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Short Communication

SEED DORMANCY IN PIGEONPEA GERMPLASM

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Dormancy due to hard seed coat is a characteristic feature of many species in the family Fabaceae (Barton, 1965) to which pigeonpea (*Cajanus cajan*(L) Millsp.) belongs. The hard seed coat acts as a barrier to absorption of water, resulting in failure or delay of germination even under favourable conditions. Apart from reduced emergence in soil when sown for multiplication, hard seedness will result in preferential selection for non-dormant types and consequent genetic drift in populations of heterogenous germplasm accessions.

The world collection of pigeonpea germplasm, consisting of 11, 482 accessions from 54 countries, is conserved at 4°C and 20 per cent relative humidity (RH) as an active collection in ICRISAT genebank at Patancheru, India. Every year, sets of this germplasm are grown in the field for evaluation and seed multiplication. During the course of systematic testing for viability, varying degrees of dormancy associatied with the hard seeds in several germplasm accessions was observed. However, there is a little published information on the problem of dormancy in pigenopea.

To find out the extent of dormancy associated with hard seeds in pigenopea, germination studies were undertaken in a set of 100 medium-duration germplasm accessions. The seeds used in the study were harvested during March-April, 1990 from a crop sown on 30 June, 1989. Following harvest, the seeds were sun-dried to reduce the moisture content and a random test on the accessions showed that seed moisture content varied between 8.5 and 9.6 per cent (wet weight basis). The percentage of hard seeds was assessed by conducting the standard germination tests. One hundred seeds in two replicates were incubated at 25°C, in plastic germination boxes (12 x 10 x 5 cm) on agar (1%) substratum and the first counts for germination were made on the 10th day of testing. The ungerminated, healthy seeds were scarified by a fine cut using blade and incubated for a further peroid of 5 days. The final

counts on germination were taken on the 15th day of testing. The initial germination among the accessions tested varied from 28-100 per cent, as the percentage of hard seeds was between zero and 71. Three accessions showed over 50 per cent hard seeds, 14 accessions had between 26 and 50 per cent hard seeds and 20 accessions had no hard seeds. The maximum percentage of hard seed (71%) was recorded in two accessions (ICP 619 and ICP 633). Hard seeds in all the accessions germinated after scarification and total germination in the different accessions varied between 94 and 100 per cent (Table 1).

Table 1. Range in percentage of hard seeds, initial germination and final germination after scarification in 100 pigeonpea germplasm accessions

Hard seeds (%)	No. of accessions	Initial germination (%)	Final germination (%)
0-9	65	90-100	94-100
10-19	14	84-89	95-100
20-29	9	69-80	97-100
30-39	5	62-69	98-100
40-49	4	51-58	96-100
50-59	1	44	100
60-69	0	-	-
70-79	2	28	99

A comparison of the seed moisture content (Table 2) with the percentage hard seeds observed in germination tests in five randomly selected accessions revealed an interesting relationship i.e., below a critical moisture level (9.5%), the number of hard seeds increased. Thus, the percentage of hard seeds was highest in accessions which reached lower levels of equilibrium seed moisture contents during sun-drying, compared to other accessions

Table 2. Seed moisture content and percentage of hard seeds in five randomly selected pigeonpea germplasm accessions

Accessions	Seed moisture content (%)±S.E.	Hard seeds (%)
ICP 404	9.6±0.03	0
ICP 57	9.5±0.06	0
ICP 92	9.4±0.02	33
ICP 615	9.2±0.22	56
ICP 633	8.5±0.05	71

Studies on the persistence of dormancy during storage in 13 accessions, showed over 25 per cent hard seeds. The seeds were harvested in March, 1975 and were in storage at 4°C and 20 per cent RH from

June 1975. After 10 days of testing, the germination in these accessions ranged between 66 and 97 per cent and hard seeds varied from 3 to 34 per cent. The degree of dormancy was less than that of the freshly harvested seeds in 12 accessions. This showed that in pigeonpea, dormancy due to hard seed coat was not removed completely even after prolonged storage.

Two broad categories of dormancy related to hard seededness, reversible and irreversible, have been recognised (Ellis *et al.*, 1985). Reversible hard seededness occurs at seed moisture contents around 10-20 per cent, but is gradually lost if the seed is exposed to high relative humidity for a long time. On the other hand, irreversible hard seededness occurs in seeds dried to moisture content of around 5-7 per cent.

In the present studies, the seed moisture content in different accessions was in the intermediate range between the two types (Ellis *et al.*, 1985). Hence, it is not surprising that some hard seeds are retained even after 15 years of storage. For long-term conservation, seeds are dried to moisture content as low as 5 per cent, and the irreversible hard seededness could have serious implications by affecting plant stand during germplasm regeneration. In view of this, the relationship between seed moisture content and aspects of dormancy related to hard seededness need to be studied further.

REFERENCES

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