagayos). In general, this is a quite hot country, though frost can occur in December-January, open to the winds coming from the Gulf. The chaparral or arid tropical scrub on detritic soils has been largely replaced by poor pastures for extensive grazing, maize and sorghum fields and citrus orchards. This zone would have been adequate for cultivation of lima beans, though the high temperatures would not permit seed conservation of native varieties for long periods of time.

In the Sierra Madre Oriental, much more diversity in vegetation occurs. First the eastern flank is more humid than the western one because of the humid winds coming from the Gulf. On the eastern foothills and going up in altitude, one will see first a tropical deciduous forest in the more humid parts and an arid tropical scrub in the drier parts, then a dense pine-oak forest, and in the higher parts a pine forest. On the summits, the dense scrub of Pinus culminicola will be soon replaced by an alpine meadow in the higher parts which are covered by snow in January (J.H. Beaman and J.W. Andresen, 1966). On the western (and drier) slopes, going down in altitude, one will find a sparse pine forest with Pinus edulis (piñon), then a pine-oak forest followed by a thorn forest and the chaparral at the foothills. In this zone, maize and beans were extensively planted. Recently, apple orchards spread in several places. The climatic conditions for seed conservation over long periods of time are better especially in the higher parts. Over grazing is permanent in all places outside the cultivated fields. Timber production is very low everywhere.

In the western zone predominate the flat and desertical highlands separated by chains of hills and mountainous areas. Humidity is going down west- and northwards. Altitude in the highlands goes up by steps from about 1600 m.a.s.l. to 2200 m.a.s.l. already outside Nuevo León. Drainage is poor and saline soils spread over large extensions. Natural vegetations are desert ones: chaparral of gobernadora (Larrea tridentata); cactus scrub of Opuntia (nopal, cholla), Agave (maguey, lechuguilla), Yucca (palma), Xotol; grasslands of Bouteloua mixed with some Cactaceae and Mimosoideae at lower altitudes, Mimoisoideae and Pinus at higher altitudes (see also Rzedowski, 1978). This zone has been used for years for extensive grazing and extensive agriculture depending on the rainfalls ("temporal"). There, maize and beans were grown for years, although the latter apparently never received the same emphasis as in other places of Durango and Zacatecas. Recently, irrigated fields spread in several places with alfalfa, new varieties of maize, wheat, sunflower. Availability and quality of irrigation water is a permanent limiting factor, though good soils beside heavily stony zones are available. The conditions for seed conservation are not so good but improving at higher altitudes.

According to the data published in the "Atlas de Agua" (1976), the main rainfalls occur from late August to October. However, especially in the southern sierra, there is another rainy period of lower intensity starting in late April and finishing in June. As in every desertical area, variation between zones within a year and throughout the years can be very important. Although 600, 700-1100 and 300 mm of rainfall are expected per year respectively in the eastern part, the sierra and the western part of the area of work, for instance, it just rained half of the amount at the expected date in the southern most part. In the district of Mier y Noriega, some maize plants reached only 60 cm high. Accurate temperature data are difficult to get due to the lack of numerous climatological stations. A mean temperature throughout Nuevo Leon in January is about 14°C, though frost up to -12°C can frequently occur. In July, extreme temperatures can reach 40°C, and even 44°C in the vicinity of Monterrey. One expects the diurnal contrast to be high (20 to 25°C).

Rendzinas, chernozems, chestnut-type soils, sandy soils were the most frequent types encountered developed on limestone, dolomite, marl, stony aluvial sediments, most of them of Mesozoic origin on both sides of the Sierra Madre Oriental, and of Pliocene and Pleistocene origin at the extreme sides of the zone. Deep soils are more the exception, and found either in the valleys or in the flat highlands; in the mountainous zones, the soil mantle is very thin (1-20 cm), rocky and with a higher organic content as the altitude rises.

##### 5. Timing

September 1: Travel Cali-Mexico City

September 2: Mexico City: meeting with Dr. Francisco Cárdenas Ramos, Head, Unidad de Recursos Genéticos, Instituto Nacional de Investigaciones Agrícolas.

Travel Mexico-Monterrey

September 3: Monterrey-Marín: Facultad de Agronomía, Universidad Autónoma de Nuevo León: meeting with Ing. Fermín Montes

Cavazos and Ing. Raul Rodriguez Peña, respectively, Director General and Director of Administration: presentation of the collaborative project "CUCI" (Consejo Internacional de Recursos Fitogenéticos, Universidad Autónoma de Nuevo León, Centro Internacional de Agricultura Tropical, Instituto Nacional de Investigaciones Agrícolas). Technical discussions with Ings. Gilberto Salinas, Mauro Rodríguez Cabrera, Mario Aguilar San Miguel (INIA) and Sergio Rodríguez Tijerina (the 3 of UANL): timing and places to be visited.

September 4: Marin, Facultad de Agronomía: technical discussions and preparation of the different routes. In the afternoon, check in the Herbarium of the Faculty and then field exploration in the Cerro de la Silla, a mountain close to Monterrey.

September 5: Road to Linares, Iturbide and La Ascención. In the last village there is an Experimental Station of INIA, where our base camp was organized. After Linares, we went across the Sierra Madre Oriental, where several stops were made as to collect wild Phaseolus species. Indeed, the collection numbers # 1501, 1502, 1503, were made at that time (see map in annex 3). Visit of INIA experimental station: a small collection of regional bean varieties was at flowering and pod-filling stages.

September 6: Road to Mier y Noriega via Doctor Arroyo. Exploration in Mier y Noriega, Lagunita de Taverna, La Cardona, San Elías, Refugio de los Cerros Blancos and Tapona Moreña, looking for native varieties of cultivated species. 25 materials land-races and seed variants were collected in those small villages.

September 7: Road to the district of Milpillas. Fields in Milpillas, La Caballada, El Rucio were visited. Four other cultivated materials were collected. Two wild species were collected

too (Nos. 1504 and 1505).

September 8: Road to Zaragoza. Exploration along the road to and in La Encantada. Five P. vulgaris were collected in El Salto and La Encantada. Five wild species were sampled along the same road (#1506 up to #1510).

September 9: Road to La Siberia via San Antonio Peña Nevada and Santa Lucia. Interviews in S. Antonio P.N. Three wild species were collected along the road to La Siberia (Nos. 1511, 1512 and 1513).

September 10: This day was lost because of a crash in the sector of Aramberri.

September 11: Road to Lampacitos via Aramberri, Los Cuartitos, La Joya de Bocaceli and El Saucillo. Interviews and visits to the fields in Aramberri and Lampacitos. Four cultivated P. vulgaris were collected in Lampacitos. Along the road to this small village, close to El Saucillo, a population of P. anisotrichus was sampled (#1514).

September 12: Road to La Mesa del Traidor, via Sandia Grande, El Alamo, San Pedro de Rueda and Santa Maria. Discussions with farmers and visits to the fields in these small villages. Fifty samples of P. vulgaris were collected, mainly from the Mesa del Traidor.

September 13: Because of its richness in seed types, back to the Mesa del Traidor, interviewing farmers in Las Jarillas, San Francisco de la Mesa, La Unión and Los Angeles (not the one in California!). One wild species was found not very far from Las Jarillas (#1515). One P. vulgaris was collected in La Unión.

September 14: A survey was made in the surroundings of the Cerro El

Potosí (alt. 3635 m), because of the interesting gradient in altitude, starting at about 1500 m. The following small villages and ranchos were visited: La Poza, 18 de Marzo, La Placeta, El Orito, La Manteca, Calabacillos, Francisco de Javier, Sta. Maria del Socorro, Tanquesillas de Galeana, San Pablo and Boca del Refugio. Three samples of P. vulgaris were collected, as well as one wild species (#1516).

September 15: Road to Camarones, via Puerto Pastores, La Colorada, Santa Rosa (Iturbide), and Cuevas. Two samples of P. vulgaris were collected, as well as three samples of wild species (Nos. 1517, 1518, 1519).

September 16: Road to San Lucas, where one wild species was found (#1520).

September 17: Processing of the seed and herbarium samples at the Facultad de Agronomía, Universidad Autónoma de Nuevo León, Marin.

September 18: Road to Laguna de Sánchez, in the Sierra Madre Oriental, south of Monterrey, via Puerto Genovevo, La Cienaga and San Isidro. Six samples of wild species were collected along this pad (Nos. 1521 to 1526).

September 19: Further processing of the samples at the Facultad de Agronomía, UANL, Marin. Visit of the facilities of the Genetic Resources Unit at the Faculty. Open discussion with the team involved in Genetic Resources (Drs. U.R. López Domínguez, R. K. Maiti, S. Puente Tristan, Ings. A. Aguillon Galicia, H. Ibarra Gil, A. Ibarra Tamez, Biol. S. Rodríguez Tijerina). Lecture to the graduate students of the Faculty: "Manejo del Banco de Germoplasma y su Aprovechamiento en Mejoramiento".

September 20: Distribution of the samples between the institutions. Mapping the collected samples. Preparation of the collection forms.

September 22: Hiking in the Cerro de Las Mitras, west of Monterrey. One sample of wild species was found (#1527).

September 23: Flight to Mexico City. Meeting with Dr. Francisco Cárdenas Ramos, rendering and account of the results of the field work in Nuevo León, discussing about future plans for collaborative work in Mexico.

September 24: Visit to the Herbario Nacional (Mexu) de la Universidad Nacional Autónoma de México. Meeting with Drs. M. Sousa Sánchez formerly Head of the Herbarium, and A. Delgado Salinas, who made his Ph.D. thesis on taxonomy of the mexican species of Phaseolus.

September 25: Travel to Cali.

## 6. Results

### 1. Phaseolus vulgaris and P. coccineus

#### A. Seed types encountered and their frequencies.

A simple device was used in the different interviews with the farmers: each seed type encountered was numbered and put in a transparent plastic bag after the separation of mixtures.

All the different seed types were presented independently to each farmer, asking him: Do you know any of the seed types presented? Under which name do you know it? For how long do you think this peculiar type has been planted and where? Each answer was registered separately. The analysis of the different answers obtained in 40 different places give the following:

1. Guadalupano: this small pinto type with its two variants (beige or pale citrine yellow background) was found and/or mentioned in 16 different localities of Mier y Noriega, Aramberri, Zaragoza, Doctor Arroyo, Galeana and Iturbide. It was also called Bayito, Pintito, Chiquito, but with lower frequencies. Altitudes range

from 990 m (Lampacitos) up to 2560 m (La Encantada). It is a regional variety.

2. Cacahuate: This is a relatively large grain with beige or pink background and red stripes. It was found in 12 different localities of Mier y Noriega, Aramberri and Doctor Arroyo. It was also known as Alicante or Alicantado, but in a very few places. Altitudes range from 990 m (Lampacitos) up to 2140 m (Mesa del Traidor). Was found growing in places close to saline soils! Though ancient in the region, it could have been introduced from other parts of northern Mexico.

3. Ojo de Cabra: the last statement seems also valid for this well-known type. It was found in 25 different places, ranging in altitude from 990 m (Lampacitos) up to 2400 m (La Manteca). In one place, it was called Ojo de Chiva and in another Guadalupano. The common seed type is with a beige background with black or coffee brown stripes and a colored circle around the hilum, but several variants exist and were separated.

Provisional Number	Seed Description	Place	Altitude
14	Beige-pink back ground, large coffee stripes	Doctor Arroyo	1700 m
25	Close to 14 but with a grey spot	Lagunita de Taverna	1940 m
32	the spot is nearly covering the whole seed	Refugio de Los Cerros Blancos	1450 m
34	the beige background is completely covered by the secondary coffee brown spot	Refugio de Los Cerros Blancos	1450 m

It is definitively an ancient variety in the zone (40 years), grown continuously for years in several places. But it must be said that:

- it is a commercial variety, the seeds will find buyers in local (and maybe national) market.
- it has been frequently distributed by federal authorities (CONASUPO, Banco Agrario).

-- it is also planted in great extension in Zacatecas and Durango.

4. Flor de Mayo: this type, one of the most common in Mexico, was found in 27 localities, from 990 m (Lampacitos) up to 2400 m (La Manteca). As an evidence of its importance in this area, there were nowhere doubts about its identification. The common type is with a beige cream background with a large solid pink-purple spot tearing on the opposite side of the hilum. Three variants were separated:

Provisional

<u>Number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
27	the spot is dark purple instead of pink	Lagunita de Taverna	1940 m
45	the pink spot is less extended, the seed is larger (this material was called Sahuin Canelo in La Caballada and Canelo in Lampacitos).	La Caballada	1250 m
60	the spot is purple-grey instead of pink	Sandia Grande	1490 m

This is a commercial variety, well diffused in northern Mexico. It has been grown for years in the area of work, and apparently has some drought tolerance (info, in San Lucas, Galeana, 1830 m). It was also frequently given to the farmers by the authorities (info. in San Lucas).

5. Pinto Vaca: it was found and/or mentioned in only 7 places. This is a quite distinct, medium size, bean with a white background and large circular bright red spots. It was called Vaca, Vaquita, and Frijol Vaca, and apparently erroneously Pinto Americano in Sandia Grande. It was known just in a limited number of places in the districts of Doctor Arroyo, and Mier y Noriega, and was also reported to have been obtained from Matehuala (San Luis Potosí). It is quite possible that this type was obtained outside Nuevo Leon and grown there because of the attractiveness of its seed. The same could be said for the provisional number 20, found only in Puerto del Aire (Mier y Noriega) close to San Luis Potosí. It is also a "Pinto Vaca", with a white background and large circular black spots. It is very similar to a group of beans "Vaquitas"

found by Debouck & Liñan in Cajamarca, Perú in 1985.

6. Chiquito: This is a regional variety mentioned as Chiquito in the eleven places it was found. Altitudes range from 990 m (Lampacitos) up to 1770 m (Santa María de Reynosa). It was well known throughout the district of Aramberri, less in Doctor Arroyo, Galeana, Iturbide. It was reported as a native bean high yielding and drought tolerant. It is a small bayo type with grey veins hardly marked; two variants were separated:

Provisional

<u>Number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
89	light cream background with cream veins	San Pedro de Rueda	1790 m
112	light cream turning purple background with yellow eye (the latter was called "Chiquito" in Santa Rosa and mixed with the normal bayo type. The size is the same).	Sta. Rosa Iturbide	1460 m

7. Garrapata: it was found in 9 places, mainly in the district of Aramberri, less in Zaragoza and Galeana. In Lampacitos, a farmer said to us: "Este frijol es para la sierra". Accordingly it seems to be planted in the higher parts, with the cultivated fields ("labores") in the summits. The altitudes of the places where it was mentioned range from 1120 m up to 2560 m. It is most probably cultivated at 1800-2400 m. It is a small roundish bean, with a violet background and some black stripes and a black eye. It was identified at the first glance by the farmers and always with the name "garrapata". No variants were found.

8. Japones: unlike the previous material, this seems to have been introduced in the area, as the diversity in names illustrates it. It was frequently identified as Canario, Amarillo, California in the 9 places it was found or mentioned (districts of Aramberri, Doctor Arroyo, Mier y Noriega). Altitudes range from 990 m (Lampacitos) up to 1940 m (Lagunita de Taverna). It is a large cylindrical dark yellow bean with a brown-greenish eye around the hilum. Some variants could be easily separated.

<u>Provisional Number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
21	Solid dark orange flattened bean (it was reported as Amarillo in several places)	Lagunita de Taverna	1940 m
29	Lightly veined dark yellow elliptical bean (it was called Canario)	La Cardona	1820 m
85	Close to 21, somewhat more cylindrical	San Pedro de Rueda	1790 m

Because of their low occurrence and lack of specific name, they were probably introduced in the area.

9. Baboso: it was found in 7 different places in the districts of Aramberri, Doctor Arroyo and Mier y Noriega, six times with this name, but one with the name Canario. The name of Baboso was apparently given because of the color of the water after soaking the seeds. Altitudes range from 1250 m to 1790 m. It is a cylindrical bean somewhat flattened, medium size, with a solid bayo background and little grey veins. Maybe one variant can be associated with it.

<u>Provisional Number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
83	Solid citrine bayo with light orange eye	San Pedro de Rueda	1790 m

More information would be necessary to attest that this material is a "criollo" in the zone of work.

10. Canelo: apparently two varieties better say two seed types, were known under this name. One - our provisional number 45 - is related to the Flor de Mayo, though it is a larger grain. Another one is a seed as large as the Flor de Mayo, medium size, shiny, with a yellow background and a diffuse dark red mottle and a dark red eye. The latter was mentioned in four places (altitude ranging from 990 m, Lampacitos to 2210 m, El Orito). It seems that this material fell into disuse: in El Orito, it was said about it: "guía poco, carga mucho, tiene unos 40 años aquí, pero ya no se

ve...", and in San Lucas: "...hace mucho tiempo que se perdió..." "¿Cuánto? "...unos 30 años por ahí..." its vanished regional importance could well be reflected by the variants, five of which were identified, but after our inquiries, it was still impossible to name them.

<u>Provisional number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
33	Small parallelepipedic grain with a cream background mottled with vine red and a reddish eye	Refugio de los Cerros Blancos	1760 m
46	Small elliptical grain with a pink background mottled with vine red and rusty stripes and a black eye	La Caballada	1250 m
47	Small parallelepipedic grain with a dark yellow background largely stripped with vine red, no eye	La Caballada	1250 m
91	Medium size elliptical grain with a cream background mottled with vine red, stripped with dark yellow, brownish eye	San Pedro de Rueda	1970 m
111	Medium size elliptical with a cream background mottled/stripped with purplish red	18 de Marzo	1880 m

11. Rebocero: this large grain type was found in 11 different places mainly in the districts of Aramberri (south), Doctor Arroyo and Mier y Noriega. It was equally known as "Rebozo" and in Tapona Moreña as "Cenizo". Its color justifies the names: cream-beige background mottled with grey, sometimes with brownish stripes, and a brownish eye. Late at the higher altitudes (2140 m: Mesa del Traidor), early "tremes" at the lower ones (1020 m: Aramberri). It seems to be a successful variety ("pega más aquí el Rebocero, es de tabla", information in San Elias, 1510 m), well diffused in the trade circuits, probably of recent introduction in the zone

of work ("tiene dos años sembrados aquí": Sandia Grande, 1490 m). Though some variation occurs in the main seed type (as possible consequence of this type of pattern), another seed type was identified by a farmer as Rebocero.

<u>Provisional Number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
37	Medium size ovale grain with a cream background "bimottled" with grey and short black stripes black eye.	Tapona Moreña	1760 m

Probably wrong was the identification of this bean in S. Antonio P. Nevada where it was called "Volador".

12. Mojoso: in our study, it was introduced under this name though it was better known as "Grullo". It is a medium size ovale bean with a solid coffee background slightly veined and without eye, found in 9 different places. Altitudes range from 1330 m (El Salto-Zaragoza) up to 2560 m (La Encantada). We found it in the districts of Zaragoza, Mier y Noriega and Doctor Arroyo. In the latter, precisely at the Mesa del Traidor, it was reported as a native type. There also we were able to separate one variant (67). Once they will be planted, differences in growth habit could occur since it was successively reported as "de guía" in San Pedro de Rueda (1790 m) and as "tremes de mata" in San Francisco de la Mesa (2100 m).

<u>Provisional Number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
67	Medium size ovale bean with a coffee background and a few dark coffee stripes, the eye slightly pronounced	San Pedro de Rueda	1790 m

At this stage, we cannot guarantee the separation as worthwhile, since this pattern is sometimes unstable. Both seem to be "criollos".

13. Bayo\_Gordo: this large grain was more elliptical than the

Bayo Gordo collected in Zacatecas and Durango. The color was about the same: solid cream-beige slightly veined and without eye. It was found or mentioned in seven different places, mainly in the flat lands of Aramberri, Doctor Arroyo and Mier y Noriega. It seems to be preferred at lower altitudes (range: 850 m to 2100 m). We got contradictory information about its origin: it was reported as an ancient variety in San Antonio Peña Nevada (1400 m), it was obtained from the CONASUPO (Compañía Nacional de Subsistencias Populares) in Lampacitos (990 m). No separation of special variants was made. However, one has to mention here the Bayo Rata (in 3 localities), also called Frijol de Ratón (in 1 locality), # 65 about the same size, a little bit more rounded, and grey dotted with the same background. It was said ancient in San Francisco de la Mesa, and was found at higher altitudes (1790 - 2310 m). More data are definitively needed to assert its regional character, but apparently it is not the same grain as the ones found in Durango and Zacatecas under this name.

14. Ojo de Cabra: (See under 3.)

15. Cacahuate Bola: medium size rounded type with a cream background mottled with brick red. It is a marmoratus case. It was found just one time in the district of Aramberri and little known elsewhere. Probably introduced.

16. Pinto Burron: this was the common name of what could well be a mixture of medium size, elliptical grain with a cream background diversely mottled. The secondary color is of various brown tinges, sometimes with a tertiary color (dark brown or black). It was found or mentioned in five different localities of Mier y Noriega and Aramberri (from 1250 up to 1940 m). It was also called "Nuevo Mexico" and "Sardo Americano", indicating some foreign origin. Two variants are related to it.

<u>Provisional Number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
59	Grey mottled with coffee stripes	Sandia Grande	1490 m
117	Brown mottled with coffee dots	San Pedro de Rueda	1790 m

Several of these types were very similar to the pintos found in Zacatecas and Durango during our previous exploration in 1978.

17. Garbancillo: this grain was very close to the well known "Garbancillo", somewhat smaller, but it could be the result of an environmental effect. It was a rounded small to medium size grain with a yellow-orange background, veined, orange-eyed. It was found/known in only 4 places, quite distant from each other, in the districts of Galeana, Aramberri and Mier y Noriega (altitudes range: 1120 m - 1950 m). The pale yellow type was called "Mantequilla" in two places. Apparently it was introduced in the zone of work, since it was never mentioned as a native variety. A more interesting type could be the "Chilacayotillo", a smaller rounded yellow grain, "cargador" mentioned in El Orito (Galeana, 2210 m). But our efforts to get seeds of it were vain. Another related type - but introduced - was the "garbancillo blanco" grown for a couple of years in El Rucio (Aramberri, 1510 m). No variants were separated.

18. Sahuin: several materials (18,33,46) were frequently reported under this name. We preferred to consider as type of sahuin or saguin the solid wine red medium size grain (our provisional number 18). It is oval, a little bit flattened, and definitively distinct from # 33 and # 46 (see them under 10. Canelo). A confusion still exists with our #24 (smaller and more rounded solid wine red grain), called "Kipin" (see below), since this #18 was also known as "Kepin" in Lagunita de Taverna and as "Piquin" in La Encantada (and as Frijol Guiador in Lampacitos). Obviously, the comparison of these two when planted together will clear up this problem. The # 18 Sahuin was found in 5 different places in the districts of Zaragoza, Aramberri, Doctor Arroyo and Mier y Noriega. It was reported as an ancient type in the district of Aramberri, maybe also as a

yielding type (information in Milpillas, 1450 m: "una mata puede dar hasta tres litros"). Altitudes range from 990 m to 2560 m. Other wine red types were seen.

<u>Provisional Number</u>	<u>Seed Description</u>	<u>Place</u>	<u>Altitude</u>
31	larger than # 18, medium size, parallelepipedic & rounded grain it was called "Garambuyo" in Tapona Moreña	Refugio de los Cerros Blancos	1450 m
40	elliptical to egg-shaped maybe somewhat immature, medium size	Tapona Moreña	1760 m
42	small flattened elliptical grain a little bit darker turning to violet	Tapona Moreña	1760 m
51	close to # 42, rounded small La Encantada cylindrical grain, a little bit purple, lighter eye, it was found mixed together with "Grullo" grains		2560 m
56	medium size, parallelepipe- dic and rounded grain, light red background almost completely covered by the wine red	Lampacitos	990 m
57	medium size, cylindrical and narrow rounded grain	Lampacitos	990 m
(These two last numbers # 56 and # 57 were found mixed with "Saguan" # 33 and "Canelo" # 45.)			
98	very close to # 56 a little bit more rounded also with two colors. Found at higher altitude. Please check if it can be merged with 56.	San Pedro de Rueda	1790 m
113	apparently discolored, close to # 40. Found with in # 33 "Saguan guidor". Please check its identity in relation to # 31 and # 40.	Camarones	1030 m

19. Frijol\_Volador: we considered the dominant type in the INIA collection as the starting base for our inquiries: medium size,

kidney-shaped, rounded grain. The pink background is twice mottled with purple (lighter additional background and darker stripes). Apparently, the distribution of this type was restricted to the district of Mier y Noriega. In the two places we found it outside Mier y Noriega, it was reported as originated from the latter: "yo lo compré en Mier y Noriega; tiene ocho años sembrado aquí, antes no había por aquí" (info. in San Elias, 1510 m), where we lost its track. However, in El Salto-Zaragoza (1330 m), a "volador" type was mentioned, but referring it to our number 28 (P. coccineus) about the seed type. Another misleading data was obtained in Mier y Noriega, where we were told about a "Frijol guiator", bayo type with red stripes. More information is necessary to assert its regional importance.

22. Unnamed material: we found it first of all in Lagunita de Taverna (1940 m) without any precise name, then in the three other places, it was called successively "Ojo de Chiva", "Ojo de Cabra" and "Garrapata", with the altitudes ranging from 940 m up to 2210 m! Because of its seed characters (medium size, parallelepipedic to elliptical, rounded grain with beige-pink background, black mottled and -eyed; in some grains large black stripes are present), indeed it could well be confused with either # 3 or # 7. More information is needed facing these contradictory results, even though it is probably introduced.

23. Pinto Americano: this is a well-known - and widely distributed - seed type in northern Mexico, though our check sample was of small seeds (bayo background slightly veined with brownish dots). It was found in 13 different places (alt. 1020 m - 2210 m) in the districts of Galeana, Iturbide, Aramberri, Doctor Arroyo and Mier y Noriega. "Pinto Americano" was the dominant name, but it was also called: Pintito, Pechito de Pato, Californiano, Americano, Borrao and Texano. In several places, it was remitted by the federal authorities in the food distributions, and frequently failed to produce once planted. Definitively introduced and already present in the gene banks.

24. Quipin: we found this small elliptical, rounded, solid wine red, shiny grain in 19 different places of the districts of Galeana (where it was less abundant), Iturbide, Aramberri, Zaragoza, Doctor Arroyo and Mier y Noriega. In 14 different places, it was known as "Quipin" (which can also be written "Kipin"), but it was also named "color rosa" (probably a wrong identification, since our # 66 was certified as "color de rosa"), "chiquito" (too general, but indicative of some difference with # 18), "Piquin", "Rojo" (too general, indicating that we left the area of distribution in Iturbide). The altitudes range from 940 m (Los Cuartitos) up to 2400 m (La Manteca). With the exception of one place in San Francisco de la Mesa, it was everywhere reported as a native bean, apparently, a bush early type (info. La Caballada, 1250 m). No variants were seen.

26. Unnammed material: this small parallelepipedic rounded solid black dull grain was found in only two places: Lagunita de Taverna (1940 m) and Refugio de los Cerros Blancos (1450 m), where it was called unspecifically "Prieto". It was reported as a climbing type in La Cardona (1820 m). In another place in the district of Mier y Noriega, we were told about a "Negro" brought from the Huasteca in Tamaulipas and grown for 50 years in this area. Therefore, it cannot be considered as a native bean in the area of work. No other related types were found.

28. Talayo: this is the only cultivated P. coccineus we found. It was grown/known in 14 different places, mainly in the districts of Mier y Noriega, Doctor Arroyo, Zaragoza, Aramberri (where it was always known as "Talayo"), less in the districts of Iturbide and Galeana (where it was known as "Vaca", "Vacas", and "Sardito Color Rosa"). Large oval grains, though somewhat reduced for this species, cream or violet background, black mottled. An interesting fact was that it was found in temperate dry environments (altitudes ranging from 1400 m up to 2200), sometimes somewhat hot (San Elias, 1510 m). It was grown for its edible seeds but not on a large scale (La Cardona, Boca del Refugio), also sometimes as an ornamental

in Galeana (with Lablab purpureus (L.) Sweet). It is a late type, producing a lot of guides (info. Los Angeles, 1560 m., where it was also named "Patoles", a common name for P. coccineus in Zacatecas). In some places (La Cardona), it was heavily attacked by bruchids. It is not sure whether this is a native bean of the area (especially for the northern part where the linguistic argument was poor), but it was thought of interest to collect it for its adaptation to these environmental conditions.

30. Unnamed material: is it different from our # 43 as it was claimed by a farmer in Sandia Grande (1490 m)? Both look quite similar and were referred as "Manzano". However, our # 30 was also reported as Bayito and Flor de Mayo! Their regional distribution was rather limited: 4 places for # 30, 2 places for # 43. Both are medium size parallelepipedic rounded, shiny grains, of solid dirty pink and some veins, orange eyed. More information is needed to assert their regional importance (up to now just in Mier y Noriega), though they could well be introduced. Altitudes range from 1250 m to 1760 m.

35 & 36. Unnamed materials: both were found just in Tapona Moreña (Mier y Noriega, 1760 m) and were separated from a mixture where the rebocero type was dominant.

<u>Provisional number</u>	<u>Seed Description</u>
35	Medium size cylindrical and shiny grains, with a pale cream background and dots of two types: dark cream and grey. No eye.
36	Medium size elliptical and shiny grains, with a cream pink background, mottled with dark pink and coffee brown. No eye.

38 & 39. Unnamed materials: found only in Tapona Moreña (Mier y Noriega, 1760 m) and separated from the same Rebocero mixture.

<u>Provisional Number</u>	<u>Seed Description</u>
38	Medium size elliptical rounded grain, with a cream-pink background mottled with light and dark grey

<u>Provisional Number</u>	<u>Seed Description</u>
39	medium size parallelepipedic shiny grain, with a grey-coffee brown background mottled with dark brown and black

41. Unnamed material: found only in Tapona Moreña (Mier y Noriega 1760 m), in a mixture where "Manzano" was dominant. Medium size, elliptical, shiny grain, with a purple background with small brownish stripes. No eye.

44. Unnamed material: this small elliptical somewhat flattened dull grain, with a solid dark pink background, slightly veined, was first ground in Tapona Moreña (Mier y Noriega, 1760 m). It was called "Color de Rosa" in Santa Rosa (Iturbide) and Boca del Refugio (Galeana), "Vaina Morada" in La Union (Doctor Arroyo), and probably wrongly "Flor de Mayo" in S. Antonio P. Nevada. In San Pedro de Rueda, a "Color de Rosa" was obtained (# 66), by far larger, more flattened parallelepipedic, with solid pink background, slightly veined. It was said that this # 66 was a late climbing type quite different from the "rosita", a bush early type "tremes". We were unable to ascertain whether our # 44 was this "rosita". Although the # 66 was only found in the region of the Mesa del Traidor (maybe the largest bean producing area in Doctor Arroyo), we got the impression that it was an ancient variety, now out of the market ("ya no tiene plaza", info, in San Pedro de Rueda).

48. Unnamed material: it was just found in El Rucio (Aramberri, 1510 m), within a mixture of "Garapata" beans. A small elliptical shiny grain with a solid dark orange background. No eye, though the hilar region is darker. A type very similar to it was our # 49 found in El Salto (Zaragoza, 1330 m) where it was named "Grullo". During the first seed increase, it will be possible to decide whether it should be merged with # 48 or #12.

50. Unnamed material: this is a quite odd type: small elliptical

shiny grain with a deep purple background, no veins and orange eyed. It was found in only two places: in La Encantada (2560 m) mixed with "Grullo", and in 18 de Marzo (1880 m) mixed with Flor de Mayo. It is distinct from # 84, another dark violet larger elliptical rounded bean, shiny and without eye, which was found mixed with "Piquin" in San Pedro de Rueda (1790 m).

52 & 53. Unnamed materials: both materials were found mixed with "Grullo" in La Encantada (Zaragoza, 2560 m) and apparently were never found afterwards.

<u>Provisional Number</u>	<u>Seed Description</u>
52	medium size parallelepipedic rounded shiny grain with a cream-pink background mottled and stripped with black, black eyed.
53	medium size elliptical rounded shiny grain with a cream background mottled with grey or brown stripped with dark brown, dark brown eyed.

Our # 52 is distinct from # 104 found in San Pedro de Rueda (Doctor Arroyo, 1790 m) by having larger seeds.

54 & 55 Unnamed materials: both numbers were found mixed with "Saguin" and "Canelo" in Lampacitos (Aramberri, 990 m). They were seen again when visiting the Mesa del Traidor in the district of Doctor Arroyo.

<u>Provisional Number</u>	<u>Seed Description</u>
54	medium size narrowly cylindrical and shiny grain, with a solid dirty orange background, slightly veined, no eye.
55	small elliptical and shiny grain, with an orange background slightly stripped with dark cream, no eye.

58. Unnamed material: it has been obtained in Sandia Grande (Aramberri, 1490 m) in a mixture of "manzano" types. A small oval rounded and shiny grain, with a pink background mottled with dark red and stripped with citrine yellow. Dark red eye. Curiously, this pattern is close to "Gloriabamba" a material recently distributed in Peru.

61. Almohadilla: this medium size parallelepipedic rounded and shiny grain, with a solid wine red background and no eye, was remitted to us in El Alamo (Dr. Arroyo, 1720 m) as "Almohadilla". It was found in three other places in the district of Doctor Arroyo in the surroundings of the Mesa del Traidor where it was named "Apetito", "Hormiga", and "Quipin". There was probably some confusion about the two last names. It seemed to be known on a limited scale, and therefore we cannot attest that it originates from southern Nuevo Leon.

62. Hormiga: according to the results of the different interviews, this seems to be the true "hormiga" type, because of its bright solid red color. The medium size grain is elongated, elliptical, with no eye. Again, its distribution was limited to the surroundings of the Mesa del Traidor (altitudes range from 1570 m to 2140 m), and therefore its origin is uncertain. In the sack where this grain was held, we were able to separate the following variants, all from San Pedro de Rueda (Doctor Arroyo, 1790 m).

<u>Provisional Number</u>	<u>Seed Description</u>
68	medium size, elliptical, somewhat flattened, shiny grain, with a pink background and black dots and dashes.
69	medium size, elongated, elliptical, somewhat flattened, shiny grain, with a pink background mottled with dark purple. Black dots and dashes are present as a tertiary color.
70, 71, 72	medium size, elongated, elliptical somewhat flattened shiny grains. The background is of pink color, differently mottled with black. # 71 offers a pattern close to some <u>P. coccineus</u> materials. # 70 and 71 are just slightly dotted with black and maybe could be merged after the first increase and characterization.
73	medium size, elliptical, shiny grain, with a pink background and olive stripes, no eye.
75	large, shiny grain, flattened, elliptical, solid pink color, no eye. Called "guiador" in Cuevas (850 m).

63. Ojo de Liebre: it was found in only four places all around the Mesa del Traidor (2000 m - 2200 m), district of Doctor Arroyo,

where it was unanimously identified as "Ojo de Liebre". It was said to be an ancient type in San Francisco de la Mesa, although, at this stage it is hard to say it is distinct from the well-known "Ojo de Liebre" types from other parts of northern Mexico (Durango, Zacatecas). Medium-size, flattened, elliptical grain, with a cream-pink background mottled with black and olive stripes, black eyed.

64. Huevo de Viejita: it was found in the same places as our # 63, around the Mesa del Traidor (Doctor Arroyo, 2000 m - 2200 m). The grain was named after the aspect of the egg of a small bird. In every place, it was immediately identified with this name; according to some sources in this area, it has been grown for more than 50 years. Medium size, rounded, elliptical, shiny grain, with a bayo background, slightly veined, and some dark yellow dots and dashes. Orange eyed.

74. Unnamed material: we got a few grains of this solid black bean in San Pedro de Rueda (Doctor Arroyo, 1790 m). Large, flattened elliptical and shiny grain. It was mixed with # 62, "Hormiga", and was no longer seen in the next stops during this trip. Most probably introduced through seed mixtures.

76. Unnamed material: obtained from a mixture where # 62, "Hormiga", was dominant, in San Pedro de Rueda (Doctor Arroyo, 1790 m). Medium size, elongated, elliptical, somewhat flattened, shiny grain, with a light cream background, mottled with pink and light purple, no eye. Larger and more elongated than the Flor de Mayo type, also with a more defined pattern.

77. Unnamed material: found in a mixture of Pintos in San Pedro de Rueda (Doctor Arroyo, 1790 m). Found once during our exploration. Quite an odd type: medium size, elliptical, shiny grain, with a cream background mottled with dark brown (but the latter color is "printed" on the background), no eye.

78 & 79. Unnamed materials: these two odd types have been collected only in San Pedro de Rueda, from a mixture of Bayos and Pintos.

Both are elliptical, medium size, rounded and shiny grains with a blue-greenish background. Our # 79 in addition has black stripes and eye. We were thinking that both could be the results of some natural segregation, and therefore unstable combinations of color, when we were told in La Union (Doctor Arroyo, 1570 m) by an aged farmer, about our # 79: "este es coloralmadillo, este frijol es muy viejo". We were unable to reconfirm this statement, nor to get more data about its potential distribution.

80,81,82. Unnamed materials: also collected in San Pedro de Rueda, in mixtures of Bayos and Pintos. Were not found again during this exploration.

<u>Provisional Number</u>	<u>Seed Description</u>
80	medium size, elliptical, rounded, shiny grain, with cream background, mottled with light and dark coffee brown. No eye.
81	large elongated, flattened, elliptical grain, shiny, with a flesh pink background slightly mottled with the same darker color. No eye.
82	elongated medium size, flattened, elliptical and shiny bean, with a cream background slightly speckled with black. No eye.

86,87,88. Unnamed materials: they were separated from a mixture of Ojo de Cabra and Pintos in San Pedro de Rueda. It was the only occurrence of these types.

<u>Provisional Number</u>	<u>Seed Description</u>
86	large, parallelepipedic, flattened, shiny grain, with a cream background, mottled with black in three different ways. No eye.
87	medium size, elliptical, somewhat flattened, shiny bean mottled with grey and striped with black on a cream background. Coffee brown eyed.
88	medium size, elliptical, glossy bean, with a cream-pink background, mottled with dark violet-black, no eye.

90,92,93. Unnamed materials: some light grey odd types, again collected in San Pedro de Rueda from mixtures where Pintos, Grullo,

Flor de Mayo were dominant. Not found again after this stop.

<u>Provisional Number</u>	<u>Seed Description</u>
90	small, oval, flattened, shiny grain, with a light grey-cream background mottled with grey. Some dots and dashes of darker grey are also present. No eye.
92	medium size, elliptical, shiny grain, with a cream background, mottled with light purple-grey, yellow eyed.
93	the same as in # 92, the grain somewhat larger. Moreover, an additional tertiary brown dot is apparent. Yellow eyed.

94 to 97. Unnamed materials: also separated from mixtures in San Pedro de Rueda. No longer seen after this place.

<u>Provisional Number</u>	<u>Seed Description</u>
94	small flattened, elliptical, shiny bean, with a cream background mottled with black in two different ways. No eye. Clearly different from our # 86.
95	small oval rounded and shiny bean, with a bright pink background striped with red. Dark orange-eyed. Similar to but different from our # 50.
96	medium size elliptical and rounded grain. Glossy bean with a cream background mottled with dark brown (distributed in dots and dashes). An additional coffee brown spot is also present among the dashes. Dark brown-eyed.
97	medium size elliptical rounded shiny bean with a grey background mottled with violet. Some small black dots are also present. No eye. The pattern is close to the one of our # 94.

99 to 103. Unnamed materials: another group of beans of unique occurrence, gathered in San Pedro de Rueda (Doctor Arroyo, 1790 m.). At the moment, it is not possible to have a single idea about their regional importance, past or present.

<u>Provisional Number</u>	<u>Seed Description</u>
99	medium size oval rounded glossy grain. The background is of light red mottled with wine red. No eye. Larger than our # 98; the secondary color is different too.
100	small flattened elliptical shiny bean. The background is of pink, veined with darker pink, orange

eyed. Smaller than # 72, and different because of the eye.

101 very small (the size of a weedy type!) elliptical somewhat flattened glossy grain, with a cream-dirty yellow background mottled with grey. Dark purple-eyed.

102 could be the same as our # 41, though a little bit more rounded.

103 small elliptical shiny bean with a bayo background mottled with grey turning blueish towards the hilum with some large coffee brown stripes. No eye.

105,106. Unnamed materials: also found only in San Pedro de Rueda.  
Provisional

<u>Number</u>	<u>Seed Description</u>
105	medium size, oval shiny, somewhat flattened bean, with a fleshy pink background mottled with the same darker color. No eye.
106	medium size, oval, rounded, glossy bean, with a light grey background, mottled with black (dots and stripes). Black-eyed. Distinct from # 104, 22.

108. Garbanzo: this bean has been collected in La Union (Doctor Arroyo, 1570 m) and has been mentioned later on in a few places in the district. It is another grain type which is becoming obsolete, because it is no longer a good commercial type. Medium size, elliptical, rounded grain, fleshy pink slightly veined, orange-eyed.

109. Caña\_Morada: found in La Poza (Galeana, 1620 m) where it was said to have been grown for about 50 years. Medium size, elliptical, rounded shiny grain with a solid bayo background slightly veined, no eye. We were not able to find it in more places.

110. Unnamed material: found mixed with "Caña Morada" in la Poza (Galeana, 1620 m). Medium size, oval, rounded grain with a cream bayo background dotted with black, black-eyed. Seen in only one place.

114. Unnamed material: collected in Tapona Moreña (Mier y Noriega,

1760 m). Large, elongated, elliptical, shiny grain, with a light cream background mottled with wine red, no eye. Found with a single occurrence.

B. Agronomical data.

In the area of work, beans are generally planted according to the rainfall distribution: plantings around April, harvest in November-December according to the varieties. When the rainfalls are delayed, the plantings are accordingly delayed (in July-August). Therefore, in some locations, there was a constant interest for early types "tremes", so the success of types such as "Ojo de Cabra", "Rebocero", etc, and also the poor interest for P. coccineus "Talayo". In some valleys, as in the district of Aramberri, two growing periods are possible: during the spring period from March to July and during the summer period from August to November; of course, good use can be made of them by planting early types. Another element is that in some valleys, some irrigation can be made thanks to some rare permanent waters or more frequently to irregular washes. In this case, the varieties are bush types (types I, III according to CIAT's classification) planted alone or mixed with squashes. Agronomical practices are highly variable: 0.50 m - 1 m between the rows; 0.30 m - 1 m within the row, with 0-2 weed cleanings.

The other important cropping system is the maize-bean association for the flat highlands in the "temporal" agricultural system. Because of the highly variable regime in pluviometry, this is a risky system giving good yields only every three years. The materials are generally planted in March as to be harvested in December. The varieties are climbing "de guía" types 3 and 4, planted in the proportion of 1/5 with maize, as to lessen the risk of lodging. Planting distances can be as aforesaid expressed or higher, especially when the availability of water is restricted. In several places, weeds were important competitors.

Although more detailed information will come through the characterization work, some preliminary classification of growth habits was possible (see table in Annex 4).

Yields were highly variable (from 400 kg up to 1600 kg/ha) because of several factors very often interacting all together: poor densities, insufficient water when needed, frost, hail, incidence of pests and diseases. Among these, one can cite:

Pests: white fly ("palomita blanca"), mexican bean beetle ("conchuela", "alborego", "borreguito"), bruchids ("gorgojos"), locust ("chapulin"), chrysomelids ("periquillo", "vaquita", "venadilla"), leafhopper, bean pod weevil ("picudo", "picudo del ejote"), whitegrubs ("gallinaciega") , stalk borer ("gusano", "gusano barrenador de tallo"), leaf miners ("minadores"), aphids ("pulgones"), thrips.

Diseases: BCMV, root rot, rust, bacterial blight, powdery mildew.

A very limiting factor was the heavy incidence of bruchids for long term seed conservation, especially below 1800 m.a.s.l. Traditional methods at the farmer level were: drying the seeds in the sun, washing the seeds with hot water, treating them with malathion.

## 2. Wild species

A total of 27 populations of wild species were sampled. For three populations (# 1502, 1506 and 1507)\* collected in the vegetative stage, it was still too early as to give them the proper identification. Two other populations (#1523 and 1525) are belonging to a new Phaseolus species unknown to the writer, but obviously related to P. neglectus. The materials are listed in Annex 5. The places of collection are mapped in Annex 3. For each of them, a collection form was filled as shown in Annex 6. Herbarium samples and seed samples when available were distributed between the three participating institutions.

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\* The populations of wild species were registered with their Herbarium number. These numbers follow a chronological sequence through the different collections sponsored by IBPGR.

7. Conclusions

A total of 141 samples were studied and collected, distributed as follows:

Cultivated species:

<u>Phaseolus vulgaris</u>	113
<u>P. coccineus</u>	<u>1</u>
Subtotal:	114

Wild species:

<u>P. anisotrichus</u>	8
<u>P. glaucocarpus</u>	1
<u>P. neglectus</u>	5
<u>P. scabrellus</u>	3
<u>P. xanthotrichus</u>	4
<u>P. sp. (new species)</u>	2
<u>P. sp. (unidentified, too early!, as herbaria)</u>	<u>4</u>
Subtotal:	27
TOTAL:	141

For the cultivated P. vulgaris, after making interviews with the farmers in more than 40 different places (1-3 interviews per place) and  $113 \times (113-1)/2 = 6,328$  comparisons during and after the collection work, it was possible to divide the collected materials into three groups: native varieties, commercial type, odd types. The first group will include all the materials which would have been grown for the last 30-50 years in the area of work on the base of farmers memories and of contradictory interviews. The second group will include genetic material obviously introduced in the zone through seed sellings, gifts/loans from federal agencies, etc. The third group is the one of poorly known types (and therefore insufficiently documented), the majority of them without any commercial value at present.

1. The native varieties of P. vulgaris: after the work carried out by INIA in 1979 (Ing. J. Muruaga M.) and the present one, it is more possible to draw up a list of the 7 native varieties of southern Nuevo Leon. It will include: Guadalupano, Chiquito, Garrapata, Canelo (at least one variant), Mojoso or Grullo, Sahuin (also called Saguin), Quipin (also called Kepin or Piquin). More information is needed in relation to: Frijol Volador, Color de Rosa, Hormiga, Almohadilla, Huevo de Viejita, Caña Morada, Color-almadillo. We were unable to find seeds and more data about: Quipin Amarillo, Chilacayotillo pequeño.
2. The commercial types: the success of those varieties is not only due to their attractive grain type, but certainly linked to qualities such as earliness, drought tolerance, and maybe for some of them tolerance to salinity. One can list here: Flor de Mayo, Cacahuate, Ojo de Cabra (though some of them could be only of regional importance and maybe origin), Baboso, Rebocero, Bayo Gordo, Pinto Burron, Cacahuate Bola, Garbancillo, Pinto Americano. The total will be about 15 materials including some of lesser frequency (such as Bayo Rata).
3. The odd types: why did we find so many (more than 70 of a total of 113 collected P. vulgaris) odd types? The fact that some of them receive a special name, were said to be grown for years, would discard our first hypothesis (i.e. segregating materials resulting from natural crosses) and would present another one. These odd types would be true cultivated materials and for some of them native varieties, either coming from other parts of northern Mexico or having been selected in Nuevo Leon and becoming obsolete. The two possibilities are probably partly correct depending on the material. In this way, we just began to explore the relationships between our area of work and other adjacent Mexican States (Tamaulipas, Zacatecas), and on the other hand to gather some data about the antiquity of each type before they will be definitively out of the folk memory.

4. The presence of a fully cultivated P. coccineus in that ecological zone was rather surprizing. Of course there is probably no longer link with the wild P. coccineus material found by Kaplan & McNeish (1960) in Tamaulipas because of the geographic distance. We were looking for wild P. coccineus in the sectors of higher altitudes, Cerros El Potosi and Peña Nevada (the latter on its eastern flank!) without finding it.
5. The absence of P. acutifolius: this species was looked for in both cultivated and wild status, and was not found. From previous explorations and reports, we knew that it was distributed as wild in central Durango and Chihuahua. Maybe Nuevo Leon is too far eastwards and the limit will be located between these two. The same could be said for P. metcalfei which was not found during this exploration.
6. The distribution of P. anisotrichus: it was interesting to find this species in that part of the country, since we lack of data about the distribution of this common wild species northeastwards. Also of interest was to find it at lower altitudes (700-1000 m.a.s.l.).
7. The presence of P. glaucocarpus: reported from Central Mexico (Morelos), it was found for the first time in the northeast part of the country. This collection opens a new horizon of collection sites to be investigated in: San Luis Potosi, Queretaro, Hidalgo and Mexico.
8. The presence of P. neglectus: in addition to the type found in Montemorelos, we were able to know more about the range of distribution of this species along the Sierra Madre.
9. The difficult taxa: two groups of difficult materials were found during this exploration: one was referred as P. scabrellus and whatever will be the definitive name of it, it will belong to the P. pedicellatus section. The other, which was thought initially

to be close to pedicellatus, is a new species unknown to the writer. Having viable seeds at disposal will help to solve these problems soon.

10. The presence of P. xanthotrichus: it was not expected to find this taxon, reported mainly from Guatemala and Costa Rica, so far north in the Mesoamerican Center. For that reason, Dr. A. Delgado Salinas defined a new variety: zimapanensis. This will also illustrate the fact that surprizing results can still be obtained when collecting in the Mesoamerican Center.

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- Centro Internacional de Agricultura Tropical, Cali, Colombia, Dr. J. L. Nickel.

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ANNEX 1. Collection carried out by INIA in Nuevo Leon in 1979.

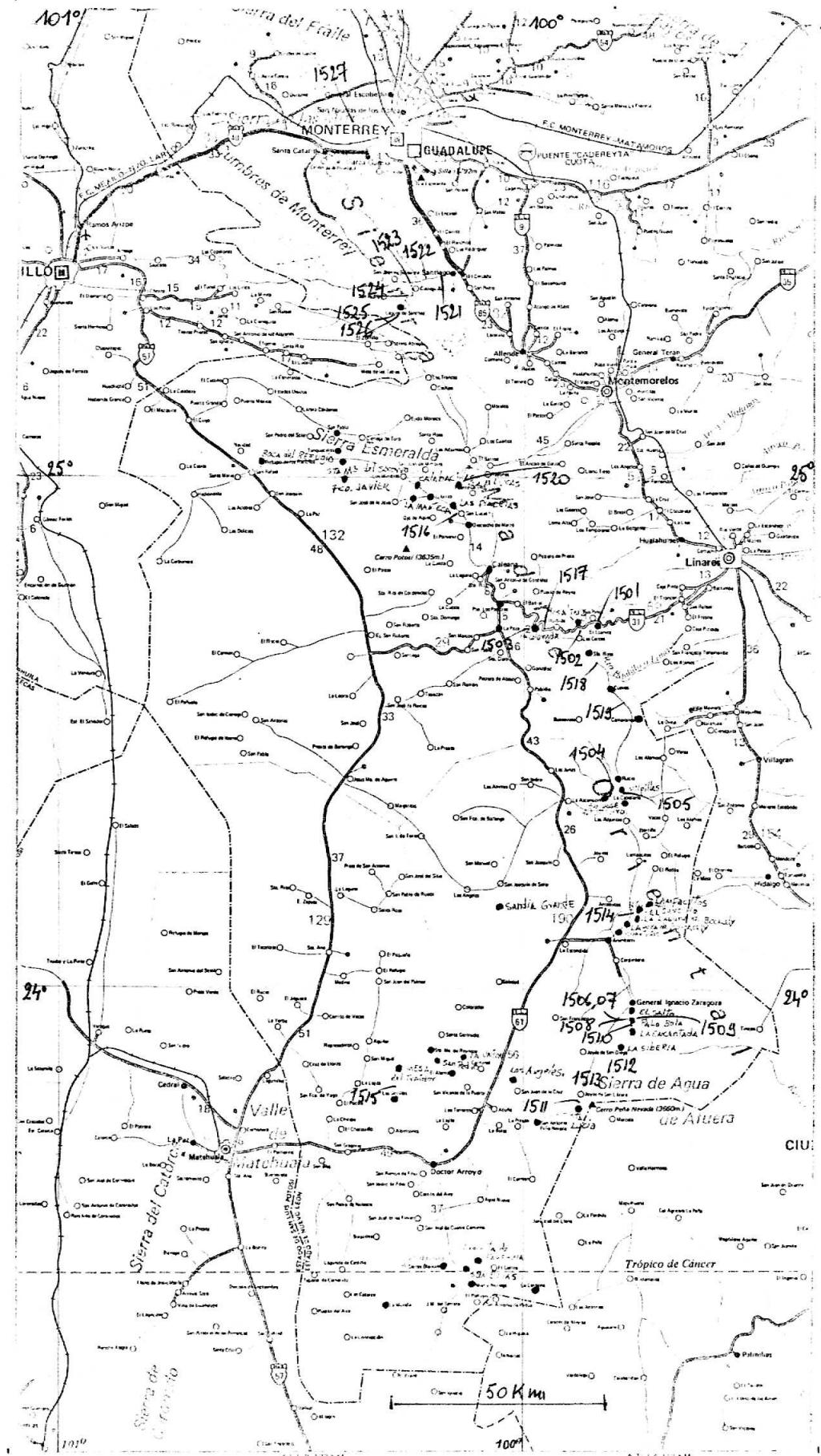
<u>INIA No.</u>	<u>Colector</u>	<u>Local Identif.</u>	<u>Local name</u>	<u>Place of collection</u>
5094	JSMM & al 1	NL-3	Saguan Rojo	Aramberri, Km 7 Car. Aramberri
5095	JSMM & al 1	NL-3	Bayo con Pintas	Aramberri, Km 7 Car. Aramberri
5096	JSMM & al 1	NL-3	Ojo de Cabra	Aramberri, Km 7 Car. Aramberri
5097	JSMM & at 1	NL-3	Pinto	Aramberri, Km 7 Car. Aramberri
5098	JSMM & al 1	NL-3	Negro opaco	Aramberri, Km 7 Car. Aramberri
5099	JSMM & al 1	NL-3	Bayo pequeño	Aramberri, Km 7 Car. Aramberri
5100	JSMM & al 1	NL-3	Jaspeado	Aramberri, Km 7 Car. Aramberri
5101	JSMM & al 1	NL-3	Negro brillante	Aramberri, Km 7 Car. Aramberri
5102	JSMM & al 1	NL-3	Frijol café	Aramberri, Km 7 Car. Aramberri
5103	JSMM & al 1	NL-4	Flor de Mayo	Aramberri Ej. El Porvenir
5104	JSMM & al 1	NL-5	Manzano	Aramberri Ej. El Porvenir
5105	JSMM & al 1	NL-6	Chiquito	Aramberri Ej. Lampasitos
5106	JSMM & al 1	NL-7	Negrito	Aramberri Ej. Lampasitos
5107	JSMM & al 1	NL-7	Negro Opaco	Aramberri Ej. Lampasitos
5108	JSMM & al 1	NL-8	Rebocero	Doctor Arroyo Ej. El Jarro
5109	JSMM & al 1	NL-8	Ojo de Liebre	Doctor Arroyo Ej. El Jarro
5110	JSMM & al 1	NL-8	Ojo de Cabra	Doctor Arroyo Ej. El Jarro
5111	JSMM & al 1	NL-9	Guadalupano	Doctor Arroyo Ej. El Jarro
5112	JSMM & al 1	NL-9	Cacahuate	Doctor Arroyo Ej. El Jarro
5113	JSMM & al 1	NL-10	Flor de Mayo	Doctor Arroyo Ej. El Jarro
5114	JSMM & al 1	NL-10	Blanco	Dcotro Arroyo Ej. El Jarro
5115	JSMM & al 1	NL-11	Pinto Americano	Galeana Ej. San Rafael

ANNEX 2. List of the Bean Accessions held in INIA-URG at Chapingo as of Sept. 1982, for the States of Coahuila, Nuevo Leon (to which the ones in Annex 1 must be added) and Tamaulipas.

<u>INIA No.</u>	<u>Collector</u>	<u>Local Identif.</u>	<u>Local Name</u>	<u>Place of Collection</u>
887	-	COAH-2	Bayo	Torreón, Torreón
888	-	COAH-4	Canelo	Torreón, Torreón
1011	EHX	COAH-1	Peruano	Arteaga, Arteaga
1012	-	COAH-5	Canelo	Viesca, Km 206 Salt-Torr
1013	-	COAH-6	Garbancillo	Saltillo
1014	-	COAH-7	Negro	Saltillo
1015	-	COAH-8	Garbancillo	Torreón Durango Km 150
1016	-	COAH-9	Garbancillo	Torreón Durango Km 100
1017	-	COAH-10	Ojo de Liebre	Torreón, Torreón
1018	-	COAH-11	Garbancillo	Torreón, Torreón
1019	-	COAH-12	Blanco Grande	Saltillo, Piedras negras
1020	-	COAH-13	Bayo Rata	Rancho Mi Sueño
1021	-	COAH-14	Garbancillo	Saltillo, Salt-Torr Km 10
1022	-	COAH-15	Bayo Rata	Saltillo
1023	-	COAH-16	Amarillo	Torreón, San Pedro Torreón
1024	-	COAH-17	Canario	Saltillo
2508	OEE 305	COAH-305	Bayo Rata	-
2523	OEE 312	COAH-312	Colorado	-
2532	OEE 321	COAH-321	-	-
2533	OEE 323	COAH-323	Mantequilla	-
2816	OEE 329	COAH-329	Rojo Chiquito	-
2817	OEE 309	COAH-309	Bolita Negro	-
2818	OEE 315	COAH-315	-	-
2819	OEE 327	COAH-327	Ojo de Pato	-
2820	OEE 86	COAH-86	Pinto	Acuna, Acuna
2821	OEE 304	COAH-304	Bayo Rata	-
2822	OEE 324	COAH-324	Ojo de Liebre	-
2823	OEE 311	COAH-311	Canelo	-
2824	OEE 302	COAH-302	Arteaga Peru	-
2825	OEE 341	COAH-341	-	-

ANNEX 2. (continuation)

<u>INIA No.</u>	<u>Collector</u>	<u>Local Identif.</u>	<u>Local Name</u>	<u>Place of Collection</u>
2826	OEE 609	COAH-609	-	-
2827	OEE 342	COAH-342	-	-
2828	OEE 317	COAH-317	-	-
2829	OEE 611	COAH-611	-	-
2830	OEE 313	COAH-313	-	-
2831	OEE 330	COAH-330	-	-
2832	OEE 342	COAH-342	-	-
2833	OEE 314	COAH-314	-	-
2834	OEE 610	COAH-610	-	-
2835	OEE 612	COAH-612	-	-
3218	-	NL-93	Tres Colores	Higueras, Higueras
3219	-	NL-39	Rosita Cadereyta	Cadereyta Jimenez (2x)
2597	-	TAMP-1	Blanco	Cd. Victoria, Sta. Cruz
2598	-	TAMP-1	Blanco	Cd. Victoria, Sta. Cruz
2599	-	TAMP-2	Negro	Rcho. La Nueva Reforma
2600	-	TAMP-3	Negro	Cd. Monte, Cd. Monte
2601	-	TAMP-6	Aluvia Chica	Tampico, Tampico
2602	-	TAMP-7	Pinto	Cd. Monte, Cd. Monte
2603	-	TAMP-8	Ejote	Cd. Monte
2604	-	TAMP-9A	Bayo Chiquito	Cd. Victoria
2605	-	TAMP-9B	Bayo Chiquito	Cd. Victoria
2606	-	TAMP-9C	Bayo Chiquito	Cd. Victoria
2607	-	TAMP-10	Negro	Cd. Victoria
3220	-	TAMP-687	-	Matamoros, Matamoros
5091	JSMM & al 1	TAMP-12	Huasteco	Tula, Ej. Gallos Grandes
5092	JSMM & al 1	TAMP-13	Frijol chiquito	Tula, Ej. Gallos Grandes
5093	JSMM & al 1	TAMP 14	-	Gomes Farias (2x)



Annex 3 : the area of work in Nuevo Leon, Mexico.

ANNEX 4. Growth Habit of Some Collected Varieties

<u>Provisional Number</u>	<u>Vernacular Name</u>	<u>Bush type ("de mata","de tabla")</u>	<u>Climbing type ("de guía")</u>
1	Guadalupano	X	
2	Cacahuate	X	
4	Flor de Mayo	X	
6	Chiquito	X	
7	Garrapata		X
9	Baboso	X	
11	Rebocero	X	
12	Grullo	X	
14	Ojo de Cabra	X	
16	Pinto Burrón	X	
18	Sahuin		X
19	Volador		X
21	Amarillo		X
24	Kipin	X	
28	Talayo		X
43	Manzano	X	
61	Almohadilla, Apetito		X
62	Hormiga		X
66	Color de Rosa		X

ANNEX 5. List of the Wild Species Collected During the Exploration

<u>Collection Number</u>	<u>Site (altitude,longitude,latitude)</u>		<u>Remarks</u>
<u><i>Phaseolus anisotrichus</i> Schlect.</u>			
1501	720 m	99°50'W	24&45'N
1505	1360 m	99°47'W	24°20'N
1514	1120 m	99°43'W	24°13'N
1518	1500 m	99°50'W	24°40'N
1519	1010 m	99°46'W	24°46'N
1521	1120 m	100°11'W	25°21'N
1524	1510 m	100°19'W	25°23'N
1526	1850 m	100°15'W	25°20'N
<u><i>Phaseolus glaucocarpus</i> Norvell</u>			
1509	1960 m	99°47'W	23°57'N
<u><i>Phaseolus neglectus</i> Hermann</u>			
1510	2060 m	99°47'W	23°56'N
1517	1650 m	99°56'W	24°44'N
1520	1860 m	100°11'W	24°56'N
1522	1380 m	100°12'W	25°22'N
1527	1040 m	100°36'W	25°50'N
<u><i>Phaseolus scabrellus</i> Benth.</u>			
1508	1960 m	99°47'W	23°57'N
1512	2550 m	99°49'W	23°50'N
1516	2140 m	100°11'W	24°54'N
<u><i>Phaseolus</i> sp. (related to <u>P. neglectus</u>)</u>			
1523	1460 m	100°12'W	25°22'N
1525	1850 m	100°15'W	25°20'N
			Presence of powdery mildew and spider mites

ANNEX 5. (continued)

<u>Collection</u>	<u>Number</u>	<u>Site (altitude,longitude, latitude)</u>	<u>Remarks</u>
<u>Phaseolus xanthothrichus</u> Piper			
	1504	1780 m      99°49'W      24°22'N	
	1511	1910 m      99°49'W      23°47'N	Presence of angular leaf spot
	1513	2080 m      99°54'W      28°48'N	Presence of ALS and bean pod weevil
	1515	2000 m      100°15'W      23°46'N	



Unidad de Recursos Genéticos / IBPGR

# FORMATO PARA RECOLECCION - FRIJOL *Carijolmochus*

COLECTOR: RESERVARLO:

1. NÚ STOCK: 2. NOMBRE Y NÚMERO DEL

3. INSTITUCIÓN

4. LUGAR DEL PRIMER DEPOSITO

5.

ESPECIE: 6. NOMBRE "LOCAL":

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80  
1501 DGDMRCSRTMA CUCI MEX, MARIN, UAML, ANIS DESCONOCIDO

LUKER DE RECOLECCION:

8. 9.

CIRFUANL  
CIAT INIA

NÚ STOCK PAÍS ESTADO: 10. DISTRITO:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80  
MEX, ENVOL LINARES LIM ITURBI IDE

11. SITIO:

12. PROXIMO PUEBLO:

3 ITJO

13. DISTANCIA AL PUEBLO: KM.  
14. TIPO DE CARRETERA:  
N S O E  
1 = SI 2 = NO  
DE LA CARRETERA

15. FECHA 16. ALT 17. LONGITUD: 18. LATITUD:

(DIA/MES/AÑO) ALTUD: M GRADOS MIN 0/2 GRAD MIN N/S

16.09.85 720 93°50'00" 24°45'N 6°34'51" 11501-1-2-2-2-1

19. TOPOGRAFIA:

20. EXPOSICION:

1 = SI 2 = NO  
1 = N 2 = S  
3 = E 4 = O  
5 = NE 6 = SO  
7 = SE 8 = NO  
9 = NO 10 = SO  
11 = SE 12 = NE  
13 = NO 14 = SO  
15 = SE 16 = NE  
17 = NO 18 = SO  
19 = SE 20 = NE  
21 = NO 22 = SO  
23 = SE 24 = NE  
25 = NO 26 = SO  
27 = SE 28 = NE  
29 = NO 30 = SO  
31 = SE 32 = NE  
33 = NO 34 = SO  
35 = SE 36 = NE  
37 = NO 38 = SO  
39 = SE 40 = NE  
41 = NO 42 = SO  
43 = SE 44 = NE  
45 = NO 46 = SO  
47 = SE 48 = NE  
49 = NO 50 = SO  
51 = SE 52 = NE  
53 = NO 54 = SO  
55 = SE 56 = NE  
57 = NO 58 = SO  
59 = SE 60 = NE  
61 = NO 62 = SO  
63 = SE 64 = NE  
65 = NO 66 = SO  
67 = SE 68 = NE  
69 = NO 70 = SO  
71 = SE 72 = NE  
73 = NO 74 = SO  
75 = SE 76 = NE  
77 = NO 78 = SO  
79 = SE 80 = NE

1 = SI 2 = NO  
1 = N 2 = S  
3 = E 4 = O  
5 = NE 6 = SO  
7 = SE 8 = NO  
9 = NO 10 = SO  
11 = SE 12 = NE  
13 = NO 14 = SO  
15 = SE 16 = NE  
17 = NO 18 = SO  
19 = SE 20 = NE  
21 = NO 22 = SO  
23 = SE 24 = NE  
25 = NO 26 = SO  
27 = SE 28 = NE  
29 = NO 30 = SO  
31 = SE 32 = NE  
33 = NO 34 = SO  
35 = SE 36 = NE  
37 = NO 38 = SO  
39 = SE 40 = NE  
41 = NO 42 = SO  
43 = SE 44 = NE  
45 = NO 46 = SO  
47 = SE 48 = NE  
49 = NO 50 = SO  
51 = SE 52 = NE  
53 = NO 54 = SO  
55 = SE 56 = NE  
57 = NO 58 = SO  
59 = SE 60 = NE  
61 = NO 62 = SO  
63 = SE 64 = NE  
65 = NO 66 = SO  
67 = SE 68 = NE  
69 = NO 70 = SO  
71 = SE 72 = NE  
73 = NO 74 = SO  
75 = SE 76 = NE  
77 = NO 78 = SO  
79 = SE 80 = NE

1 = SI 2 = NO  
1 = N 2 = S  
3 = E 4 = O  
5 = NE 6 = SO  
7 = SE 8 = NO  
9 = NO 10 = SO  
11 = SE 12 = NE  
13 = NO 14 = SO  
15 = SE 16 = NE  
17 = NO 18 = SO  
19 = SE 20 = NE  
21 = NO 22 = SO  
23 = SE 24 = NE  
25 = NO 26 = SO  
27 = SE 28 = NE  
29 = NO 30 = SO  
31 = SE 32 = NE  
33 = NO 34 = SO  
35 = SE 36 = NE  
37 = NO 38 = SO  
39 = SE 40 = NE  
41 = NO 42 = SO  
43 = SE 44 = NE  
45 = NO 46 = SO  
47 = SE 48 = NE  
49 = NO 50 = SO  
51 = SE 52 = NE  
53 = NO 54 = SO  
55 = SE 56 = NE  
57 = NO 58 = SO  
59 = SE 60 = NE  
61 = NO 62 = SO  
63 = SE 64 = NE  
65 = NO 66 = SO  
67 = SE 68 = NE  
69 = NO 70 = SO  
71 = SE 72 = NE  
73 = NO 74 = SO  
75 = SE 76 = NE  
77 = NO 78 = SO  
79 = SE 80 = NE

## DATOS AGRONOMICOS:

NÚ STOCK 31. MUESTREO:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80  
72 55

32. PRODUCTIVIDAD:

33. DENSIDAD:

34. Fisiología al Encuentro:

35. SISTEMAS DE PRODUCCIÓN:

36. TIPO DE:

37. FERTILIZANTE:

38. INSECTICIDA:

39. FUNGICIDA:

40. DESHIERBA:

41. HABITATO DE CRECIMIENTO:

42. ENFERMEDADES:

43. PLAGAS:

NÚ STOCK 44. USO:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80  
ALT 7140

46. RAZONES POR COLECTAR:

47. NOTAS ADICIONALES:

## Códigos para ENFERMEDADES y PLAGAS:

48. ENFERMEDADES:

Fungos: ALS, ALI, ASC, ANT, BOT, BHN, CCH,  
DAD, EAT, HAC, PHV, R, RA, UBD, UHN.  
Bacterias: BBDS, BU, HBL.  
Virus: ACNV, OCTAV, PCMV, BMV, BSMV,  
BSOV, BYMV, CTV, CTV.

49. PLAGAS:

APH, APH, BNU, ERI, EMP, HEL, HYL,  
MAR, MBD, MFT, MCN, THR, WFL.

47. NOTAS ADICIONALES:

se extiende entre 640 y 810 m en estacion  
bosque Claro y Encino y Pino en la  
parte alta. Requiere sol, lejano  
agua, sombra y microclima con alto  
humedad cerca alrededor.  
Sobre roquerios. Presencia de minadores  
de hoja.

50. HABITATO DE CRECIMIENTO:

1 = Determinado arbustivo

2 = Indeterminado arbustivo

3 = Indeterminado pastoreo

4 = Indeterminado frutal

5 = Silvestre, bajo

6 = Silvestre, mediano

7 = Silvestre, alto

8 = Determinado

9 = En floración

10 = En floración

7. TIPO DE MATERIAL:

- 1 = Cultivo crudo
- 2 = Cultivo maduro
- 3 = Excepcional
- 4 = Silvestre

11. TIPO:

- 1 = Planta
- 2 = Raíz
- 3 = Planta
- 4 = Fruto
- 5 = Hoja
- 6 = Flores

12. EXPOSICION:

- 1 = En el sol
- 2 = En la sombra
- 3 = Intermedia

13. TECTURA DEL SUELTO:

- 1 = Arenoso
- 2 = Organico
- 2 = Franco
- 3 = Pardojoso
- 3 = Arcilloso
- 4 = Diferente

14. DENSIDAD:

- 1 = Normal
- 2 = Fino
- 3 = Excesivo

15. SALINIDAD EN EL SUELO:

- 1 = Ausencia
- 2 = Presencia
- 3 = Declarada

16. PROFUNDIDAD:

- 1 = Cero
- 2 = Altura

17. PROFUNDIDAD:

- 1 = Cero
- 2 = Altura

18. PROFUNDIDAD:

- 1 = Cero
- 2 = Altura

19. PRODUCTIVIDAD:

- 1 = Cultivo, < 100 kg/ha
- 2 = Cultivo, 100-200 kg/ha
- 3 = Cultivo, 200-300 kg/ha
- 4 = Cultivo, > 300 kg/ha

20. PRODUCTIVIDAD:

- 1 = Baja
- 2 = Media
- 3 = Alta

21. PRODUCTIVIDAD:

- 1 = Cultivo, < 100 kg/ha
- 2 = Cultivo, 100-200 kg/ha
- 3 = Cultivo, 200-300 kg/ha
- 4 = Cultivo, > 300 kg/ha

22. PRODUCTIVIDAD:

- 1 = Baja
- 2 = Media
- 3 = Alta

23. PRODUCTIVIDAD:

- 1 = Cultivo, < 100 kg/ha
- 2 = Cultivo, 100-200 kg/ha
- 3 = Cultivo, 200-300 kg/ha
- 4 = Cultivo, > 300 kg/ha

24. PRODUCTIVIDAD:

- 1 = Baja
- 2 = Media
- 3 = Alta

25. SISTEMA DE PRODUCCION:

- 1 = Monocultivo
- 2 = Mixto
- 3 = Asociado con maiz
- 4 = Asociado con otra

26. DESHIERBA:

- 1 = Poco
- 2 = Regular
- 3 = Buena

27. DESHIERBA:

- 1 = Poco
- 2 = Regular
- 3 = Buena

28. DESHIERBA:

- 1 = Poco
- 2 = Regular
- 3 = Buena

29. DESHIERBA:

- 1 = Poco
- 2 = Regular
- 3 = Buena

30. CANTIDAD:

- 1 = Poco
- 2 = Regular
- 3 = Buena