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Influence of season on maturity and seed yield in soybean seed production

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Abstract
A field experiment consisting of five soybean genotypes (JS-335, MAUS-81, MAUS-71, MAUS-47 and MAUS-61) with four replication was conducted in three season *viz*. *kharif*, *rabi* and *summer* at Seed Technology Research Unit, VNMKV, Parbhani to find out the influence of season on maturity and seed yield in soybean seed production. Result revealed that the maturity period is the sum of length of pre-flowering period and pod development; among these the pre-flowering period is greatly influenced by seasonal variation, where as pod development and maturity are relatively stable. The fluctuation in yield and number of pods/plant is the amplified effect of variation in pre-flowering period occurring under the influence of seasonal changes.
The genotypes MAUS-71 and MAUS-81 were found most ideal for year round cultivation as it has high yield potential, least co-efficient of variation and highest number of pods plant.

Keywords: Soybean, seasonal variation, maturity yield potential, co-efficient of variation

Introduction
Availability of quality seed in general is a prerequisite to boost up productivity of any crop. The area under soy bean cultivation is increasing in India and concentrated in Maharashtra (www. sopa.com) In general, environmental factors such as temperature and humidity has great influence on production of soybean seed. Harvesting of soybean crop at physiological maturity is important to maintain maximum vigour and viability of seed and to avoid losses at the time of harvesting. Pod shattering is one of the lacunae that take a heavy toll to produce. Extent of yield losses due to pod shattering in soybean range from negligible to as high as 90% depending up on time of harvesting, environmental conditions and genetic endowment of variety (Tiwari arid Bhatnagar, 1988). In view of the above circumstances, the present investigation was undertaken to studies on influence of seasons on maturity and seed yield in soybean.

Material and Methods
The present investigation was carried out Seed Technology Research Unit, VNMKV, Parbhani. The expenditure laid out in RBD design with four replication having plot size 5.40 x 5.0 meter with spacing of 45 x 5 cm. Five soybean genotypes *viz*. JS-335, MAUS-81, MAUS-71, MAUS-47 and MAUS-61 were sown in *kharif, rabi and summer* seasons. Tire fertilizer dose of 30 kg N and 60 kg P_2O_5/ha was applied. Hand weeding, irrigation, plant protection measure were carried out from time to time as and when required to rise good crop by adopting standard crop production techniques. The observations on days to 50% flowering, number of branches/plant, number of nodes/plant, plant height (cm), days to maturity, number of pods/plant, number of seed/plant, seed weight/plant, plant density at harvest, 100 seed weight (g) and seed yield/plot or ha were recorded in 10 randomly selected plant in each plot. The data subjected to pooled analysis over seasons and calculated the co-efficient of variation for soave important growth and yield parameters.

Results and Discussion
Seed yield is an expression of the integrated effect of genetic makeup of the cultivar and the climatic factors against which the growth and development occurs. In broad sense, the maturity period can be considered as a sum of time period required for the vegetative growth to the reproductive stage. Mehetre and Jamdagni (1997) [2] reported that the average pre-flowering period is 39 days, whereas, the post-flowering period is 55 days in soybean.

They also reported that the soybean is characterized by concurrent occurrence of vegetative and reproductive phase.

In present investigation, the average pre-flowering, period of the five genotypes over three seasons was found to be 41.60 days, whereas, the post-flowering and pod development period was 57.08 days making 98.68 days as an average duration of soybean crop when taken over three seasons. The average number of pods/plant of the five genotypes over the three seasons were 46.84, whereas, the average seed yield was 16.31 qt/ha. (Table No. 1)

Table 1: Co-efficient of variation for some important growth and yield parameters of soybean during different seasons.

Variety	Season	Na. of days after sowing			No. of Pods/ Plant	Yield (qt/ba)
		Pre- flowering	Post flowering (Pod Development)	Maturity		
JS-335	K	35.50	63.00	98.50	59.06	22.51
	R	48.75	58.75	107.50	34.55	12.39
	S	41.50	59.25	100.75	42,97	15.00
	Mean	41 92	60 33	102 25	45 53	16 63
	CV	6.45	443	2.60	5.31	12.94
MAUS-81	K	35.50	61.00	96.50	61.92	23.07
	R	48.50	56.75	105.25	40.52	12.89
	S	40.50	57.75	98.25	48.05	15.97
	Mean	41.50	58.50	100.00	50.17	17.52
	CV	6.51	4.57	2.61	4.82	12.43
MAUS-71	K	34.50	61.00	95.50	64.85	23.71
	R	48 75	55 75	104,50	40 75	13 36
	S	39.75	57.75	97.50	48.75	16.39
	Mean	41.00	58.17	99.17	51.42	17.82
	CV	6.59	4.60	2.62	4.72	12.07
MAUS-47	K	33.00	52.75	85.75	48.22	17.07
	R	4! 50	54.25	95.75	29.50	10.17
	S	37.50	50.00	87.50	35.96	13.20
	Mean	37.33	52.33	89.67	37.89	13.48
	CV	7.24	511	3.68	3.68	15.99
MAUS-61	K	42.50	55.75	98.25	60.15	22.01
	R	50 75	57 00	107.75	39 57	11 69
	S	45.50	55.50	101.00	47.97	14.58
	Mean	46.25	56.08	102.33	49.21	16.09
	CV	5.85	4.77	2.60	4.76	13.37
Mean		41.60	57.08	98.68	46.84	16.31
CV (%)		6.55	4.70	2.82	5.20	13.36

The critical persuasal of coefficient of variation revealed that there was a maximum fluctuation for seed yield (CV=13.36%) followed by pods/plant (CV=5.20%). Among the two components of maturity period the pod development period had least magnitude of co-efficient of variation (CV=4.70%), whereas, pre-flowering period had high coefficient of variation (CV=6.43%). The variation for maturity period was very less (CV=2.82%). This clearly indicated that the average maturity and pod development period were less affected either by genetic makeup or by climatic factors. The pre-flowering period is greatly influenced by the genetic constitution as well as season of cultivation. The fluctuation in length of pre-flowering period could be considered as the basis for instability in expression of number of pods per plant and seed yield of the genotypes over season. Further, it could also be concluded that the effect of fluctuation in pre-flowering is amplified while expressing the performance in terms of number of pods and seed yield.

Identification of individual genotypes, which can perform consistently under all kinds of season, yield is a important character, which is principally determined by number of pods per plant. In present investigation, the highest mean seed yield was obtained from MAUS-71 (17.82 qtl/ha) followed by MAUS-81 (17.52 qtl/ha), JS-335 (16.63 qtl/ha) and MAUS-61 (16.09 qtl/ha) over three seasons. The MAUS-47 had significantly low average yield (13.48 qt/ha). The critical perusal of magnitude of co-efficient of variation for seed yield indicated that highest yield of genotype MAUS-71 had very low magnitude of co-efficient of variation (CV=12.07%) suggesting stable behavior over three seasons followed by MAUS-81, JS-335 and MAUS-61 with 12.43%, 12.94% and 13.37% respectively, suggesting stable behavior over three seasons. Tire genotype MAUS-47 was characterized by maximum magnitude of coefficient of variation (CV=15.99%) with lowest average seed yield indicating the most unstable nature for yield performance. High yield performance with stable consistency is the prime, object for practical purpose. The MAUS-71 could be regarded as the most ideal type as it had first ranking in yield performance (17.82 qtl/ha) and low magnitude of coefficient of variation (12.07%) over seasons. Secondly MAUS-81 was also found the most ideal type as it ranks second in yield performance (17.52 qtl/ha) and low magnitude of co-efficient of variation (12.43%) over seasons.

From the forgoing discussion, it can be concluded that the maturity period is the sum of length of pre-flowering, period and pod development among these the pre-flowering period is greatly influenced by seasonal variation, whereas, pod development and maturity are relatively stable. The fluctuation in yield and number of pods/plant is the amplified effect of variation in pre-flowering period occurring under the influence of seasonal changes. The genotypes MAUS-71 and MAUS-81 were found most ideal for year round cultivation as it has high yield potential, least co-efficient of variation and highest number of pods/plant. These results are in agreement with Salioo *et al.* (1991), Nian *et al.* (1996) [3], Mehetre and Jamdagni (1997) [2] and Shelar (2002) [5].

Conclusion

The genotypes MAUS-71 and MAUS-81 were found most ideal for year-round cultivation as it has high yield potential, least co-efficient of variation and highest number of pods/plant

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