Indian J. Genet., **59**(3): 375-377 (1999)

Short Communication

POSSIBILITY OF APOMIXIS IN MUNGBEAN AND URDBEAN

K. B. WANJARI

Pulses Research Unit,
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola 444 104

(Received: November 10, 1998; accepted: June 23, 1999)

The crosses of mungbean and urdbean were confirmed in F_1 by visualizing one of the prominent trait from male parent. The F_1 crosses were harvested plantwise and were carried to F_2 in plant to row progenies. Critical observations (Table 1) made on morphological feature of every hybrid revealed that there was high percentage of hybrid plants (92.8, 93.6 per cent) in mungbean as compared to those in urdbean (30.4 and 50.0 per cent). The confirmed F_1 plants were harvested separately and were grown plantwise in F_2 progenies. Surprisingly, some of the F_2 lines were very uniform without segregation. At the same time, the hybrids were very much distinct from their respective female parents and confirmed the presence of prominent trait of male parent seen in F_1. It indicated that they were derived from perfect hybridization.

A few F_2 progenies, (Table 2) were uniform and distinct from the parents. A higher level of plant vigour or dwarfness than both the parents in these lines may be due to complementation of the genes. These progenies are most probably the apomictic lines, with fixed hybridity.

The alleles governing apomixis are likely to be contributed to the hybrid by male parent. Miles [1] presented breeding scheme where apomicts are used as male for producing the crosses with sexually propagating female in a forage crop *Brachiaria*. The differences in terms of segregating vs. nonsegregating types or for certain characteristics were seen between different progenies originating from different hybrid plants of same cross. This may be due to the heterozygosity of male parent for the alleles governing the respective characters. Such male parents are the carriers of apomictic alleles to the hybrid. Possibility of facultative apomixis on female side can not be ruled out. It is likely to be confused with uncrossed (selfed?) plants observed in F_1 in varied proportions in the crosses under study.

Apomixis has been reported in over 300 species in at least 35 different families of plant kingdom [2]. Majority of reports are in tropical and subtropical forage grass genera. In leguminoseae there are very rare reports of induced apomixis while there

Table 1. Crosses confirmed with prominant trait from male parent

Cross	Prominant traits in		No. of plants grown		
	Female	Male	Total	Confirmed F_1*	
				No.	%
Mungbean					
BM-4 × PDM 8-139	Early flowering (34 days) and maturity (75 days)	Late flowering (40 days) and maturity (85 days) Short and thin pods (Small seeds)	47	44	93.6
AKM-9242 × PDM 84-139	Early flowering (32 days) and maturity (75 days) medium bold and long pods with medium seed size	- do -	42	39	92.8
Urdbean					
T-9 × AKU-10	Dwarf (22 cm) short and thin pods with sparse hairs	Tall (43 cm) hairy, bold and long pods	4	2	50.0
Pant U-30 × AKU-10	-do-	-do-	23	7	30.4

*Based on prominant characters from male parent

Table 2. Distinct uniform progenies located in F_2

Cross	Character of distinctness in F_2	No. of progenies
	MUNGBEAN	
BM-4 × PDM 84-139	Seedling vigour,tall stature like male parent late flowering and maturity	4
AKM-9242 × PDM 84-139	Dwarf	2
	Average in height like PDM 84-139	11
	URDBEAN	
T-9 × AKU-10	Hairy pods, taller	2
Pant U-30 × AKU-10	Seedling vigour, tall and late in flowering and maturity	4

are no reports of autonomous one [3]. Number of studies explained its simple monogenic nature which favours genetic manipulation more easily in breeding [4]. The genes governing apomixis could be used to produce true breeding hybrids in *Pennisetum* [5]. Apomixis may be useful in heterosis breeding in mungbean and urdbean which are completely self pollinated crops lacking an access to any other method of hybrid seed production on large scale. Isolation and use of the gene controlling apomixis would allow for production and perpetuation of unique, high yielding genotypes which have a competitive advantage [6]. Source of apomixis discovered so far are in wild species or in related genera of most cultivated crops [2]. The best source would be one from within the species targeted for improvement [7]. In present case there are indications of existence of apomixis with some of the available lines of mungbean and urdbean. Sexual × apomictic crosses usually release a large amount of genetic variation for the heterozygosity of the apomictic parents. The cultivated background possibly may ease the hybrid development on the apomictic lines and may be expedited much faster and more effectively in these legumes in near future.

REFERENCES

1. J. W. Miles. 1997. A breeding scheme to exploit heterosis in apomicts. International Symposium on 'The Genetics and Exploitation of Heterosis in Crops" 17-18 August, 1997, CIMMYT, Mexico city, Mexico. abst. p. 182-183.
2. W. W. Hanna and E. C. Bashaw. 1987. Apomixis: Its Identification and use in plant breeding. Crop Sci., **27**: 1136-1139.
3. N. A. Sobolev, G. K. Adamchuk and E. D. Zhila. 1970. Apomixis in Pea. In "Apomiksis i Selektslya, Nauka Pub. Muscow. (Apomixis and Breeding; English translation by B. Sharma. Amerind Publ. Co., New Delhi.)
4. S. E. Asker and J. Jerling. 1992. Apomixis in plants. CRS Press, Boca Raton, Florida, USA.
5. W. W. Hanna, M. Dujardin, P. Ozias-Akins, E. Lubbers and L. Arthur. 1993. Journal of Heredity., **84**: 213-216.
6. W. W. Hanna, P. Ozias-Akins and D. Roche. 1997. Apomixis and heterosis. International Symposium on "The genetic and exploitation of heterosis in Crops" Mexico, D.F., Mexico, Abst. pp. 214-215.
7. W. W. Hanna. 1994. Use of apomixis in cultivar development. Advances in Agron., **34**: 337-350.