Journal of the Saudi Society of Agricultural Sciences (2016) xxx, xxx–xxx

King Saud University

Journal of the Saudi Society of Agricultural Sciences

www.ksu.edu.sa
www.sciencedirect.com

FULL LENGTH ARTICLE

# The effects of cutting interval on agro-qualitative traits of different millet (*Pennisetum americanum* L.) cultivars

**Mehmood Ali Noor** [a,*], **Sajid Fiaz** [b], **Ali Nawaz** [c], **Muhammad Mohsin Nawaz** [a]

[a] *Institute of Crop Science, Chinese Academy of Agricultural Sciences, Key Laboratory of Crop Physiology and Ecology, Ministry of Agriculture, Beijing 100081, China*
[b] *China National Rice Research Institute, State Key Laboratory of Rice Biology, Hangzhou 310006, Zhejiang, China*
[c] *Department of Agronomy, University of Agriculture, Faisalabad 38040, Pakistan*

Received 21 April 2016; revised 28 June 2016; accepted 11 July 2016

**KEYWORDS**

Millet;
Phenology;
Harvest time;
Forage yield;
Forage Quality

**Abstract** A field experiment was conducted to study the forage yield and qualitative traits of different varieties of millet with different days of harvest during the summer, 2014 at Agronomic Research Area, University of Agriculture Faisalabad. Experiment was laid out in randomized complete block design (RCBD) under factorial arrangement having three replications. Pearl millet seeds of three varieties viz. BS-2011, Ghana White and MB-87 were grown in 30 cm apart rows. Net plot size was 3.6 m × 8.0 m. Three different harvesting times were adopted i.e. 55, 65 and 75 days after sowing (DAS). Maximum plant height of pearl millet was recorded for cultivar BS-2011 at harvest time of 75 DAS. Maximum leaf area per plant was observed for the cultivar BS-2011 when it was harvested 75 DAS. Maximum dry matter percentage was also attained in cultivar BS-2011 where plots were harvested at 75 DAS. The highest forage yield was obtained where variety BS-2011 was grown and harvested at 75 DAS. Similarly, maximum dry matter production of BS-2011 was recorded in plots harvested at 75 DAS followed by Ghana White and MB-87 harvested at 55 DAS. Higher crude protein content was recorded where plots were harvested at 55 DAS and cultivar BS-2011 was sown. Higher crude fiber and total ash percentage was also seen in BS-2011. Finally, cultivar BS-2011 proved best for cultivation with harvest time of 75 DAS under Faisalabad conditions to obtain higher forage yield and better quality.


* Corresponding author. Fax: +86 010 82108752.
E-mail addresses: mnoor@ksu.edu.sa, mehmood2017@gmail.com (M.A. Noor).
Peer review under responsibility of King Saud University.

ELSEVIER Production and hosting by Elsevier

## 1. Introduction

In a country like Pakistan where subsistence farming is prevalent and landholding is small, livestock is an important segment of farming systems. However, due to increasing population and change in land use, livestock is facing severe

http://dx.doi.org/10.1016/j.jssas.2016.07.002
1658-077X © 2016 The Authors. Production and hosting by Elsevier B.V. on behalf of King Saud University.
This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Please cite this article in press as: Noor, M.A. et al., The effects of cutting interval on agro-qualitative traits of different millet (*Pennisetum americanum* L.) cultivars. Journal of the Saudi Society of Agricultural Sciences (2016), http://dx.doi.org/10.1016/j.jssas.2016.07.002

competition for resources, especially land. Livestock provides food as well as offer draught services for farm processes. Furthermore, it can contribute to crop production in the form of farmyard manure. Livestock is one of the main sub-sectors of agriculture in Pakistan and plays a main role in the economy of the country particularly in rural economy. Livestock contributed approximately 56.3% of the agricultural value addition and 11.8% to the national gross domestic production during 2014–2015 (Government of Pakistan, 2015). In support of a more competent as well as prolific livestock industry, production of enormous amount as well as high-quality forage is the basic necessity. Area under fodder crops is about 2.35 million hectares in Pakistan which is 12% of the total cultivated area of Pakistan (Govt. of Pakistan, 2013). Fodder crops show essential part in the agricultural economy of emerging countries by providing low-priced means of feedstuff for livestock.

In Punjab fodder crops are grown on an area of 2.7 million hectares, with once a year forage production of 57 million tones, providing an average forage yield of 21.1 t $ha^{-1}$ (Bhatti, 2001; Bilal et al., 2001). Due to less yield $ha^{-1}$ and minimum area under fodder crops, the available fodder amount is one third less than required and shortage is increasing due to reduction in area under fodder crops by 2% after each decade (Sarwar et al., 2002).

Among choices to control the scarcity of forage, the most important are cultivation of high yielding crop varieties (Bilal et al., 2001) and efficient resource use crop production through better agronomic management practices. Many studies have evidenced cultivar variation in forage yield. Significant differences have been reported among the pearl millet cultivars for yield and quality traits (Ashraf and Harris, 2004). Every cultivar has its own set of optimal agronomic practices and management regimes, also subjected to prevailing agro ecological conditions, to yield maximum.

Modern trend of worldwide agriculture is to explore prolific, environment friendly and sustainable cropping pattern by adopting integrated methods of management including nutrition management of crop, proper sowing method and selecting appropriate stage for harvesting (Crew and Peoples, 2004). Horizontal rise in forage production is almost impossible because of rapid elevation in population as well as decline in cultivated area. So the feasible approach is now to improve its yield per unit area. The time of harvest is a major factor affecting the yield and quality of forage. There are studies that proved the effects of harvesting interval not only on yield but quality of forage produce, which ultimately is an important aspect of forage production. Ram and Singh (2007) reported that harvesting interval affects the chemical composition of forages and according to Joshi et al. (2004), yield mostly increases as the harvesting time is extended but quality is reduced. Selection of proper harvesting interval and usage of efficient planting pattern improve the total mixed green forage yield as well as crude protein (Iqbal et al., 2006).

Whether it is for livestock raised at family owned small farms or private sector led commercial livestock farms, supply of quality forage is essential to add to the net productivity of livestock farming. Hence, determining the optimal crop harvesting calendar to reap maximum gains in terms of yield, quality and efficiency of resources utilized is important. Current study was therefore, planned to determine the effect of harvest time on agro-qualitative traits and green forage yield of different Millet (*Pennisetum americanum* L.) cultivars under agro-ecological conditions of Faisalabad.

## 2. Materials and methods

### 2.1. Experimental

Field experiment was carried out at Agronomic Research Area, University of Agriculture Faisalabad, during the summer 2014. Bold and healthy seeds of millet crop were selected and obtained from Punjab Seed Corporation, Faisalabad. Seeds were sown on 27th June 2014 and three harvesting times were selected i.e. harvesting at 55, 65 and 75 days after sowing (DAS), respectively. Forage yield from each plot was recorded after sun drying and computed on hectare basis.

The crop was laid out in randomized complete block design with three replications, grown in 30 cm apart rows using three varieties of pearl millet viz. MB-87, BS-2011 and Ghana White, which were harvested at three different times. Physio-chemical analysis of experimental soil was conducted before sowing indicating that the experimental soil was clay loam with slight alkaline reaction (Table 1). Average climatic features for the whole crop season were also presented in Fig. 1. Previous crop in the experimental area was wheat, grown with recommended agronomic practices.

### 2.2. Treatments

$V_1H_1$ = Cultivar MB-87, harvested at 55 DAS.
$V_1H_2$ = Cultivar MB-87, harvested at 65 DAS.
$V_1H_3$ = Cultivar MB-87, harvested at 75 DAS.
$V_2H_1$ = Cultivar BS-2011, harvested at 55 DAS.
$V_2H_2$ = Cultivar BS-2011, harvested at 65 DAS.
$V_2H_3$ = Cultivar BS-2011, harvested at 75 DAS.
$V_3H_1$ = Cultivar Ghana white, harvested at 55 DAS.
$V_3H_2$ = Cultivar Ghana white, harvested at 65 DAS.
$V_3H_3$ = Cultivar Ghana white, harvested at 75 DAS.

### 2.3. Cultural operations

After harvesting previous crop, seed bed was prepared by cultivating the field for 3–4 times each followed by planking. Recommended dosage of Nitrogen and Phosphorus (60–60 kg $ha^{-1}$) was applied. Half dose of nitrogen was applied with 1st irrigation. Seed rate was 15 kg $ha^{-1}$ with line sowing by single row hand drill, keeping row to row distance of 30 cm. Three irrigations were applied overall during the growing season. One hand weeding was done after about 20–30 days of sowing to eradicate weeds. All other agronomic practices were kept normal and uniform throughout the experiment.

### 2.4. Measurements

#### 2.4.1. Phenology

Population of pearl millet from three randomly selected places of one square meter from each plot was counted and averaged. Leaves of ten randomly selected plants of pearl millet from each plot were counted and mean was calculated. Similarly,

Please cite this article in press as: Noor, M.A. et al., The effects of cutting interval on agro-qualitative traits of different millet (*Pennisetum americanum* L.) cultivars. Journal of the Saudi Society of Agricultural Sciences (2016), http://dx.doi.org/10.1016/j.jssas.2016.07.002