Dry pod and haulm yields (Q/ha)

Dry pod yield/ha was significantly higher in P1 than P2 (Table 2). V1, V2 and V3 were equally efficient and significantly superior over V4 in producing dry pod yield. However, neither the different package of practices nor the varieties significantly influenced dry haulm yields. Significant positive correlations between pod yield/plant and number of branches per plant have been reported earlier by Barlawat (1985) and Tekale *et al* (1988).

REFERENCES

BALRAWAT, S.H. (1985). Effect of sowing dates on growth and yield of bunch varieties of groundnut in kharif season. M.Sc.(Agri.). Thesis, Marathwada Agricultural University, Parbhani.

GOSH, T.K. and DASGUPTA, D.K. (1975). Effects of date of sowing on growth and yield of groundnut (*Arachis hypogaea* L.) in lateritic upland. **Plant Science 7**: 56-60.

REID, P.H. and YORK, E.T. (1958). Effect of nutrient deficiencies on growth and fruiting characteristics of peanut in the sand cultures. **Agron. J. 20**: 274-279.

TEKALE, G.R., DAHIPHALE V.V. SHELKE,V.B. and SONDAGE,V.D. (1988). Correlation and regression studies in groundnut. **J.Maharashtra agric. Univ.,13**: 215.

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NODULATION IN GROUNDNUT CULTIVARS DURING *KHARIF* UNDER DIFFERENT PACKAGES OF PRACTICES

D.D.DESHMUKH AND D.V.DEV.
Science College, Nanded 431 602

ABSTRACT

Field experiment conducted in the *kharif* season of 1989-90 showed that the number of nodules/plant and the dry pod and haulm yields of groundnut crop were significantly higher under the package of practices recommended by ICRISAT, when compared with the recommended package of practices of the Department of Agriculture, Pune, In general, groundnut CV. ICGS 11, ICGS 21 and ICGS 44 produced higher number of nodules plant over CV. SB IX. These varieties behaved similarly in respect of the traits dry pod and haulm yield/ha.

KEY WORDS : Groundnut, Nodulation, Package of Practices, Rhizobia, Economic yield.

Groundnut is a leguminous plant which fixes atmospheric nitrogen in the root nodules. The amount of nitrogen fixed symbiotically depends mainly on the rhizobial strain, the genotype of the host plant and elements of external environment including soil moisture and temperature, light intensity, day length and availability of plant nutrients. It would be worthwhile to develop better package of practices for groundnut cultivation and responding genotypes that are capable of efficient nitrogen fixation in symbiosis with native rhizobia. Keeping this in view, the present investigation was under taken to study the nodulation in various genotypes of groundnut during *kharif* (monsoon/rainy) season grown under the different package of practices.

MATERIALS AND METHODS

The field experiment was conducted during *kharif* 1989-90 in a factorial randomised block design with three replications. A combination of two package of practices (P_1 = ICRISAT, Patancheru, Andhra Pradesh, India., P_2= Department of Agriculture, Maharashtra State, Pune, India) and four varieties of groundnut (V_1= ICGS 11, V_2= ICGS 21, V_3 = ICGS 44 and V_4=SB XI) comprised eight treatments. The details of field operations done and inputs used under different package of practices are given in Table 1. In P_1, two rows of groundnut were grown on raised beds of 50 cm width. After every bed, a furrow of 30 cm width and 15 cm depth was opened. In P_2, the crop was cultivated on a flat check-basin seed bed. Two randomly selected plants from each net plot were

Table 1. Field operations done and inputs used in the different packages of practices

Field operation/inputs	ICRISAT package of practices (P_1)	State Department package of practices (P_2)
Preparatory tillage	2 ploughings, 2 harrowings, clod crushings, and stubble collection	2 ploughings, 2 harrowings, clod crushings and stubble collection
Seedbed	2- rows narrow bed and furrow	Flat bed (Check basin)
Basal dose of manure and fertlizers/ha		
Farm yard manure	10 t	10 t
Single super phosphate	500 kg	Nil
Ammonium sulphate	25 kg	Nil
Zinc sulphate	10 kg	Nil
Di-ammonium phosphate	Nil	10 kg
Top dressing/foliar application		
	Ferrous sulphate 2.5 kg + urea 5 kg in 500 l water/ha/spray, total two sprays 30 and 50 days after emergence.	Nil
	Gypsum @ 400 kg/ha at flowering	Nil
Seeds and sowing		
Spacing and method of sowing	30 x 10 cm^2 by hand dibbling	30 x 10 cm^2 by hand dibbling
Seedrate (kernel, kg/ha)	100-105	125-130
Seed treatment	Thiram @ 3 g/kg of kernels	Thiram @ 5 g/kg of kernels
		Rhizobium inoculation250 g/10- kg of kernels
After care		
Weedicide	'Stomp' pre-emergence 3.5 l/ha	Nil
Gap filling	Once	Once
Weeding	Once	Twice
Light earthing up	Nil	Once
Uprooting big weeds	Once	Once
Other	Deepening of furrows thrice (5)	Hoeing twice
Plant protection		
Dimethoate	660 ml/ha/spray, once	500 ml/ha/spray twice.
Monocrotophos	1 litre/ha one spray	700 ml/ha, one spray
Mancozeb	1 kg/ha, two sprays	1 kg/ha, two sprays
Carbendazim	250 g/ha one spray	250 g/ha, one spray
Carbendazim + tridemorph.	250g+350ml/ha respectively one spray	250g+350ml/ha respectively one spray
Irrigation (No.)	Nil	Nil
Harvesting	By pulling the plants	By pulling the plants.
Stripping, drying and cleaning the pods and storing	By manual labour	By manual labour

uprooted for nodule count. On complete sun-drying, the weight of pods and haulms per net plot was recorded separately.

RESULTS AND DISCUSSION

Number of nodules/plant

The number of nodules/plant were significantly higher under P_1 than under P_2 at all the stages of crop growth (Table 2). This may be attributed to the better seed bed in P_1 which provided better aeration and root development and better drainage and supply of essential elements to the groundnut crop. Franco (1977) noted that deficiency of phosphorus, sulphur, calcium and molybdenum limit grain yield of tropical legumes and is dependent on symbiotic nitrogen fixation. Nair *et al.* (1970) observed reduction in nodulation, nodule weight, nitrogen fixation and dry matter production with the absence

Table 2. Number of nodules per plant during *kharif*

Treatments	Days after sowing					At harvest
	30	50	70	90	110	
Package of practices						
P1	56.54	103.75	176.29	205.58	177.25	118.12
P2	46.71	84.08	142.33	162.71	123.00	97.20
SE±	0.87	2.33	5.99	9.87	6.69	5.02
CD at 5%	2.65	7.08	18.16	29.94	20.29	15.24
Varieties						
V1	55.17	99.42	170.67	206.42	174.00	124.17
V2	54.75	96.67	162.92	188.33	146.42	107.37
V3	54.50	94.75	161.75	193.00	165.67	118.83
V4	42.08	84.83	141.92	148.83	144.42	80.27
SE±	1.24	3.30	8.47	13.96	9.46	7.10
CD at 5%	3.75	10.00	NS	NS	28.69	21.55
Interaction P x V						
SE±	1.75	4.66	11.97	19.74	13.37	10.05
CD at 5%	NS	NS	NS	NS	NS	NS
G. Mean	51.62	93.92	159.31	184.14	150.13	107.66

of calcium. Oram (1958) stated that sulphur encourages nodulation. The significant impact of the various groundnut genotypes was evident at 30th, 50th, 110th day and at harvest stage (Table 2). The nodulation significantly increased in V_1,V_2 and V_3 when compared with V_4 at almost all the stages of crop growth except at 50th day and 110th day, when V_4 was at par with V_3 and V_2 and V_3,

Table 3. Dry pod and haulm yield during *kharif* (Q/ha)

Treatments	Dry pod yield	Dry haulm yield
Package of practices		
P1	15.77	25.92
P2	12.45	20.95
SE±	0.72	0.78
CD at 5%	2.18	2.38
Varieties		
V1	15.38	25.07
V2	14.14	23.61
V3	16.23	26.81
V4	10.68	18.23
SE±	1.01	1.11
CD at 5%	3.08	3.37
Interaction P x V		
SE±	1.43	1.57
CD at 5%	NS	NS
G. Mean	14.11	23.43

respectively. Significant variation in nodulation and nitrogenase activity had been found between groundnut cultivars (Duggar, 1935; Nambiar and Dart, 1980). Large variations were observed between cultivars within each group (Wynne *et al.*, 1980).

Dry pod and haulm yields

Dry pod and haulm yields/ha were significantly higher in P_1 than in P_2 (Table 3). This could be attributed to good bed and optimum supply of nutrients made available for the better crop growth and development under P_1. Beneficial effects of raised beds (NARP -T 1980; Patil, 1989), gypsum (Chandrasekhara Reddy and Patil, 1980), zinc (Saini *et al.*, 1975) and ferrous sulphate (Patil *et al.*, 1985) in increasing the pod yield of groundnuts were reported. V_1, V_2 and V_3 produced similar dry pod and haulm yields/ha, superior over V_4 which recorded significantly the lowest values for these traits. Higher nodulation in V_1, V_2 and V_3 resulted ultimately in higher pod and haulm yields. Positive correlation between pod yield and nodules was observed by Balrawat (1985). Wynne *et al.*, (1980) opined that since biological yield and economic yield appear to be correlated with nitrogen fixation, it may be possible to select genotypes for higher nitrogen fixation by

selecting for biological yield and/or economic yield.

REFERENCES

BALRAWAT,S.H.(1985). 'Effect of sowing dates on growth and yield of bunch varieties of groundnut in *kharif* season'. M.Sc. (Ag) Thesis, Marathwada Agricultural University, Parbhani.

CHANDRASEKHARA REDDY S. and PATIL,S.V. (1980). Effect of Ca and S and certain minor nutrient elements in growth, yield and quality of groundnut (*Arachis hypogaea* L.). **Oleagineux 35**: 507-510.

DUGGAR, J.F. (1935). The nodulation and other adaptations of certain summer legumes. **J. Amer. Soc. Agron., 27**: 32-37

FRANCO, C.A. (1977). Contribution of the legume-Rhizobium symbiosis to the ecosystem and food production, In:**Exploiting the Legume- Rhizobium Symbiosis in Tropical Agriculture** (Vincent, J.M., Witney, A.S. and Bose, J. (eds). University of Hawaii, USA, pp. 237-252.

NAIR, K.S., RAMASWAMY, P.P. and RANI PERUMAL (1970). Nutritional factors affecting nitrogen fixation in *Arachis hypogaea* L. **Madras Agric J. 57**: 307-310.

NAMBIAR, P.T.C. and DART, P.J. (1980). Studies on nitrogen fixation on groundnuts at ICRISAT, **Proceedings of the International Workshop on Groundnuts** (Gibbons, R.W. ed.) ICRISAT, Petancheru, Andhra Pradesh, pp.110-124

NARP-T (1980). Annual Report 1979-80. National Agricultural Research Project, Tirupati Centre.

ORAM,P.A (1958). Recent development in groundnut production with special references to Africa. **Field Crop Abstr., 11** (1): 1-6.

PATIL, B.P. (1989). Evaluation of broad beds and furrows (BBF) for irrigated groundnut on medium black soils of Konkan, India./AW = 6: 8-9

PATIL, R.G., RADDER,G.D. and PATIL, V.C. (1985). Effect of time of sowing and foliar application of ferrous sulphate with urea on bunch groundnut.**J Farming Syst., 1**: 20-26.

SAINI, J.S., TRIPATHI, H.P., DWIWEDI, R.S. and RANDHAWA, N.S. (1975). Effect of micro-nutrients on pod yield and quality of groundnut (*Arachis hypogaea* L.). **J.Res. PAU., 12**: 224-227.

WYNNE, J.C., ELKAN, E.H. and SCHNEEWEISS, T.J. (1980). Increasing nitrogen fixation of the groundnut by strain and host selection. **Proceedings of the International Workshop on Groundnuts** (Gibbons, R.W. ed.) ICRISAT, Patancheru, Andhra Pradesh, pp. 95-109.

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MUTAGEN INDUCED STRESS RESPONSE AND ITS IMPLICATION IN IMPROVEMENT OF RAPESEED AND MUSTARD

P.K.SUBUDHI and P.K.PANDA

College of Agriculture, Bhubaneswar

ABSTRACT

An experiment with M_1 and M_2 generation following treatment of one variety each of mustard *(Brassica juncea)* and rapeseed *(Brassica campestris* var. *toria)* with three different doses of Ethyl methane sulphonate (EMS) and Diethyl sulphate (DES) revealed that the mustard variety is less sensitive than rapeseed variety for EMS whereas the reverse trend was noticed for DES in respect of mutagen induced stress response. The EMS and DES mutagenesis may be recommended for improvement of the rapeseed and mustard varieties respectively. The analysis of stress response is considered helpful in predicting changes in mean and variability of some traits like siliqua per plant and plant height in favourable direction.

KEY WORDS : Rapeseed, Mustard, Chemical Mutagen, Mutation Effects, Stress Response Index.

Physiological damage of primary injury exerted by mutagens is of special interest in genetics and plant breeding (Gaul, 1977). It is generally restricted to M_1 generation and sets the practical limit to increasing dose. This can be manifested in terms of changes in germination, survival, growth and developmental traits, Since some of the M_1 parameters are correlated with M_2 mutation frequency (Gaul, 1977), studies of physiological injury in M_1 are often a routine procedure in mutation breeding experiment. In the present investigation, an attempt was made to differentiate the response of rapeseed and mustard in terms of mutagen induced stress in M_1 and its relationship with M_2 mean and variability of different quantitative traits.

MATERIALS AND METHODS

The experimental material comprised of M_1 and M_2 generations following treatment of one variety each of mustard *(Brassica juncea)* and rapeseed *(B.campestris* var. *toria) viz.*, BM 35-9- 9 ·