Website : www.asthafoundation.in
Frontiers in Crop Improvement
Vol 11 (1) : 27-30 (January-2023) Print ISSN : 2393-8234 Online ISSN : 2454-6011
Astha Foundation, Meerut (U.P.) India

Evaluation of Quality Parameters in Fodder Maize Genotypes Sown under Different Dates of Sowing

Umer Rashid Bhat[1], Bilal Ahmad Lone[2], Moneesa Bashir[1], Wani Barkatul Islam[3], Mohd. Aslam Dar[4], Sabia Akhter[2], Ambreen Nabi[2], Shazia Ramzan[2], Vaseem Yousuf[2] and Bhinish Shakeel[2]

[1]*Division of Agronomy, FOA, Wadura, Sopore, SKUAST-Kashmir, J&K*

[2]*KVK Budgam, SKUAST-Kashmir, J&K*

[3]*Division of Floriculture and Landscape Architecture, FOH, Shalimar, Srinagar, SKUAST-Kashmir, J&K*

[4]*Division of Genetics and Plant Breeding, FOA, Wadura, Sopore, SKUAST-Kashmir, J&K*

Abstract

A field experiment was carried out at Agronomy research farm, FoA, Wadura,Sopore, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir during *kharif* 2019. The experiment comprised of two factors with four dates of sowing viz. 30th April, 10th May, 20th May and 30th May as main plot treatments and three genotypes viz. SFM-1, PMC-6 and J-1006 as sub-plot treatments laid in split plot experimental design replicated thrice with the aim to find out optimum sowing date and genotype with respect quality parameters.The investigationresults depicted that quality parameters viz; Protein content,ash content, neutral detergent fiber and acid detergent fiber were statistically higher on 30th April sowing date, while lowest with 30th May sowing date except protein content which showed non-significant effect with sowing dates.Among genotypes SFM-1 recorded higher protein content, ash content, acid detergent fiber, and lowest neutral detergent fiber respectively and J-1006 noticed lower quality parameters except higher neutral detergent fiber but statistically at par with PMC-6.

Key words : *Sowing dates, genotypes, acid detergent fiber, neutral detergent fiber, ash content, protein content.*

Introduction

Maize (*Zea mays* L.) is the third major cereal crop of the world and in India ranks third after wheat and rice. Maize is considered as extensive cereal crop primarily due to highest productivity among cereals and acquires wider adaptability in varied agroclimatic conditions hence, known as 'Queen of Cereals' [1]. In world around 190 million hectares of area with production of about 1438 million tonnes is under maize cultivation [2]. In India about 9.50 million hectares with annual production of 27.23 million tonnes and productivity of 2870 kg hectare^{-1}is under maize cultivation [3]. The area under fodder production in India is around 9.85 million hectares and accounts only 4 percent of cultivated area and production of about 462 million tonnesfor green fodder and 394 million tonnesfor dry fodder respectively [4.] In the union territory of Jammu and Kashmir maize is the second most important cereal cropafter rice and is grown on an area of 0.31 miilion hectare with production of 0.51 million tonnes with an average productivity of 1650 kg ha^{-1} [3]. In union territory of Jammu and Kashmir, about 90.6% of the total area under maize is planted under rainfed conditions [5]. Maize (*Zea mays* L.) is considered as important double-purpose cropgrown widely in *kharif* season used in human diet as grain as well as animal feed. Maize forage supplies large amounts of energy rich forage for dairy animal diets; free from anti nutritional factorsso can be fed to cattle at any growth stage [6]. The maize crop is having many desirable fodder qualities due to which it is preferred as compared to other cultivated non fodder crops viz; high productivity, high production potential, broader adaptability, rapid growing nature, succulence, palatability, free from toxicants, rich in protein and minerals and having highdigestibility than non-legume fodder, body weight and milk quality increases in cattle [7]. Hence, it is widely known as ready-made fodder crop. Maize is highly nutritive, excellent, and sustainable fodder for livestock [8]. The green fodder of maize possesses lactogenic properties and therefore, suited for milch cattle [9]. There ismodifying effect on the growth and development of maize plants with the environmental changes (sunshine, temperature) associated with different sowing dates. Growth and yield of maize is significantly affected by sowing dates. Greater the deviation from optimum date of sowing of each hybrid greater the reduction in yield [10]. One of the challenges for maize growers at present is to findthe narrow interval between sowing earlier and sowing later [11]. Maize sown earlier performs better and yields moredue to the fact that the vegetative phaseof life cycle prevails in the cooler part of the season with less moisture stress [12]. Early sowing is beneficial compared to latesowing due to long growth span which allows more choice of hybrid maturities and more chances for re plant. In earlier sowing tasseling and silking period lies before to moisture stress risk and

Received : September-2022; Revised : September-2022; Accepted : October-2022

Table-1 : Protein content, ash content, neutral detergent fiber (NDF %) and acid detergent fiber (ADF %) of maize as influenced by sowing dates and genotypes.

Treatments	Protein content (%)	Ash content (%)	Neutral detergent fiber (NDF %)	Acid detergent fiber (ADF %)
Dates of sowing				
30th April	9.11	8.58	65.48	42.75
10th May	9.10	8.45	65.06	42.26
20th May	9.09	8.37	64.79	41.97
30th May	9.09	8.25	64.49	41.35
SEm±	0.01	0.03	0.07	0.06
CD (P= 0.05)	NS	0.10	0.23	0.19
Genotypes				
SFM-1	9.13	8.45	64.48	42.35
PMC-6	9.08	8.41	65.13	42.02
J-1006	9.07	8.39	65.25	41.88
SEm±	0.003	0.01	0.07	0.05
CD (P= 0.05)	0.01	0.03	0.21	0.15

drought damage [13]. Harvesting is done earlier in the season when conditions are better which minimize time losses [14]. One of the advantages of early sowing is that female flowering happens before month of July which is the month of stressbecause of water deficiency. Late sowing adversely decline maize production viz; the effective growing season is shortened,crop photo-synthesisis declines and crop is exposed to high risk lethal cold temperatures before grain maturation late in the season, insect and disease stress and moistureandheat stress during pollination. There is accelerated crop development in late sowings due to presence of increased temperatures during crop duration which decline assembled solar radiation causing reduction in biomass production [13]. Choosing of appropriate sowing date with a good varietyguarantee higher maize production in addition to recommended agromanagement practices [15]. For achieving higher efficiency from available nutrients, water, and solar energy, selection of optimum sowing date for already existing varieties is unavoidable [16].

Materials and Methods

The present investigation was carried at the Agronomy Research Farm, FoA, Wadura, Sopore, SKUAST-Kashmir during *kharif* 2019 that lies between 34° 21' N latitude and 74° 23' E longitude having an altitude of 1590 m above the mean sea level. The climate is temperate and continental type characterized by hot summers and severe winters with average annual precipitation is 812 mm (average of past thirty years) and more than 80 percent of precipitation occurs during December to April in the form ofrains and snow received from western disturbances. The mean maximum and minimum temperatures during crop growth season were 33.34 °C and 6.81 °C respectively.The total precipitation amounted to 398.1 mm during crop growth season. The soil of the experimental site was silty clay loam in texture, with medium in available nitrogen, phosphorus and potassium and neutral pH.The experiment consisting of two factors viz., four sowing dates (30th April, 10th May, 20th May and 30th May) and three genotypes (SFM-1, PMC-6 and J-1006) laid out in split plot design (SPD) taking sowing dates as main plots treatments and genotypes as sub plot treatments with three replications. A fertiliser dose of 10 t ha^{-1}FYM, 120 kg ha^{-1}nitrogen,60 kg P_2O_5 $ha^{-1}$and 40 kgK_2O $ha^{-1}$was applied uniformly to each plot. For the purpose of recording data, five plants were randomly selected and tagged from every plot of each replication.

Protein content (%) : The nitrogen (N) content was estimated by the modified micro Kjeldahl procedure and expressed in percentage. Protein content was calculated from the N content by multiplying with a factor 6.25.

Total ash content (%) : Ash content of ground samples was determined by the method described by A.O.A.C[17]. The total ash was calculated by the following formula and expressed in percentage.

$$\text{Total ash (\%)} = \frac{\text{Weight of ash}}{\text{Weight of sample}} \quad 100$$

Neutral detergent fiber (NDF %) and acid detergent fiber (ADF %) : The concentrations of neutral detergent fiber (NDF) and acid detergent fiber (ADF) were determined using proximate analysis (Van Soest fiber analysis [18].

Calculation :

Weight of sample = W_1 g

Weight of empty crucible = W_2 g

Weight of crucible + NDF = W_3g

Weight of NDF = $(W_3 - W_2)$ g

$$\% \text{ of NDF} = \frac{W_3 - W_2}{W_1} \quad 100$$

Weight of sample = W_1 g

Weight of empty crucible = W_2 g

Weight of crucible + ADF = W_3g

Weight of ADF = $(W_3 - W_2)$ g

$$\% \text{ of ADF} = \frac{W_3 - W_2}{W_1} \quad 100$$

Results and Discussion

Protein content (%) : Data obtained in (Table-3) examined that sowing dates impact statistically non-significant effect on protein content, while as protein content differed significantly among genotypes. Higher protein content reported in sowing date 30th April while as lowest protein content obtained on 30th May sowing date. [19] obtained that delayed sowing resulted in lower quality of forage. [20] that delayed sowing had inverse effect on protein content and maximum protein content was obtained from early sowing. SFM-1 obtained higher protein content followed by PMC-6 and J-1006 respectively. It might be possible that varieties differ in nitrogen use efficiency. [21] Concluded that sorghum varieties have varying nitrogen use efficiencies. Protein content has been varied among studied genotypes in cereals as examined by [22, 23].

Ash content (%) : Data marked in (Table-3) reported that 30th April sowing recorded highest ash content. And lowest ash content was noticed with 30th May sowing date.The more ash content in case of 30th April may be contributed by more dry matter content which improved uptake of nutrients by the plants. [24] Confirmed that early sowing leads to more ash content than late sowing. SFM-1 recorded highest ash content followed by PMC-6 and J-1006 respectively. This may be attributed to the fact that SFM-1 recorded higher dry content matter which improved mineral matter. Ash content varied among genotypes as noticed by [25] and [26].

Neutral detergent fiber (NDF %) and acid detergent fiber (ADF %) : Data pertaining in (Table-3) indicated sowing on 30th April registered significant higher neutral detergent fiber and acid detergent fiber respectively. While as lowest neutral detergent fiber and acid detergent fiber was recorded on 30th May sowing.Early sowing increases neutral detergent fiber (NDF %) and acid detergent fiber (ADF%) because crop sown earlier attains full maturity due to more number of days taken to harvest of crop which results in more accumulation of lignin, cellulose and hemicellulose in forage than late sowing in which crop does not attain full maturity and results in lower neutral detergent fiber (NDF %) and acid detergent fiber (ADF %) in forage. [27] investigated that neutral detergent fiber and acid detergent fiber content is dependent on age of plant at harvest and increases with that advancement of maturity so, age of plants at harvest is different with different dates of sowing which consequently increases or decreases neutral detergent fiber and acid detergent fiber in forage Similar explanation given by [28] and [29]. Among genotypes, SFM-1 reported lowest neutral detergent fiber and highest acid detergent fiber respectively than J- 1006, recorded higher neutral detergent fiberand lower acid detergent fiber respectively. [30, 31, 32] noticed variation in neutral detergent fiber and acid detergent fiber of fresh corn stover among different varieties.

Conclusions

Present investigation concluded that to realize desired quality parameters of fodder maize sowing should be carried around 30th April and with genotype SFM-1 respectively.

References

1. Choudhari V.V. and Channappagouda B.B. (2015). Effect of organics on morpho-physiological traits and grain yield of maize (*Zea mays* L.). *The Bioscan.,* 10(1): 339-340.
2. Food and Agriculture Origanisation, 2019.
3. Directorate of Economics and Statistics, 2019
4. Directorate of Economics and Statistics, 2015
5. Directorate of Economics and Statistics, 2017.
6. Dahmardeh M., Ghanbari A., Syasar B. and Ramroudi M. (2009). Effect of intercropping maize with cowpea on green forage yield and quality evaluation. *Asian Journal of Plant Science,* 8(3): 235-239
7. Sattar M.A., Haque M.F., Rahman M.M. (1994). Intercropping maize with broadcast rice at different row spacing. *Bangladesh Journal of Agricultural Research,* 19: 159-164.
8. Iqbal A., Ayub M., Zaman H. and Ahmed R. (2006). Impact of nutrient management and legume association on agroqualitative traits of maize forage. *Pakistan Journal of Botany,* 38: 1079-1084.
9. Valk H. (2000). Effect of reducing nitrogen fertilizer on grassland on grass intake, digestibility and milk production of dairy cows. *Livestock production Science,* 63(1): 27-38.
10. Berzsenyi Z. and Lap D.Q. (2001). Effect of sowing time and N fertilisation on the yield and yield stability of maize (*Zea mays* L.) hybrids between 1991-2000. *Novenytermeles,* 50(2): 309-331.
11. Nielsen R.L., Thomson P.R., Brown G.A., Halter A.L., Wells J. and Wuethricc K.L. (2002). Delaying planting date effects on flowering and grain maturation of corn. *Agronomy Journal,* 93: 540-547
12. Ali Q., Ali A., Waseem M., Muzaffar A., Ahmad S., Ali S.,

Awan M. and Samiullah T. (2014). Correlation analysis for morpho-physiological traits of maize (*Zea mays* L.)." *Life Science Journal,* 11: 9-13.

13. Otegui M.E. and Melon S. (1997). Kernel set and flower synchrony within the ear of maize. I. Sowing date effects. *Crop Science,* 37: 441-447.
14. Hicks D.R., Harrington I.D. and McGahen J.H. (1993). Maximizing the advantages of early com planting. National corn handbook crop management. West Lafayette, Indiana, USA: Purdue University Cooperative Extension Service.
15. Qureshi A.S., Qadir M., Heydari N., Turral H. and Javad A. (2007). A review of management strategies for salt-prone land and water resources in Iran. International water management Institute 30P (IWMI working paper 125) Colombo, Srilanka.
16. Ogbomo K.E.L. and Remison S.U. (2009). Growth and yield of maize as influenced by sowing date and poultry manure application. *Notulea. Botanicae. Horti. Agrobotanici. Cluj.,* 37(1): 199-203.
17. A.O.A.C. (1995). Official Methods of Analysis. Association of Official Analytical. Chemists. 16th ed. Arlington, Virginia, USA.
18. Goering H.K. and Soest Van P.J. (1970). Forage fiber analysis (apparatus, reagents, procedures, and some applications). *Agricultural Research Service* (ARS-USDA, Washington, D.C. Handbook No. 379.
19. Darby H.M. and Lauer J.G. (2002). Planting date and hybrid influence on corn forage yield and quality. *Agronomy Journal,* 94(3-4): 281-289.
20. Mokhtarpur H., Mosavat S.A., Feyzbakhsh M.T. and Saberi A. (2008). Effect of sowing date and planting density on ear yield of sweet corn in summer sowing. *Electronic Journal of Crop Production,* 1(1): 101-113.
21. Pal U.V., Singh V.P., Singh R. and Verma S.S. (1983). Growth rate, yield and nitrogen uptake response of grain sorghum (*Sorghum bicolor* (L) Moench) to nitrogen rates in humid subtropics. *Fertilizer research,* 14(1): 3-12.
22. Ma G.S., Xue J.Q., Lu H.D., Zhang R.H., Tai S.J., Ren J.H. (2007). Effects of planting date and density on population physiological indices of summer corn (*Zea mays* L.) in central Shaanxi irrigation area. Ying Yong Sheng Tai Xue Bao, 18(6): 1247-1253.
23. Xu X., Yuan H., Li S. and Monneveux P. (2007). Relationship between carbon isotope discrimination and grain yield in spring wheat under different water regimes and under saline conditions in the Ningxia Province (North-west China). *Journal of Agronomy and Crop Science,* 193(6): 422-434.
24. Koca O.Y. and Canavar O. (2014). The effect of sowing date on yield and yield components and seed quality of corn (*Zea mays* L.). *Scientific Papers. Series A. Agronomy,* 12(7): 227-231
25. Roussel V., Branlard G., Vezine J.C., Bertrand D. and Balfourier F. (2005). NIRS analysis reveals temporal trends in the chemical composition of French bread wheat accessions cultivated between 1800 and 2000. *Journal of Cereal Science,* 42(2): 193-203.
26. Merah O., Deléens E., Souyris I. and Monneveux P. (2001). Ashes content might predict carbon isotope discrimination and grain yield in durum wheat. *New Phytologist,* 149(2): 275-282.
27. Salama A.S.H. (2019). Yield and nutritive value of maize (*Zea mays* L.) forage as affected by plant density, sowing date and age at harvest. *Italian Journal of Agronomy,* 14(1383): 114-121.
28. Gaile Z. (2008). Harvest time effect on yield and quality of maize (*Zea mays* L.) grown for silage. *Latvian Journal of Agronomy,* 10: 104-111.
29. Ball D.M., Collins M., Lacefield G.D., Martin N.P., Mertens D.A., Olson K.E., Putnam D.H., Undersander D.J. and Wolf M.W. (2001). Understanding forage quality. *American Farm Bureau Federation Publication,* 1-01, Park Ridge, Illinois, USA.
30. Lynch P.J., Okiely P. and Doyle M.E. (2012). Yield, quality and ensilage characteristics of whole-crop maize and of the cob and stover components: Harvest date and hybrid effects. *Grass and Forage Science,* 67(4): 1365-2494.
31. Tang S.X., Gan J., Sheng L.X., Tan Z.L. and Tayo G.O. (2008). Morphological fractions, chemical compositon and invitro fermentation of maize stover of five genotypes. *Animal,* 12: 1772-1779.
32. Om Singh (2022). Evaluation of yield potential of forage maize (*Zea mays*) with legumes in inter-cropping system under organic manure nutrient management. *Progressive Research : An International Journal*, 17(1): 62-64.