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Influence of Sowing Dates on Fodder Yield Production of Berseem under the Climatic Condition of Peshwar Valley

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Abstract
Research work under the title "Influence of sowing dates on fodder yield production of berseem under the climatic condition Peshawar" was conducted at New Developmental Farm, The University of Agriculture Peshawar, Khyber Pukhtonkhwa Pakistan, during the session 2012-2013. Experiment was laid out in randomized complete block design (RCBD) having three replications. Sowing dates (15th November 2012, 15th December 2012, 15th January 2013, and 15th February 2013) were allotted to main plots. Plots sown in November and December showed better performance as compared with sowing in January and February. Sowing dates had significant effect on emergence me-2, fresh forage yield kg ha^{-1}, dry matter yield at 20 days after first cut, days to 75% flowering. Maximum emergence m^{-2} (368), fresh forage yield (17233 kg ha^{-1}), dry matter yield at 20 days after first cut (12916 kg ha^{-1}), days to 75% flowering (173 days) were obtained from sowing on 15th November. It was concluded that planting of berseem either on 15th November or 15th December were better in terms of fodder yield production, and thus recommended for obtaining maximum yield in agro-climatic condition of Peshawar.
Keywords: clover, berseem, sowing dates, fresh forage yield

INTRODUCTION

Agriculture is the mainstay and backbone of Pakistan economy, contributing nearly 20.9 % of gross domestic product (GDP) and 43.4 % of the total employment generation. Livestock contributes more than 50 % of agriculture value added, more than the contribution of all other crops (48%) and 11% in national GDP (Economic Survey of Pakistan, 2007).

Berseem grown in various parts of Pakistan. Berseem (*Trifolium alexandrinum* L.) called "Egyptian clover" belongs to family "Papillionaceae (Leguminoseae)" and genus "Trifolium". Berseem is an annual, cool season forage crop. There is a large number of livestock in the country which need a constant supply of fresh forage yield. Due to the extra ordinary regenerative power, berseem gives several cuttings during its growing season and supplies nutritious, palatable and succulent forage for animals. Normally 4-6 cuttings of berseem are taken in Pakistan (Graves et al., 1996). It is fed either green or in hay form, when seasonal conditions permit. Seed production of berseem is confined to irrigated areas in Pakistan, which plays an important role in farm-economy but the practices of obtaining 4-6 cuttings result in very poor seed yield because multi-cutting exhausts the root reserve and nutrients in the soil. This reduction in seed production has resulted in import of clover seeds (Chaudhry et al., 1994).

Low fodder production and lesser feed availability are the major limiting factors for increasing livestock productivity in Pakistan, particularly in Khyber Pukhtunkhwa. Improvement in livestock production depends on the proper quality and quantity of feed (Amanullah *et al*., 2005).

Sowing of berseem in November gives maximum green forage yield and seed production (Baig, 2000). Delay in sowing from 1st October to 15th November decreased fresh and dry forage yield but increased the seed yield (Virendra *et al.,* 2000).

Cutting is very important practice for increasing the forage as well as seed yield of berseem and shaftal (Mukharjee and Mandal, 2000). Improved seed production of berseem and shaftal require proper sowing time and efficient method of planting (Garza and Marquez, 1994).

The recommended sowing date of berseem is last week of September to mid October, however due to harvesting of summer crops as well as farmers engagements in other field activities planting of clovers is delayed. The present study was designed to determine the effect of late dates of sowing to get higher forage yield kg ha^{-1} under the irrigated conditions of Peshawar valley.

MATERIALS AND METHODS

To investigate the influence of sowing dates on fresh forage yield of berseem. An experiment was conducted at New Developmental Farm, The University of Agriculture Peshawar, Pakistan During the session 2012-13. The soil of experimental site was silty clay-loam with a clay type montmorillonite, low in nitrogen (0.03-0.04 %),

low in organic matter (0.8-0.9%) and alkaline in nature with pH of 8.0-9.2. A local variety (Peshawar Local) was sown in randomized complete block design (RCBD) having three replications. Sowing dates (15th November 2012, 15th December 2012, 15th January 2013 and 15th February 2013) were allotted to main plots (Factor A). Plot size of 4 m × 3 m (12 m^2) was used in the experiment. A basal dose of fertilizer was applied at the rate of 25 kg N ha^{-1} from urea and 60 kg P ha^{-1} from SSP (single super phosphate) at the time of planting. Two irrigation channels were made to irrigate the field. Seed at the rate of 30 kg ha^{-1} of berseem was applied through broad casted in standing water. Data regarding emergence m^{-2}, fresh forage yield kg ha^{-1}, dry matter yield at 20 days after first cut (80 days after sowing) kg ha^{-1} and days to 75% flowering were recorded. Data regarding emergence m^{-2} was taken one week after sowing by placing one meter square iron ring randomly in three different places in each treatment. The number of seedling were counted and then average number of seedling m^{-2} was work out. At 60 days after sowing all the plots were harvested. The material was weighed, and then converted into fresh forage yield (kg ha^{-1}). Then 20 days after first cut, the plots were harvested again, the material was weighed and converted into fresh yield (kg ha^{-1}). The material was then sundried for 2 weeks, weighed and converted into dry yield (kg ha^{-1}). Days to 75 % flowering was calculated from the date of sowing to more than 75% flowering formation.

RESULTS AND DISCUSSIONS

Emergence m^{-2}

Emergence m^{-2} data is presented in Table 1. Statistical analysis of the data illustrated that sowing date had significant effect on emergence m^{-2}. Maximum emergence m^{-2} (368) was recorded from sowing on 15th November, followed by sowing on 15th December (336), while minimum emergence m^{-2} (200) was recorded on 15th January. Good emergence and germination, desired for optimum plant population, plays a key role in the yield of a crop especially in the forage yield. The temperature of the soil during the germination period of plots sowing on different dates was within the different range of optimum temperature for germination of berseem seeds, so all the plots had different germination percentage. It is may be due the variation in temperature and different environmental conditions for different planting dates. This conformity with Garza et al., (1996) reported that emergence is affected by delay in sowing dates and sowing between mid Octobers to early November result in good emergence of berseem. Fresh forage yield (kg ha^{-1})

Fresh forage yield data is given in Table 1. The statistical analysis of the data revealed that sowing date had significant effect on fresh forage yield. Fresh forage yield was maximum (18400 kg ha^{-1}) was recorded from sowing on 15th November, followed by 15th December (16083 kg ha^{-1}), while minimum fresh forage yield (7417 kg ha^{-1}) was recorded from sowing on 15th January. Highest succulent fresh forage yield is vital goal towards which the efforts of the farmer are directed. These result were in agreement with those suggested by Wojick (1999) who observed that highest green forage yield were obtained when Egyptian clover was sown in mid of November. Different consequences were reported by Ciricofolo et al., (1997) so as to fresh forage yield (kg ha^{-1}) increased with delay in planting. Other scientist Garza et al., (1996) observed that planting between mid October and early November give highest forage yield.

Dry matter yield (kg ha^{-1}) at 20 days after first cut (80 days after sowing)

The data concerning dry matter yield at 20 days after first cut (80 days after sowing) was presented in Table 1. The statistical analysis of the data indicated that sowing date had significant effect on dry matter after 20 days. The maximum dry matter after 20 days (12417 kg ha^{-1}) was obtained from planting on 15th November, followed by (12208 kg ha^{-1}) from planting on 15th Febuarary, while minimum dry matter after 20 days interval was obtained (8717 kg ha^{-1}) from sowing on 15th January. These results is conformity with Mani and Singh (1997) who reported that dry matter yield was significantly greater when the crop was sown in October and harvested every 30 days interval after the initial cut then cut with every 30 days. Hattab and Hazb reported (1984) reported that highest green forage yield and dry matter yield were obtained from 15th October Sowing.

Days to 75% flowering

Data regarding days to 75% flowering is presented in Table 3. Analysis showed that sowing dates and irrigation schedule cant response to days to 75% flowering and their interaction had no significant effect on days to 75% flowering. Maximum days to 75% flowering (173 days) were found in plots sown on 15th November. Followed by (145 days), (119 days) in plots sown on 15th December and 15th January respectively. Minimum days to 75% flowering (96 days) were found in the plots sown on 15th February. Flowering time flexibility is a commonly happening adaptive feature of fodder crops. Flowering time is primarily influenced by temperature, genotype and photoperiod. It has normally been confirmed that flowering time is a common adaptive aspect of annuals, including legumes, in arid or semiarid environments (Fox, 1989, Ehrmann and Cocks, 1996). Time from sowing to flowering decreased as sowing was late which resulted in increasingly shorter growing season. Days to 75% flowering is significantly affected by planting dates.

CONCLUSION AND RECOMMENDATIONS

It is concluded that sowing of berseem 15th November to 15th December gave best growth and fodder yield. Due to late harvesting of summer crops as well as farmers engagements in other field activities, we recommended planting of berseem from 15th November to 15th December for getting maximum fodder yield production in agro climatic conditions of Peshawar valley.

Table 2. Emergence m^{-2}, fresh forage yield (kg ha^{-1}), dry matter yield at 20 days after first cut (80 days after sowing) and days to 75% flowering as affected by sowing dates.

Sowing dates	Emergence m^{-2}	Fresh forage yield (kg ha^{-1})	Dry matter yield at 20 days after first cut (kg ha^{-1})	Days to 75% flowering
15-Novemebr	368 a	18400 a	12417 a	173 a
15-Decemebr	336 b	16083 ab	12175 a	145 b
15-Janruary	200 c	7417 c	8717 b	119 c
15-February	209 c	13742 b	12208 a	96 d
LSD Values at P ≤0.05	18.92	43.99	918.23	1.59

Mean followed by different letter in each category are significant at P ≤ 0.05 using least significant difference (LSD) test.

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