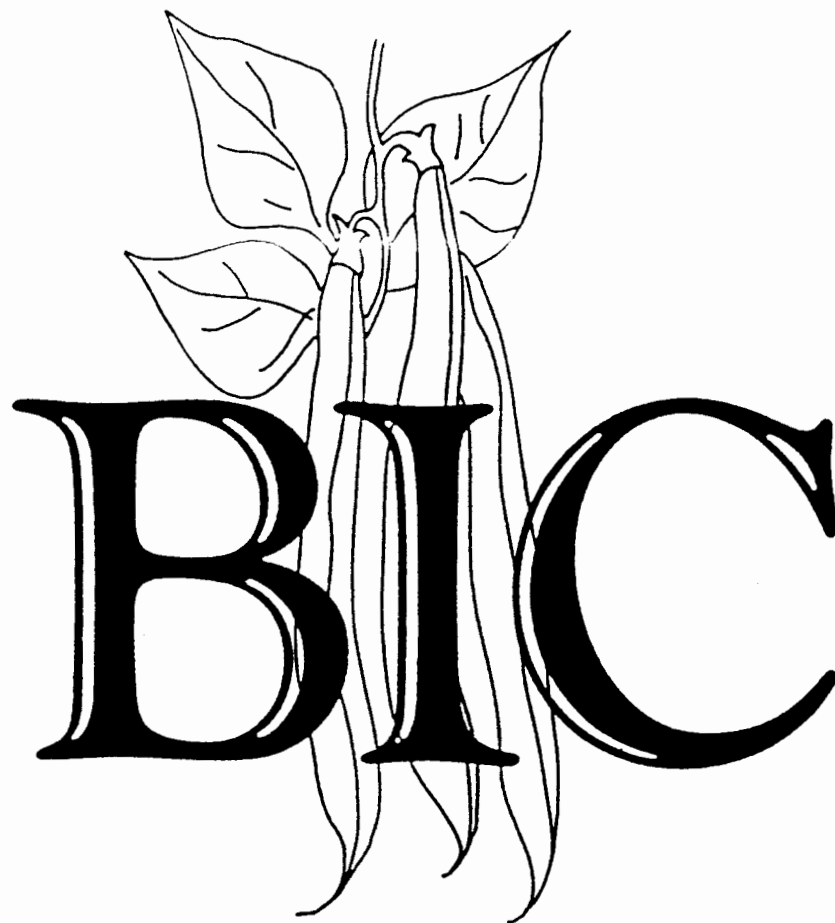


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# MORPHOLOGICAL AND AGRONOMICAL VARIABILITY IN GANXET COMMON BEAN (*PHASEOLUS VULGARIS* L.), AN ECOTYPE FROM CATALONIA (NE OF SPAIN)

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## INTRODUCTION

In the NE of the Iberian Peninsula a large majority of traditional cultivars have been replaced by more modern crops, economically more viable, meaning that a great deal of the native germplasm is no longer cultivated. Nevertheless, within this typical panorama of today's agriculture, a few traditional ecotypes of the region continue to subsist because, despite their poor productivity, they are appreciated at local tables.

One of these traditional varieties which continues to be cultivated and which enjoys considerable popularity is the Ganxet common bean. Of indeterminate growth, the white seeds show a strong kidney shape (in the Catalan language "ganxet" means little hook).

In an effort to preserve a representative part of the genetic wealth of the ecotype, 46 accessions of the variety commercialized under the denomination Ganxet were collected from farmers distributed throughout the growing area. In order to study their morphological and agronomical variability, these were sown in a comparison trial at two different locations in four blocks per locality with control of the traits as indicated in Table 1.

## RESULTS AND DISCUSSION

Accessions displayed notable differences in terms of hook degree (between 0.7 and 2.8; Table 1), a trait which is considered emblematic in the Ganxet ecotype. Accessions with hook degree 1 or lower were considered non-Ganxet, though they were sold under this denomination to take advantage of the high price demanded for these beans. The other traits also showed significant and important differences (Table 1), in particular yield which varied between 1090 and 1750 g/plot; number of seeds/pod between 3.7 and 5.7; and weight of 100 seeds between 37 and 62 g.

High production levels were associated with a large number of seeds per pod and seeds smaller in size as reported by Singh (1991), and low hook degree (Table 1). The negative correlations between number of seeds/pod, number of pods/plant and 100 seed weight indicated by Ranali et al. (1991) were fulfilled only for seeds/pod and 100 seed weight. We concluded that, in this material, the most hooked beans were characterized by low production levels from pods with fewer, medium-sized seeds (Table 1).

The multivariate analysis showed that the first canonic axis explains 67% of the variation, while the first plus second axis explain 84% of the total variation. The addition of a third axis increases this to 88%. The traits which best correlated to the first axis were: hook degree ( $r=0.97$ ), number of seeds per pod ( $r=-0.60$ ), yield ( $r=-0.45$ ) and 100 seed weight ( $r=0.41$ ). For the second axis they were: 100 seed weight ( $r=0.82$ ) and seeds/pod ( $r=-0.27$ ). For the third axis they were: pod length ( $r=0.84$ ), % of seeds attacked by fungi ( $r=0.37$ ) and yield ( $r=-0.31$ ).

From the cluster analysis and subsequent dendrogramme (Figure 1) four main groups can be distinguished with a minimum distance between cluster centroids of 0.5: **Group A**, characterized by medium to low hook degree, few seeds per pod and large seeds. **Group B**, characterized by high to very high hook degree, few seeds per pod and medium seeds. **Group C**, characterized by medium hook degree, many seeds/pod and medium seeds. **Group D**, characterized by low to very low hook degree, many seeds/pod and small seeds.

The impression given by the results as a whole and the noticeable internal heterogeneity observed in many of the accessions in terms of hook degree suggest the existence of an ancient, highly hooked ecotype. The present accessions which most closely correspond to this typology would be 3, 4, 55, 40, 36, 46, 45 and 50. These accessions are largely uniform with seeds strongly hooked (values between 2.1 and 2.8), flattened and of medium size (100 seeds weight between 46.1 and 51.3 g). In addition, this is a low-yielding material with few seeds per pod (between 3.7 and 4.4). With this Ganxet germplasm, successive waves of other germplasm will have become intermixed over the years.

**Table 1.-** Mean trait values for each accession considering the two locations.  
lsd = least significant difference  $p \leq 0.05$ .

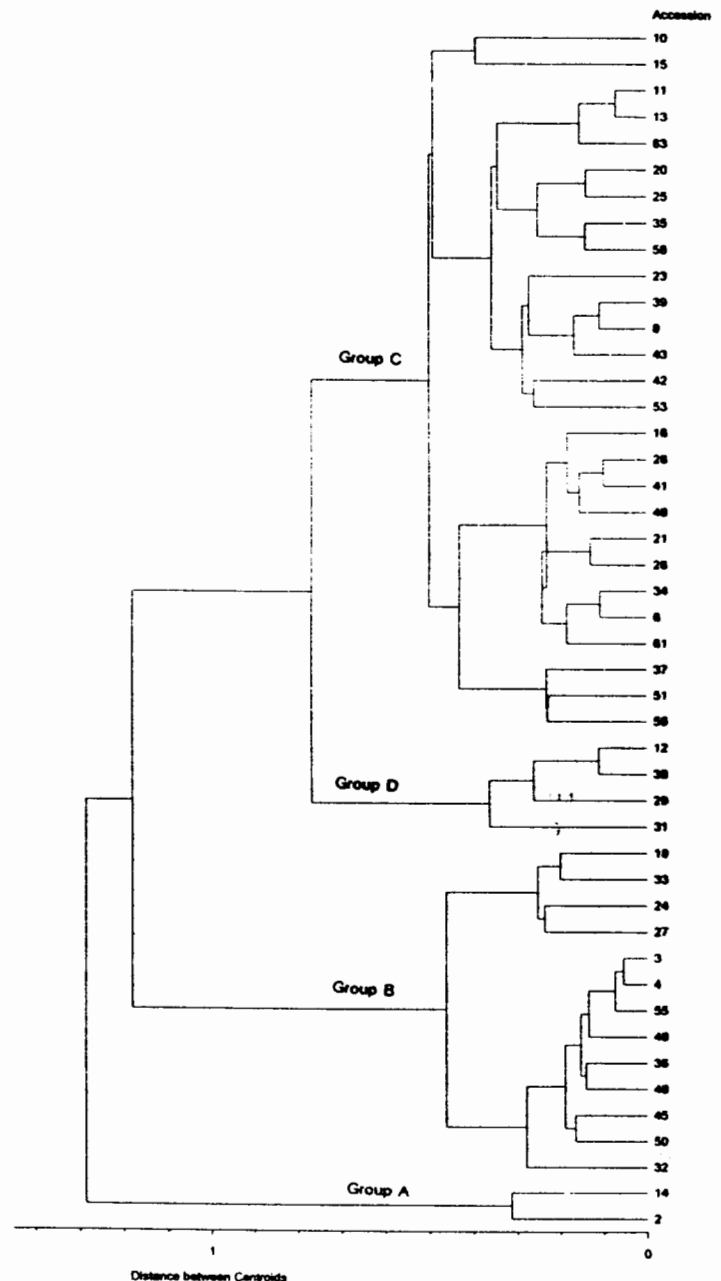
Accn. No.	Yield /plot (g)	No. seeds/pod	100 s. weight (g)	Hook* degr.	Pods** per m	Pod leng. (cm)	Mat.*** rate
31	1754	5.6	37.3	0.7	26.6	14.3	7
12	1649	5.7	40.3	0.9	21	15	3.3
29	1562	5.1	41.5	0.8	21.3	13.6	4.8
42	1556	5.1	42.3	1.5	19.4	15.1	2.7
23	1527	5.1	43.3	1.7	23.8	14.6	2.8
28	1517	5.8	45.3	1.3	22.5	15.5	3.5
25	1513	5	42.4	1.9	19.8	15.4	3
21	1499	5.1	44	1	22.1	15	2.5
61	1497	5.6	40	1.2	20.9	15.5	2
9	1493	5.2	40.1	1.1	18.4	15.2	5
41	1491	5.4	42.4	1.3	20	15.1	3.8
38	1482	5.1	39	0.9	19.8	14.3	4.3
26	1472	5.7	42.8	1.1	18.6	14.8	3
53	1472	5.8	38.8	1.5	20.1	15.2	3.8
32	1468	4	46.8	2.5	17.8	14.5	4
13	1449	4.7	45.6	1.8	20.4	15.6	2.5
48	1445	4.9	44.6	1.3	20.9	15.2	2.3
34	1441	5.3	41.3	1.1	22.5	14.6	2.5
43	1441	5.2	44.3	1.7	22.9	15	6
20	1436	5.2	43.6	2.1	19.7	15.1	3.5
51	1436	4.2	48.1	1.3	18.4	13.9	2.5
10	1423	5.6	45.8	1.5	18.6	17	3.3
14	1422	4	56.8	1.3	20	14.9	2.8
8	1408	5.4	43.9	1.6	19.8	15.6	3.3
24	1399	3.7	51.3	2.4	22.3	14.3	3.8
58	1396	4.2	45	2	23	14.6	4.7
56	1384	4.3	46.2	1.2	27	14.3	3.3
37	1377	5	46.1	1.6	17.6	13.9	2.8
2	1364	3.9	61.9	1.5	18.8	14.1	3
15	1362	5.4	40.6	1.4	23.4	16.6	3.3
33	1343	4	46.9	2.2	18.5	14.5	3.8
35	1342	5	46	2	20.4	15.4	2.8
39	1338	4.9	42.1	1.6	21	15.2	2.5
16	1336	5.1	41	1.1	20.5	15.3	3
27	1333	4.3	50.7	2.3	22.3	16	2.5
3	1320	3.9	47.1	2.8	16.5	14.7	5
18	1319	4.1	47.7	2.1	24.5	14.8	3.3
11	1301	4.9	44.3	1.7	16.5	15.3	2
4	1280	3.7	46.6	2.7	20.6	14.5	3.5
36	1273	4.1	47.5	2.7	22.4	14.2	3.5
55	1237	3.8	46.7	2.7	25.5	14.6	4
45	1195	3.9	49.4	2.6	22.3	13.9	3.5
40	1187	3.9	47.6	2.8	18.1	14	4.5
46	1168	4.4	46.1	2.8	23.5	14.5	3.8
50	1161	3.7	48.3	2.7	19.3	14.4	3.8
63	1090	4.4	45.7	1.7	16.3	15.1	4
lsd	181	0.7	3.7	0.3	5.2	1.2	1.7

\* Hook degree: 0=hookless; 3=maximum hook value.

\*\* No of pods in a horizontal transection of one meter length, taken on the net supporting the plants 0.8 m above soil surface.

\*\*\* Defined according to the scale: 1=very early; 10=very late.

**Figure 1.-** Dendrogramme representing the results of cluster analysis with the distances between accession centroids.



It is logical that the selection pressure which has been exerted on the Ganxet x non-Ganxet material should run counter to hook degree, since the more hooked forms are clearly less productive. Consequently, it is our belief that commercial use of the denomination Ganxet includes a wide range of heterogeneous forms resulting from Ganxet crosses with other types of germplasm. The material has been multiplied and stored in an effort to protect the Ganxet germplasm.

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