From the correlation and path analysis studies it can be inferred that dry matter yield, dry weight of stem, dry weight of leaf and number of leaves are the major component traits for the improvement of fodder yield on cowpea. Selection for yield improvement based on dry matter yield, dry weight of leaf and stem weight is as complex as yield itself, and selection based on those attributes will be more effective.

REFERENCES

AKUNDABWENI, L.S. PETER PAUL, C. and SINGH, B.B. (1990) Evaluation of elite lines of cowpea *(Vigna unguiculata* (L.) Walp) for leaf/fodder plus grain. **Trop.Agric.**, (Trinidad) **67**: 133-136

DEWEY, D.R. and LU,K.H. (1959) A correlation and path-coefficient analysis of components of crested wheat grass seed production. **Agron.J., 51**: 511-518.

JINDAL, S.K. (1989) Path coefficient analysis in fodder cowpea grown under rainfed conditions. **Madras Agric.J., 76**: 121-124.

JOHNSOWN, H.W. ROBINSON, H.F. and COMSTOCK, R.E. (1955). Genotypic and phenotypic correlations is soybean and their implications in selections. **Agron.J., 47**: 477-483.

USHAKUMARI, R., and CHANDRASEKHRAN, P. (1991) Genetic variability and correlation studies in fodder lalab *(Lablab purpureus* L.) **Forage Res., 17**: 1-5.

(Received : February 1994 Revised : December 1995)

Madras Agric J., 83(3): 149-152 March 1996
https://doi.org/10.29321/MAJ.10.A00990

AN APPRAISAL OF SEED HEALTH OF RICE IR 20 AS INFLUENCED BY PROVENANCE AND GENERATIONS OF MULTIPLICATION

P.PANDIAN C. DHARMALINGAM M.SUBRAMANIAN AND R.JAYANTHI
Department of Seed Technology
Pandit Jawaharlal Nehru College of Agriculture
Karaikal 609 603

ABSTRACT

Significant differences were noticed in the percentage infection of seed-borne pathogens and white tip nematode *(Aphelenchoides besseyi christie)* in 33 seed samples of IR 20 rice belonging to three generations of multiplication produced at 11 locations. (6 in Madurai District of Tamil Nadu and 5 from Pondicherry) Of them, seeds from periyakulam recorded very low infection of seed-borne pathogens. The seed produced at Theni were totally from nematode infestation. Besides, nine samples of certified seed produced at eight selected locations in Madurai District and one from Karaikal also revealed significant differences. Certified seeds from Sedapatti, Theppampatti and Thirumangalam were free of seed-borne pathogens and seeds from Kottampatti, Thirumangalam and Vinayagapuram were completely free from nematode infestation.

KEY WORDS : Rice, Seed Health, Provenance, Generation Time, Effect

A number of pathogens and nematodes affect rice causing loss of vigour and viability during storage and ultimately affect the yield potential. *Aphelenchoides bessyi christie* White tip nematode is common in rice, feeding ectoparasitically on tender tissues of leaf primordia and developing grains (Israel *et al.*, 1964). By invading the inflorescence, it becomes seed- borne. Seeds having infestation level of 30 or more nematodes per 100 seeds were enough to cause appreciable damage (Fukano, 1962). Many of the seed-borne fungi were transmitted through seeds, more common being *Fusarium moniliforme, Alternaria alternata, Curvularia lunata* and *Trichoconis padwickii* (Sharma *et al.*, 1987) causing reduction in germination. Studies have indicated variations in the prevalence of individual fungi in respect of variety and location (Hossain *et al.*, 1976; Basak and Mirdha, 1985). Hence, experiments were conducted to study the influence of provenance and generations of multiplication affecting seed health condition of rice (IR 20) seeds conforming to three generations and from 11 locations as well as certified seeds produced in 9 selected locations.

MATERIALS AND METHODS

Representative seed samples of rice IR 20 were collected from the farmers saved-seeds belonging to three generations from 11 locations (6 from Madurai district of Tamil Nadu and 5 from the Union Territory of Pondicherry). The generations include the first, second and third after certified seed (G1, G2 and G3) and compared with

Table 1. Influence of provenance and generations of multiplication on seed-borne fungi and nematode levels in farmers saved-seeds of rice IR 20

Locations	Seed-borne Fungi (%)				Seed nematode (100 seed-1)			
	Generations			Mean	Generations			Mean
	G_1	G_2	G_3		G_1	G_2	G_3	
Madurai District of Tamil Nadu								
Theni (L_1)	10.0 (18.42)	8.9 (17.43)	8.9 (17.43)	9.3 (17.76)	0	0	0	0
Periyakulam (L_2)	6.0 (14.13)	6.0 (14.13)	5.0 (12.92)	5.7 (13.73)	8	7	11	8
Andipatti (L_3)	6.9 (15.28)	8.0 (16.43)	7.0 (15.31)	7.3 (15.67)	10	10	10	10
Melur (L_4)	5.0 (12.86)	7.0 (15.31)	6.0 (14.13)	5.9 (14.10)	0	5	0	2
Chittampatti (L_5)	9.9 (17.43)	7.9 (16.40)	7.0 (15.31)	8.0 (16.38)	6	0	0	2
Vadipatti (L_6)	6.0 (14.13)	7.0 (15.31)	7.9 (16.40)	6.9 (15.28)	12	11	3	9
Pondicherry								
Bahoor (L_7)	7.9 (16.40)	10.0 (18.42)	11.0 (19.37)	9.6 (18.06)	9	10	9	9
Iyyankuttipalayam (L_8)	11.9 (20.25)	13.0 (21.12)	14.0 (21.96)	13.0 (21.11)	9	9	25	14
Kunichempet (L_9)	11.0 (19.25)	11.0 (20.25)	11.9 (20.25)	11.6 (19.95)	16	23	26	22
Kottucherry (L_{10})	11.0 (19.35)	12.0 (20.27)	11.9 (20.25)	11.7 (19.96)	11	8	10	9
Nedungadu (L_{11})	12.0 (20.27)	13.0 (21.12)	11.9 (20.25)	12.5 (20.55)	9	7	5	7
Mean	8.6 (17.08)	9.4 (17.83)	9.2 (17.60)		8	8	9	
L_0 (Certified Seed)	-	-	-	5.8	-	-	-	-
C.D. (P=0.05)	Location	1.58**				Location - 1.26** Generation - 0.66** Location x Generation 2.19**		

certified seeds collected from Madurai. Besides, certified seed samples were collected from nine locations. (8 from Madurai district and 1 from Karaikal) The Foundation (L_0) collected from the State Seed Farm, Vinayagapuram in Madurai district formed as the control for the latter. Seed health test for seed-borne fungi was carried out in blotter technique (Anon., 1985) using three replications of 100 seeds each. The number of seeds infected was counted and expressed as percentage and the fungi identified and enlisted. For nematode count, 100 seeds were taken at random from each location, dehusked and soaked in water along with the glumes in a clean petri-dish and kept covered overnight. They were examined next day under a present was counted and the mean value of three replications expressed as number/100. The data were statistically analysed after transforming the percentage data to respective angles (arc-sin) wherever necessary.

RESULTS AND DISCUSSION

Farmer's Saved-Seeds

The differences in the percentage infection of seed generation wise were highly significant (Table 1). Seeds collected from L8, L11, L_{10} and L_9 while on par, had significantly higher infection (13.0 to 11.6%) and those from L_2 had very low infection (5.7%). The differences noticed in the seeds from

Table 2: Influence of provenance on seed-borne fungi and nematode populations in the certified seeds of rice IR 20

Locations		Seed-borne Fungi (%)	Seed Nematode ($100\ Seed^{-1}$)
Chittampatti	(L_1)	4.0 (11.54)	5
Sedapatti	(L_2)	3.3 (10.47)	6
Kottampatti	(L_3)	5.0 (12.92)	0
Theppampatti	(L_4)	3.3 (10.47)	15
Theni	(L_5)	6.0 (14.18)	1
Thirumanglam	(L_6)	3.3 (10.47)	0
Thiruparangundram	(L_7)	4.0 (11.54)	9
Usilampatti	(L_8)	4.7 (12.52)	2
Madur	(L_9)	8.7 (17.15)	4
Vinayagapuram	(L_0)	3.0 (9.97)	0
C.D. (P=0.05)		3.75**	0.93**

L_1 to L_8 - Madurai District of Tamil Nadu
L_9 - Karaikal Region of POndicherry State
L_0 - Foundation Seed

pathogens, *Dreschlera oryzae, Trichoconis Padwickii, Fusarium moniliforme, Curvularia* spp., *Asperqillus* spp. and *Rhizopus* spp. were present in all locations. The certified seeds (Control) had only 5.8 per cent infection of *Trichoconis padwickii* and *Curvulaira* spp, With advancement in generations, the level of infection increased with an overall level of 8.6, 9.4 and 9.2 in G_1, G_2 and G_3 respectively. Variations in the prevelance of fungi with respect to variety and locations have been reported by Hossain *et al.*, (1976) and Basak and Mirdha (1985) in rice. The temperature and relative humidity prevailing in the above locations would have favoured the existence and multiplication of these seed-borne fungi.

The nematode population in farmer's saved-seeds across locations and generations and their interaction were significant (Table 1) The seeds produced at L_1 and certified seed were totally free from nematode infestation. The seed from L_9 and L_8 had significantly higher (22 and 14/100 seeds) and those from L_5 and L_4 had lower (2/100 seeds) population of nematodes. The differences in nematode population in seeds from other locations were on par with each other and the mean number ranged from 2 to 10. The seeds from G_3 had higher number of nematodes than those from G_2 and G_1 registering an overall mean of 8 per cent in G_1 and G_2 and 9 per cent in G_3. Seeds from different locations although had nematode infestation, it was well below the economic threshold level of 30 numbers/100 seeds. However, necessary precautions have to be taken to contain or completely eradicate the nematodes to avoid their spread. The need for selecting nematode free locations for the production of quality seeds became evident from this study.

Certified Seeds

The infection by seed-borne fungi across locations showed significant differences (Table 2) The pathogenes, *D.oryzae, I.padwickii, E. moniliforme* and *Curvularia* spp. were noted in seeds from most of the locations. The level of infection however, was more pronounced in the seeds from L_9 (8.7%) followed by L_5 and L_3 (6 and 5%) and minimum in the seeds from L2, L4 & L6 (3.3%). When compared to Foundation seeds the intensity of infection was more in certified seeds (0.3 to 5.7%) irrespective of locations.

Differences in the nematode population of certified seeds from nine locations were highly significant. The foundation seeds (control) and certified seeds from L_3, L_6 and L_{10} were completely free from nematode infestation. In other cases, the population ranged from one to 15/100 seeds, the highest being in seeds from L4 (15) and L7(9). The seeds belonging to other locations had 1 to 6 per cent infestation. In IR 20 rice, Moolanur area in Dharmapuri district of Tamil Nadu was shown to have more than threshold level of seed nematode that affect seed quality (Ganesan, 1987). The approach of identifying locations for the production of quality seeds that are devoid of seed-borne pathogens and soil nematodes is more scientific and has great practical utility in the long run for developing scientifically sound seed production programme.

REFERENCES

ANONYMOUS (1985) International Rules for Seed Testing. Seed Sci. & Technol., 13: 299-355.

BASAK, A.B. and MIRDHA, A.U. (1985) Mycoflora associated with Seeds of different varieties of Aman rice collected from Chittagong and Chittagong hill tracts districts of Bangladesh. Seed Res., 13: 78-84

FUKANO, H. (1962) Ecological studies on white tip disease of rice plant caused by *Aphelenchoides besseyi* Christie and its control. Bull. Fukuoka Agric. Expt. Sta., 18:108.

GANESAN, S.P. (1987) Studies on seed quality of farmers and certified seeds in generation system- A drill box survey. M.Sc. (Ag). Thesis, Tamil Nadu Agricultural University

HOSSAIN, M., FAKIR, G.A. and NOMIN, A. (1976) Microflora of rice grains in Bangladesh. IV. Effect of location on the fungi of rough rice grain. Bangladesh Agric. Sci. Abstr., 2 : 161.

ISRAEL, P., RAO, Y.S. and RAO, Y.R.V.J. (1964). Studies on nematodes of rice and rice soils. Oryza 2: 125-127.

SHARMA, H.L., RANDHAWA, H.S. KAPUR, A. and SATNAM SINGH. (1987) Seed discolouration in rice. Oryza 24 : 37-41.

(Revised: December 1994 Revised : June 1995)

Madras Agric. J., 83(3): 152-154 March 1996

INFLUENCE OF IRRIGATION AT CRITICAL STAGES ON YIELD AND QUALITY OF SUNFLOWER

A.NANDHAGOPAL, K.S. SUBRAMANIAN, A.GOPALAN AND A.BALASUBRAMANIAN

Agricultural Research Station
Tamil Nadu Agricultural University
Bhavanisagar 638 451

ABSTRACT

Field experiments were conducted in summer and *Kharif* seasons during 1991-92 at the Agricultural Research Station, Bhavanisagar to study the critical stages of irrigation requirement for sunflower. Results revealed that skipping irrigations at button initiation, flowering and seed filling stages significantly reduced the seed yield of sunflower by 19.6, 31.2 and 9.4 per cent in summer and 11.9, 10.2 and 11.5per cent in *Kharif* respectively over the optimal level of irrigations scheduled. Response to irrigations was more pronounced in summer than *kharif*

KEY WORDS : Sunflower, Stages, Irrigation, Yield

Sunflower is a recent entrant into India's vegetable oil scenario accounting for four per cent of the current indigenous production of oil seeds. To step up the production and realise maximum benefit in a short period, it is imperative to schedule irrigations need based. Proper use of irrigation water demands its application at the proper dryness at which maximum net profit is obtained. Ideal irrigation frequency varies with climatic conditions, soil type, stage of growth, tolerance to soil dryness and consumptive use rate. Depth of water applied per irrigation should be equal to the soil moisture deficit created in the root zone. Lindstorm *et al* (1982) found that flowering stage in sunflower is more sensitive to moisture stress. Rawson and Turner (1983) reported that crop has the capacity to recoup the loss in reduction in earlier leaf area due to moisture stress once it is alleviated. With this in view, an experiment was initiated to define the criteria or irrigation scheduling for sunflower growing tracts of Tamil Nadu.

MATERIALS AND METHODS

Field experiments were conducted in both summer and *kharif* seasons of 1991-92 at the Agricultural Research Station, Bhavanisagar, to assess the stagewise irrigation requirement in [illegible] texture, highly porous having 70 per cent sand 5 per cent silt and 25 per cent clay fractions. Field capacity and wilting point moisture contents were 19.2 and 8.5 per cent respectively. Fertility status is low in available N and P and medium in available K. Treatments comprised of moisture stress at germination phase, vegetative, button initiation, flowering, seed filling and seed maturity along with the conventional method of need based irrigation replicated thrice in randomised block design.Each plot was provided with buffer channels all the four sides to avoid seepage interference. Irrigations were monitored through a constant head module designed to deliver 6 1/sec. Common irrigations were given once to all the plots for better establishment.

Quantum of precipitation was taken into account while imposing treatments. Meterological parameters were recorded periodically during the crop period to derive valuable conclusion. The hybrid BSH-1 was used for the investigation. Sowing was taken up in ridges and furrows by adopting a spacing on 60 x 30 cm. Fertilizers were applied at the rate of 60:90:60 kg NPK ha^{-1}. Half of the N and full P and K were applied basally and remaining N top dressed at button initiation and flowering stages on equal basis. Standard