which was 19, 32 and 54 per cent higher over coir pith, organic mulch and control respectively. The higher kapas yield in black LLDPE mulch may be due to better conservation of soil moisture and nutrient availability. Similar findings were reported by Chovaita *et al.*, (1992) in *ber*. The next best treatment was coir pith which recorded a kapas yield of 565 kg ha^{-1}. Application of organic mulch was also found to increase the kapas yield considerably over control.

From this study, it may be concluded that mulching has got influence in improving the soil moisture content and maintaining higher level of soil temperature. Among different type of mulches, the black LLDPE mulch was found to improve the soil moisture content and increase the plant growth and yields of cotton under rainfed condition.

REFERENCES

CHHANGANI,S.(1993). Effect of mulching on growth and yield of pumpkin in the semiarid regions of Borno state. Ann.Arid Zone 12: 67-68.

CHOVAITA,R.S., PATEL,D.S., PATEL,G.V. and KALYANASUNDARAM,N.K. (1992). Effectiveness of mulches on ber (*Zizyphus mauritiana* Lamk) cv. Umran under dryland conditions. **Ann.Arid Zone 31**: 301- 302.

(Received : August 1995 Revised : January 1996)

Madras Agric. J., 83(11): 711-713 November 1996
https://doi.org/10.29321/MAJ.10.A01093

COMBINING ABILITY STUDIES FOR FODDER ATTRIBUTES IN SWEET PEARL MILLET

A. LOGASUNDARI AND A.K. FAZLULLAH KHAN

School of Genetics
Tamil Nadu Agricultural University
Coimbatore 641 003

ABSTRACT

Ten sweet pearl millet genotypes were crossed in a partial diallel and the resultant 45 hybrids were evaluated for their combining ability for 10 different fodder attributes. The results indicated that juice volume, leaf-stem ratio, number of tillers and plant height were largely under the influence of additive genes. The characters, green fodder yield, dry matter yield, days to 50 per cent flowering, number of leaves, leaf length and crude protein were influenced equally by both additive and dominant genes. Among the parents, Co-7, ICMV 87111 and TNSC-1 were the best general combiners for green fodder yield, and dry matter yield. AFB-48-1 was found to be the best general combiner for crude protein. Among the hybrids AFB 48-1 x PCB 87-24, AFB 48-1 x HC-4 and APFB 2 x Co-7 were found to be the best specific combiners for green and dry fodder yield.

KEY WORDS : Sweet Pearl Millet, Fodder Attributes, Combining Ability

Pearl millet is gaining importance as a fodder crop in India of late, though such an use is widely prevalent in Australia, USA, Korea and other European countries for a very long time. In developing pearl millet varieties or hybrids with high forage yield coupled with high quality parameters, the choice of parents is of prime importance, together with their nature of combining ability, gene action and expression of heterosis. Recently a number of new sweet pearl millet genotypes with sweet juicy stalks have been introduced in Tamil Nadu and studied for their use in grain improvement (Jayaraman 1989, Karthigeyan 1994). The present study is an attempt in evaluating the combining ability of some of these sweet pearl millet genotypes for different fodder yield related traits so as to select the best parental lines for further fodder improvement.

MATERIALS AND METHODS

Ten different sweet pearl millet genotypes selected on the basis of their fodder quality attributes were crossed in a partial diallel during summer '94. The resultant 45 crosses were evaluated during *kharif* '94 in a randomised block design replicated thrice for ten quantitative fodder traits. Each genotype was sown in two rows of three metre length, with a spacing of 30 x 10 cm. At flowering eight different fodder attributes were recorded and the crop was harvested. The juice volume and crude protein content were recorded after harvest. The data were analysed by the

Table 1. General combining ability effects of parental lines for different characters

Parent	Days to 50% flowering	Plant height	No. of tillers	No. of leaves	Leaf length	Leaf stem ratio	Juice volume	Green fodder yield	Dry matter yield	Crude protein
APFB-2	-0.06	-2.77**	-0.23**	-0.63	-2.29**	-0.03**	-5.57**	-22.86**	-8.93**	-0.04
AFB 48-1	0.25	-8.23**	-0.18**	-1.28**	-0.90	-0.02**	-1.40	4.98**	1.71**	0.24
HC-4	0.19	-6.47**	-0.06	-0.10	-0.46	0.01	-0.36	-3.11**	-2.21**	0.08
PCB 87-24	0.31*	-2.75**	-0.15**	-0.51	-1.26	0.002	1.74	-19.13**	-4.71**	0.14
APFB-3	0.11	5.34**	-0.18**	1.25**	3.38**	0.02**	1.19	-2.02**	1.33**	0.06
ICMV-87111	0.01	8.13**	-0.08	-0.69**	1.48	-0.001	3.48**	9.59**	2.40**	-0.14
TNSC-1	0.39**	0.63	0.23**	1.30**	1.16	0.02**	0.39	8.84**	3.10**	-0.14
AFB 52-12	-0.42**	5.44**	0.09	0.51	0.10	0.01	0.91	5.64**	-0.65**	-0.23
L-72	-0.25	2.83	0.04	-0.26	0.01	-0.01	0.91	7.87**	2.94**	-0.09
Co-7	-0.53**	-2.15	0.16**	0.41	-0.22	-0.001	1.80	10.20**	5.02**	0.04
SE	0.13	3.11	0.05	0.47	0.65	0.009	0.97	0.69	0.05	0.07

*P = 0.05, **P = 0.01

combining ability. The analysis of variance for combining ability and general and specific combining ability effects were estimated.

RESULTS AND DISCUSSION

The relative estimates of variance due to general and specific combining ability for the ten characters were highly significant. The relative estimates of GCA variance were greater than SCA variance for juice volume, leaf-stem ratio, number of tillers and plant height indicating that additive genes greatly influence these characters. Navale and Harinarayana (1992) and Kannan Babu and Soundrapandian (1992) have also reported additive genetic control for these characters. In the case of days to 50 per cent flowering, number of leaves, leaf length, green and dry fodder yield and crude protein content both additive as well as non-additive genes seem to have an equal importance in controlling these characters. Krishnaiya Setty and Appadurai (1992), Shinde and Desale (1985) have also reported the equal importance of both additive and non- additive gene action in governing these characters in pearl millet.

The general combining ability effects of the parents is given in Table-1. Parents with high negative gca effects for days to 50 per cent flowering could be considered the best for exploiting earlines in hybrids. Among the parents Co-7 and AFB 52-12 expressed highly significant negative gca effects and could be utilised in pedigree breeding programmes to develop early types. Attributes like plant height, number of tillers, leaves, leaf length, leaf stem ratio and juicyness are important contributing characters for fodder productivity. For improving plant height, ICMV 87111, AFB 52-12 and AFB 3 were the best and for improving tillering and leafyness TNSC- 1 was found to be the best parent. To increase the juicyness of the stem, ICMV 87111 was the best

Table 2. Specific combining ability effects of important hybrids for different characters

Hybrid	Days to 50% flowering	Plant height	No. of tillers	No. of leaves	Leaf length	Leaf stem ratio	Juice volume	Green fodder yield	Dry matter yield	Crude protein
APFB-2 x HC-4	-1.23**	-0.27	-0.41*	-2.78	-3.10	-0.01	0.59	-21.19**	-9.00**	0.74**
APFB-2 x Co-7	-1.17**	-6.69	-0.10	-2.35	1.12	0.01	-6.14*	23.67**	15.33**	-0.74**
AFB 48-1 x HC-4	-0.20	0.67	0.12	-0.07	1.58	0.02	7.16*	36.64**	15.06**	-0.86**
AFB 48-1 x PCB 87-24	0.69	-7.79	-0.09	-3.39*	-2.07	0.07*	-3.98	52.59**	18.90**	-0.10
HC-4 x PCB 87-24	0.92*	-6.41	-0.25	-2.44	-0.82	-0.05	2.67	24.09**	9.38**	0.41
HC-4 x TNSC-1	0.33	-9.27	-0.47*	-3.91*	-4.91	-0.02	-8.42*	20.11**	9.77**	-0.13
APFB-3 x Co-7	-1.34**	12.13*	0.19	1.50	-0.75	0.01	3.11	15.17**	5.84*	-0.17
ICMV 87111 x TNSC-1	-0.48	11.07	-0.11	-1.52	0.31	-0.01	1.58	19.34**	11.40**	-0.02
ICMV 8711 x L-72	-0.84	-4.93	-0.32	-3.76*	-7.47*	-2.02	0.65	17.31**	8.99*	0.05
TNSC-1 x Co-7	-0.62	-6.91	-0.31	3.79*	-1.36	-0.01	1.09	28.64**	9.01*	0.27
AFB 52-12 x Co-7	1.85**	-1.81	-0.11	-2.96	-5.64	-0.01	0.19	-36.50**	-5.12*	0.70**

parent. The ultimate major objective of any forage breeding programme will aim at high green and dry fodder production. The parents Co-7, ICMV 87111, TNSC-1 and L 72 registered very high positive significant gca effects for both these characters and would be very valuable in pedigree breeding programmes. For increasing crude protein content, AFB 48-1 and PCB 87-24 would be the best parents.

The specific combining ability effects of the hybrids are given in Table-2. Six of the hybrids ie. AFB 48-1 x PCB 87-24, AFB 48-1 x HC 4, APFB 2 x Co-7, HC 4 x PCB 87-24, HC 4 x TNSC-1 and ICMV 87111 x TNSC-1 recorded highly significant and positive sca effects for both green and dry fodder yield. Among these, AFB 48-1 x HC 4 also recorded significant sca effect for leaf-stem ratio. The hybrids APFB 2 x HC 4 and AFB 52-12 x Co-7 were the best with regard to sca effect for crude protein content. The hybrids APFB-3 x Co-7, TNSC-1 x Co-7 and ICMV 87111 x L 72 also recorded high positive sca effects both green and dry fodder yields.

REFERENCES :

BURTON, G.W. and POWELL, J.B., (1968). Pearl millet breeding and cytogentics. **Adv. Agron., 20 :** 50-89.

CHOI, H.B., PARK, K.Y. and PARK, R.K., (1990). Productivity and feed value of pearl millet (*Pennisetum americanum* (L.) Leeke) grown as a newly introduced forage crop. **J. Korean Soc. Int. Agric., 1:** 71-84.

GRIFFING, B. (1956). Concept of general and specific combining ability in relation to diallel crossing systems. **Aust. J. Biol. Sci., 9:** 463-493.

JAYARAMAN, N. (1989). **Genetic parameters for sweetness of stem and grain yield in pearl millet (*Pennisetum glaucum* (L.) R. Br.),** Ph.D. Thesis, Tamil Nadu Agricultural University, Coimbatore.

KANNAN BABU, J.R. and SOUNDARAPANDIAN, G. (1992). Combining ability of certain populations and land races of pearl millet (*Pennisetum americanum* (L.) Leeke). **Madras Agric.J., 79:** 492-496.

KARTHIGEYAN, S. (1994). **Studies on heterosis and combining ability in Sweet pearl millet (*Pennisetum glaucum* (L.) R. Br.).** M.Sc. (Ag.) Thesis, Tamil Nadu Agricultural University, Coimbatore.

KRISHNAIAH SETTY, B.V. and APPADURAI, R. (1992). Heterosis and combining ability studies in some non restorer and restorer lines of pearl millet (*Pennisetum americanum* (L.) Leeke). **Madras Agric. J., 79:** 82-89.

NAVALE, P.A. and HARINARAYANA, G. (1992). Combining ability in S1 derived lines of pearl millet. **J. Maharastra Agric Univ., 17 :** 264- 266.

SHINDE, D.V. and DESALE, J.S. (1985). Heterosis and combining ability studies in pearl millet (fodder components). **Current Research Reporter, Mahatma phule Agrl. Univ., 1 :** 21-26.

(Received : August 1995 Revised : September 1995)

Madras Agric. J., 83(11): 713-715 November 1996

CHARCOAL RECOVERY FROM *Prosopis juliflora* FUELWOOD AND ROOTSTOCK

V.CHELLAMUTHU, T.N.BALASUBRAMANIAN AND SP.PALANIAPPAN

Department of Agronomy
Agricultural College and Research Institute
Tamil Nadu Agricultural Universtiy
Coimbatore 641 003

ABSTRACT

Studies on charcoal recovery from fuelwood billets of different dia classes (<2.5 cm, 2.6 to 4.5 cm, 4.6 to 6.5 cm, 6.6 to 8.5 cm, 8.6 to 10.5 cm and >10.5 cm) as well as from the rootstocks (10.5 cm dia) of *Prosopis juliflora* (Swartz) DC revealed that charcoal recovery increased with the increase in diameter of fuelwood billets. Comparing the charcoal recovery per cent between the fuelwood billets and root stock of *P.juliflora* of the same dia class (>10.5 cm), the charcoal recovery was more from rootstocks than fuelwood billets.

KEY WORDS: *Prosopis juliflora*, Fuel wood, Rootstock, Charcoal, Recovery

More than 1.5 billion people in the developing countries depend on fuelwood and charcoal for cooking and heating (Arnold and Jongma, 1978). This dependency on fuelwood and charcoal has affected reserve forest to a reater extent. This problem could be tackled through encouraging green wood cover in the wastelands with fast growing leguminous multi purpose tree species such as *Prosopis juliflora*. The fast growing *P. uli ora* has been recommended all over the