

## **Comparison of seed quality at physiological maturity and harvest maturity of two pigeon pea (*Cajanus cajan* L. Millsp) cultivars**

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(Received: 1997)

### **A b s t r a c t**

Seed quality at physiological and harvest maturity of two pigeon pea cultivars viz. ALI5 and T21 was compared. Seeds of both cultivars attained maximum dry weights, germination potential and seed vigor in terms of root/shoot lengths and dry weights of seedlings at 35 DAA in cv ALI5 and 46 DAA in cv T21 denoting their physiological maturities. The levels of endogenous seed reserves like starch, proteins, lipids, DNA and RNA were comparable at physiological and harvest maturities. The seeds at physiological maturities i.e. at 35 DAA in cv ALI5 and 46 DAA in cv T21 attained most of the required characters associated with the harvest of crop.

### **INTRODUCTION**

Efforts are being made to harvest the crop plants at their physiological maturity (PM) in order to reduce the risk of various biological and climatic hazards. Nutrient supply from the mother plant to seeds stops after PM (Singh et al., 1987). There seems to be no additional benefit of keeping the seeds on the mother plant till harvest maturity (HM) as beyond PM there is a decline in seed quality. In pigeon pea, timely harvest has important implication for sowing of next rabi crop at optimal time in Northern India. However, before harvesting the seeds at PM becomes a practice, it is necessary to assess the quality of seeds harvested at PM vis-a-vis those of HM and hence this study.

## MATERIALS AND METHODS

Pigeonpea crop was raised in the experimental area of Botany Department, Punjab Agricultural University, Ludhiana, India. The freshly opened flowers were tagged at intervals (from 7 DAA onwards). The pods were removed at intervals and seeds were separated.

The physiological maturity (PM) of pigeonpea cultivars viz. AL15 and T21 was determined on the basis of some morphophysiological observations i.e. I – time when seeds gained maximum dry wt., II – initiation of seed shrinkage, III turning of pod and seed coat colour from green to brown and light brown respectively (Table I). Data on the above characteristics suggested that the seeds reached PM at 35 DAA (days after anthesis) in cv. AL15 and at 46 DAA in cv T21. In the present study, harvest maturity (HM) is referred to as the stage when the crop was finally harvested. Seeds of both cultivars at PM and HM stages were tested immediately after harvest for germination potential (ISTA, 1976) at  $30\pm 2^{\circ}\text{C}$  in paper towels in a BOD incubator. After 7th day, the final counts of germinated seeds were recorded given as per cent germination. Seed vigour in terms of root/shoot lengths and their dry weights were recorded after 7th day of germination. For dry weight determinations, roots and shoots of ten seedlings (in triplicate) were separated on final count (7 days after the test) and dried in hot air oven at  $80\pm 2^{\circ}\text{C}$  for 48 h.

Percent hard seeds were counted on final count. Biochemical constituents like starch (L o e w u s, 1952); reducing sugars (S u m n e r, 1935); Lipids (C o l l i n s e t al., 1967); DNA and RNA (O g u r and R o s e n, 1950) and total proteins (M a e s, 1963 and L o w r y et al., 1951) were determined in seeds at PM and HM stages. Test weight of the seeds was recorded by drying hundred seeds in hot air oven at  $80\pm 2^{\circ}\text{C}$  in triplicate. Per cent shrivelled seeds were also recorded at both stages. The data was statistically analyzed according to P a n s e and S u k h a t m a (1985).

## RESULTS AND DISCUSSION

The seeds of pigeon pea acquire germination potential at PM as both the seeds harvested at PM and HM showed a comparable per cent germination (Table I). Rather the seeds at PM depicted a higher vigour as root and shoot length and dry weight of seedlings were significantly higher in seeds at PM than those at HM in both the cultivars. Besides, hardseededness also developed beyond PM in the two cultivars. In seeds, germinability is generally associated with endogenous reserves like proteins, starch, nucleic acids and lipids (V o l d and S y p h e r d, 1968). Here, PM seeds had more or less the similar level of the above endogenous reserves. However, level of reducing sugars was quite less at PM as compared with HM seeds. It is often suggested that seeds should be harvested when free reducing sugars reach their minimum to reduce fungal attack in storage (S t o d d a r t, 1968). Further, the seeds at PM possessed higher test seed dry weight as compared with those at HM in the present

study. Retaining the seeds on mother plant beyond PM resulted in the reduction in the seed vigour in both the cultivars as seedling growth in terms of root/shoot lengths and dry weights recorded a decline at HM than at PM (Kaur and Khattri, 1995). Studies thus revealed that at PM i.e. at 35 DAA in cv. AL15 and at 46 DAA in cv. T21, seeds achieved most of the desirable characters associated with the harvest of crop.

Table I

Comparison of seeds at PM and HM in pigeonpea cultivars viz. AL15 and T21

Characters/cvs	Harvest LSD (0.05) maturity (HM)		Physiological maturity(PM)		LSD (0.05)	
	AL15 (35DAA)	T21 (46DAA)	AL15	T21	AL15	T21
Seed moisture (%)	22.47	29.29	12.00	14.60	3.5	1.9
Germination (%)	100	100	93	96	6.6	1.5
Hardseeds (%)	Zero	Zero	2.33	4.00	—	—
Shrivelled seeds(%)	Zero	Zero	3.3	8.6	—	—
Root length (cm)	6.7	6.7	5.7	5.3	0.7	0.9
Shoot length (cm)	7.7	10.4	7.5	9.4	1.0	1.4
Root dry wt. (mg)	25	40	20	35	5.0	5.1
Shoot dry wt. (mg)	49.3	123.0	35	92.5	9.3	12.1
Starch(Ågg-Idry wt.)	347	285	348	285	21.5	45.7
Reducing sugars (mg g <sup>-1</sup> dry wt.)	3.64	3.41	10.29	13.38	2.3	3.5
Total protein (mg g <sup>-1</sup> dry wt.)	282	244	253	268	—	—
Total lipids (%)	2.40	2.80	2.53	2.80	NS	0.5
DNA (Åg seed l)	12.1	18.4	10.9	11.0	—	—
RNA (Åg seed l)	15.0	15.3	13.6	12.9	—	—
Podwall colour	Brown	Brown	Brown	—	—	—
Seed coat colour	Brown	Light brown	Brown	Light brown	—	—
Initiation of seed shrinkage (DAA)	35	46	—	—	—	—

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## Porównanie jakości nasion dwóch odmian grochu gołębiego (*Cajanus cajan* L. Millsp) w stadium dojrzałości fizjologicznej i gotowości do zbioru

### Streszczenie

Porównano jakość nasion dwóch odmian grochu gołębiego AL15 i T21, w stadium ich dojrzałości fizjologicznej i gotowości do zbioru. Nasiona obydwu odmian osiągnęły maksymalną suchą wagę, potencjał kiełkowania i energię mierzoną długością korzeni i pędów oraz suchą masą kielków. W przypadku odmiany AL15 wielkość ta wynosiła 35 DAA, zaś w przypadku odmiany T21 - 46 DAA, co wskazuje na ich dojrzałość fizjologiczną. Poziom zgromadzonych w nasionach skrobi, białek, lipidów, DINA i RNA był porównywalny w stadium dojrzałości fizjologicznej i gotowości do zbioru. Nasiona o dojrzałości fizjologicznej, tzn. które osiągnęły 35 DAA w przypadku odmiany AL15 oraz 46 DAA w przypadku T21, osiągnęły większość z cech charakteryzujących gotowość do zbioru.