of respective altered A line with 0.5 TG level (Table 5). This may be due to the interaction of the genome of the altered male sterile line at 0.5 TG level, since the altered A line at 0.5 TG level itself is a hybrid (F1 male sterile line).

From this study, it is observed that the existing male sterile lines may be utilised for production of three way cross hybrids by introducing genomes from alternate B lines. Diversification of A lines at 0.5 TG level is found to be adequate. Inbred male sterile lines produce more uniform hybrids than the three-way hybrids produced by altered A line with 0.5 TG (F1 male sterile seed parents). However, with the wide acceptance of more variable open-pollinated varieties by farmers, it is unlikely that the variability of a three way hybrid on an altered male sterile seed parent will be a significant barrier to its adoption.

REFERENCES

APPA RAO, S., MENGESHA, M.H. and RAJAGOPAL REDDY, C.(1989) Identification, characterization and geographic distribution of male sterility restorer and maintainer lines from diverse pearl millet germplasm. Euphytica 40: 155-159.

HARINARAYANA, G.(1987) Pearl millet in Indian Agriculture. **Proc.Int.Pearl Millet Workshop, 7-11 April, 1986, Hyderabad, India.**

ICRISAT(International Crops Research Institute for the Semi-Arid Tropics)(1989) **Annual Report, 1988.** Patancheru,Hyderabad,India.

SIVASAMY,N.(1988). Studies on altered male sterile lines and their hybrids in sorghum (*Sorghum bicolor(L.)* Moench.) Ph.D., Thesis, Tamil Nadu Agricultural University, Coimbatore.

(Received: September 1993 Revised: September 1995)

Madras Agric. J., 83(4): 225-227 April 1996
https://doi.org/10.29321/MAJ.10.A01009

EFFECT OF SOIL MOISTURE STRESS ON SEED YIELD AND QUALITY OF COTTON CV. MCU 7

A.S. PONNUSWAMY and T.V.KARIVARATHARAJU
Department of Seed Technology
Agricultural College and Research Institute
Tamil Nadu Agricultural University
Coimbatore 641 003

ABSTRACT

Seed yield and quality attributes were studied in MCU 7 summer seed cotton crop raised under different levels of soil moisture stress treatments. Irrigation below 0.6 IW/CPW ratio registered significant reduction in seed cotton yield, seed yield, 100-seed weight, germination, vigour index and storability. The seed crop of MCU 7 should be irrigated prior to 0.6 IW/CPW ratio.

KEYWORDS : Soil Moisture Stress, Cotton, Yield, Quality

Soil moisture plays an important role on seed yield and quality (Austin, 1972). Moisture stress at different levels and different growth periods affect the crop growth, yield and seed quality. Studies on this aspect is available for limited seed crops like sorghum (Krishnasamy, 1982) and maize. In cotton the information on the effect of soil moisture stress in relation to seed germination and crop growth are available (Sankaran, 1975) However, its influence on seed quality, vigour and storability of the resulting seeds is meagre. Hence, the present study was taken up to determine the optimum soil moisture for the production of quality seeds in cotton.

MATERIALS AND METHODS

The summer cotton crop of MCU 7 was raised during March 1984-85 under irrigated condition with the recommended package of practices except desired irrigation frequencies. The stress treatments were imposed after weeding and earthing up. Single plant per hill was maintained. The following soil moisture regimes were monitored through IW/CPE (irrigation water/cumulative pan evaporation) ratio with five replications.

T_1 - Irrigation at 0.4 IW/CPE ratio
T_2 - Irrigation at 0.5 IW/CPE ratio
T_3 - Irrigation at 0.6 IW/CPE ratio
T_4 - Irrigation at 0.7 IW/CPE ratio

Table 1. Effect of soil moisture on plant growth and yield in summer cotton cv. MCU 7

Observstions	Treatments IW/CPERatos				CD (P=0.05)
	0.4	0.5	0.6	0.8	
Plant height (cm)	46.2	47.8	50.6	54.4	3.40
No. of sympodia/plant	12.8	12.9	13.6	13.6	NS
Total umber of burest/bollsplant	9.9	11.4	11.5	12.6	0.62
Seed cotton kapas yield (kg/ha)	1.199	1.250	1.321	1.352	64
No. of seeds/boll	29.80	30.60	31.29	32.21	NS
Seed Yield (kg/ha)	760	810	882	908	69

Measured quantity of water was irrigated by using parshall flume and each time 6 cm depth of irrigation was given. The receipt of rainfall during the treatment period was also accounted.

The plant height and number of sympodia were recorded on 100th day. At each picking, number of burst bolls per plant (mean of 5 plants) was recorded. After picking, the kapas were shade dried uniformly for two days and seed kapas weight and number of seeds per boll (mean of 10 bolls) were also recorded. The ginned seeds were dried to 8 per cent moisture content, cleaned and recorded the seed yield. Germination test was conducted in roll towel (ISTA, 1985) and normal seedlings were counted and seedlings length was measured (mean of 5 seedlings). The vigour index was arrived by multiplying germination and seedlings length. The normal seedlings used for seedling measurement were dried in a hot-air oven maintained at 85°C for 24 hr and dry weight recorded. To assess the storage potential, the seeds were, subjected to accelerated ageing at 40 ± 2°C and 95 ± 1% RH for 10 days and evaluated for germination.

RESULTS AND DISCUSSION

The number of sympodia per plant was not influenced significantly due to different soil moisture regimes. The plant height and production potential parameters like number of burst bolls, seed kapas yield and seed yield were significantly influenced by moisture stress treatments (Table 1). The seed crop irrigated at 0.8 IW/CPE ratio recorded the maximum seed yield of 908 kg/ha against 750 kg in the most stress condition of irrigation viz., 0.4 IW/CPE ratio. The seed plots irrigated at 0.5 IW/CPE ratio and below recorded significantly lower 100-seed weight, germination, dry matter production, vigour index and storability than the seeds produced from plots which were irrigated at higher IW/CPE ratios (Table 2). The decreased seed yield and quality attributes might be due to inadequate mobilisation of nutrients and metabolities to the developing bolls and seeds resulting in poor quality of seeds that developed under moisture stress condition. Similar results were reported in groundnut and maize (Moss and Downey, 1971). Marani (1973) reported that soil moisture stress at the end of flowering period adversely affected the seed weight in upland cotton. Salter and Goode (1967) reviewed the evidences for moisture sensitive stages and concluded that many annual crops are particularly sensitive to drought during the floral organs development stage. Hence, it may be concluded that the seed crop of MCU 7 summer cotton has to be irrigated before the IW/CPE ratio reaches 0.6 to obtain higher yield of quality seeds.

REFERENCES

AUSTIN, R.B. (1972). Effect of environments before harvesting on viability. In: Viability of Seeds. (Roberts,E.R. ed) Chapman and Hall Ltd., London, pp.114-149.

Table 2. Influence soil moisture on seed quality characters in summer cotton cv. MCU 7

Observstions	Treatments IW/CPERatos				CD (P=0.05)
	0.4	0.5	0.6	0.8	
100-seed weight (g)	7.89	8.05	8.48	8.43	0.24
Germination (%)	63	67	75	78	5.4
Seedling length (cm)	31.6	31.8	31.9	32.2	NS
Dry matter production (mg/5 seedlings)	198	205	213	217	9.2
Vigour index	1,990	2,130	2,392	2,511	165
Germination (% after accelerated a ein"	44	46	55	56	4.2

ISTA, (1985). International Rules for Seed Testing. Seed Sci. Technol., 13: 309-520.

KRISHNASAMY, V. (1982). Studies on certain aspects of production and storage of sorghum seed. Ph.D. Thesis, Tamil Nadu Agricultural University, Coimbatore.

MARANI, A. (1973). Effect of soil moisture stress on two varieties of upland cotton in Israel. Exp. Agric.,1: 121-128.

MOSS, G.J. and DOWNEY, L.A (1971). Influence of drought stress on female gametophyte development in corn and subsequent grain yield. Crop Sci., 11: 368-372.

SALTER, P.J. and GOODE, J.E. (1967). Crop Responses to Water at Different Stages of Growth. Commonwealth Agricultural Bureaux, Farnham Royal.

SANKARAN, V. (1975). Studies on seed quality in MCU 7 cotton. M.Sc. (Ag.) Thesis, Tamil Nadu Agricultural Univercity, Coimbatore.

(Received : April 1994 Revised : August 1995).

Madras Agric. J., 83(4): 227-229 April 1996

EFFECT OF DIFFERENT P SOURCES ON PHOSPHORUS TRANSFORMATION AND AVAILABILITY IN MIXED BLACK CALCAREOUS SOIL

M.DHAKSHINAMOORTHY and V.MURUGAPPAN

Department of Soil Science and Agricultural Chemistry
Agricultural College and Reserch Institute
Tamil Nadu Agricultural University
Coimbatore 641 003

ABSTRACT

An incubation experiment was conducted to study the transformation of applied phosphorus into various inorganic P fractions in a mixed black calcareous soil. There were three P sources *viz.*, single superphosphate (SSP) diammonium phosphate (DAP) and Mussoorie rock phosphate. Phosphorus was applied at the rate of 60 kg P_2O_5 ha^{-1} at field capacity moisture level. These were maintained upto 60 days for transformation and inorganic P fractions were determined at 15 days intervel. The concentration of different P froms was higher with DAP followed by SSP. There was continuous increase in the P fractions with advancing incubation time upto 45 days. However, phosphorus availability was increased upto 60 days irrespective of P source. DAP resulted in highest per cent recovery into inorganic P fractions. Ca-phosphate was the dominant P from followed by RS-P, Fe-P and Al-P in all the P sources. All the P fractions were highly correlated with available P in soil. Ca-phosphate showed highest r value (0.80). The contribution of Ca-P towards P-availability was 64 per cent. The combination of different P fractions were also highly correlated with available P in soil.

KEY WORDS : 'P' Sources, Phosphorus, Transformation, Availabilty, Black Calcareous soil

A knowledge on the transformation of applied phosphorus into specific inorganic forms is important as corp plants obtain most of the fertilizer phosphorus from reaction products and not form the applied source as such. The availability of these forms of P to plant is considered as a function of its capacity,. intensity and rate factor. The nature of reaction products formed due to P transformations in the soil are influenced by serveral factors such as the nature of fertilizers added, microclimate of the rhizosphere, physico-chemical properties of the soil such as pH, $CaCo_3$ etc. Keeping this in view, an experiment was conducted to study the transformation and availability of P as influenced

MATERIALS AND METHODS

An incubation experiment was conducted in a completely randomised design with three replications. The treatments included three p sources *viz.*, single superphosphate (SSP), diammonium phosphate (DAP), Mussorie rock phosphate (MRP) applied at 60 kg P_2O_5/ha and mainatined at field capacity moisture level for 6 days. The soil smples were analysed for inorganic P forms after 15,30, 45 and 60 days of incubation. Inorganic P forms, Al-P, Fe-P, RS-P and Ca-P were determined from the soils using Chang and Jackson (1957) procedure as modified by Peterson and Corey (1966). The per cent recovery of