Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.4, No.9, 2014

Sowing Dates and Irrigation Schedule Influenced on Yiled and Yield Components of Berseem in District Peshawar

Subhan ud Din[1], Ihsan Ullah[2], Gul Daraz Khan[3],Muhammad Ramzan[1],Bashir Ahmad[2], Muhammad Hameed[1]
1.Department of Agricultural Mechanization, Faculty of Crop Production Sciences the University of Agriculture Peshawar, Pakistan
2.Department of Agronomy, Faculty of Crop Production Sciences the University of Agriculture Peshawar, Pakistan
3.Department of Water Management, , Faculty of Crop Production Sciences the University of Agriculture Peshawar, Pakistan
E-mail: engr_subhan19@yahoo.com

Abstract
The present research was conducted for the purpose to find out the effect of sowing dates and irrigation schedule influenced on yield and yield components of berseem in district Peshawar. The experiment was carried out at New Developmental Farm, The University of Agriculture Peshawar, Khyber Paktunkhwa, Pakistan during 2012-2013. The experiment was planted in randomized complete block design (RCBD) with three replication having split plot arrangements. Irrigation schedule (2, 5, 7 and 10) were allotted to main plots (Factor A) and Four sowing dates (15th November 2012, 15th December 2012, 15th January 2013, and 15th February 2013) were allotted to sub plots (Factor B). Plots sown in November and December showed better performance as compared with sowing in January and February. Sowing dates had significant effect on all parameter. Maximum receme weight (2.99 g), thousand grain weight (3.52 g), number of seeds head^{-1} (45), biological yield (8003 kg ha^{-1}) and seed yield (653 kg ha^{-1}) were obtained from sowing on 15th November. Irrigation schedule also had significant effect on receme weight (g), number of seeds head$^{-1,}$ thousand grain weight (g), biological yield (kg ha^{-1}) and seed yield (kg ha^{-1}). Receme weight (2.76 g), number of seeds head^{-1} (40), thousand grain weight (3.55 g), biological yield (8530 kg ha^{-1}) and seed yield (508 kg ha^{-1}) were highest with 10 irrigations treatment, while two irrigations resulted minimum non productive branches plant^{-1} (1.48), receme weight (2.02 g), thousand grain weight (2.99 g), number of seeds head^{-1} (33) and seed yield (429 kg ha^{-1}). It was concluded that planting of berseem either on 15th November or 15th December with ten irrigations were better in term seed yield production, and thus recommended for obtaining maximum yield in agro-climatic condition of Peshawar.
Keywords: Berseem (Trifolium alexandrinum L.) Sowing dates, irrigation number Seed yield, yield components

INTRODUCTION

Berseem (*Trifolium alexandrinum* L.) also called Egyptian clover belongs to family fabacea and Trifolium genus. The berseem plant has a strong tap root system. The stem is hollow and the leaves are tender juicy and trifoliate. The individual flower is tiny and white in color. Berseem fulfils the requirements of nutritious forage in winter and spring session. Due to its growth character, berseem gives a number of cutting during its growth season. Agriculture sector gives about 20.8 % to National GDP and 43.3% of employed opportunity to country people. Livestock contribute greater than 51% agriculture rate additional and other crops contribute about 48% and 11% to National GDP. (Economic Survey of Pakistan.2007).

A number of fodder crops are grown in Pakistan, but berseem are believe to be the king of fodders because of its green succulent leaves, stem and its quick regeneration power. It enriches the soil by fixing considerable quantity of atmospheric nitrogen. Its vigorous root system improves aeration, water holding capacity and organic matter of the soil. The plentiful growth of legume entirely covers up the field there by suppressing the weeds. Continuous cutting also helps in controlling the perennial weeds and also increase the seed production. It is used as green manure which is more economical and beneficial for the irrigated tracts (Virendra *et al*., 2000). Low fodder production and low feed availability are the major restrictive factors for increasing livestock efficiency in Pakistan, mostly in KPK. Improvement in livestock production depends on the proper quantity and quality of feed (Amanullah et al., 2005). Berseem is nutritious and palatable crop and is highly like by animals. It improves the fertility of the soil through biological nitrogen fixation and therefore helps lower the quantity of nitrogenous fertilizer required by berseem (Graves et al., 1996). The nutritional composition of berseem is 2.9% phosphorous, 18.3% protein, 2.6% calcium and 20 ppm carotenes and also rich source of vitamin A (Khalil, 2008).

Berseem is cultivated throughout the irrigated tracts of Pakistan. Berseem is the most important forage crop and plays an important role in our farm economy (Chaudhry et al., 1994). Berseem crop was cultivated on 16750 hectare in Khyber Paktunkhwa during the year 2012 and produced about 45670 tons of forage with average yield was 410 kg ha^{-1} (MNFSR, 2012). The cultivation of berseem is generally done in the month of October and November in Khyber Paktunkhwa. The practice of getting 4-6 cutting related to minimum seed yield due to more cutting exhausted the reserved food in the roots and soil nutrient. This decrease in the seed production due to the

increase in clover seed imports. (Chaudhry et al., 1994). Unavailability of seeds of improved forages varieties is a major problem for optimum forage production. The urban dairy industry had never flourished to the amount to create a big demand for forage crop seed (Dost, 1997). There is no well planned and regular system of seed collection and multiplication of improved forage crop varieties in the country. To maximize income, most of the 83 registered seed companies in Pakistan focus on producing cash crops such as maize, cotton, rice, vegetable, sunflower and seed of potatoes (Dost, 1997). Import of fodder seeds is increasing each year. The farmer particularly uses the locally available cultivar. Local production of clover seed seems to be ignored by farmer, government organization, and private companies (Dost, 1997). The present research was therefore planned to study the effect different irrigation schedule and sowing dates on production of berseem seed under the climatic condition of Peshawar.

MATERIALS AND METHODS

The experiment was conducted at New Developmental Farm of The University of Agriculture, Peshawar (34° 00' N, 71° 30' E, 510 MASL) Pakistan during winter 2013. The experiment was laid out in randomized complete block design with split plot arrangement having three replications. Four irrigation numbers (2, 5, 7 and 10) were allotted to main plots (Factor A), while four sowing dates (15th November 2012, 15th December 2012, 15th January 2013 and 15th February 2013) were allotted to sub plots (Factor B). A sub plot size of 4 m x 3 m was used. Phosphorous was applied at the rate of 60 kg ha^{-1} in the form Single Super Phosphate (SSP) at the time of sowing while nitrogen in the form of urea was applied at 25 kg ha^{-1}, half dose was applied at sowing time and the remaining half was applied after two irrigation. Seed rate was used at the rate of 30 kg ha^{-1} in standing water condition and local cultivar (Peshawar local) was used for sowing. Data regarding to the receme weight was taken from in such a way that 5-10 flower was taken from each sub plot and were weighed in gram. Number of seeds $head^{-1}$ was recorded by selecting five head randomly from each sub plot and counted number of seeds $head^{-1}$ and averaged. After threshing data from thousand seeds weight (g) were recorded for three seed lots and weighed with the help of electronic balance. Seed yield was recorded after threshing and cleaning the seed of each sub plot and convert into kg ha^{-1} by the following formula.

$$\text{Seed yield (kg ha}^{-1}) = \frac{\text{Seed yield of harvested area (kg)} \times 10{,}000\ m^2}{\text{Harvested area (12 m}^2)}$$

Harvested crop was sun dried and weighed by using electronic balance and then converted into kg ha^{-1} by the following formula.

$$\text{Biological yield (kg ha}^{-1}) = \frac{\text{Weight of plant materials of harvested area (kg)} \times 10{,}000\ m^2}{\text{Harvested area (12 m}^2)}$$

All data collected were subjected to analysis of variance (ANOVA) with the help of statistical software, Statistix 8.0 USA (2005). Upon significant F-Test, least significance difference (LSD) test was used for mean comparison to identify the significant components of the treatment means.

RESULTS AND DISCUSSION

Receme weight (g)

Data presented in Table 1 indicated that sowing dates and irrigation schedule had significantly affected receme weight whereas interaction between D x I were not significant effect on receme weight. Plots sown on 15th November had significantly higher receme weight (2.99 g) while lowest receme weight (1.73 g) was recorded for 15th February sowing. This might be due to early planting produced more health plants as compared to late planting as a result heavier and plump seed produced. These results are in line with those Virendra *et al*., (2000) reported that delaying planting from 15th December significantly decreased receme weight in berseem. A decrease in receme weight for late planting dates can be attributed to changes in the duration of light interception. Irrigation schedule had significant effect on receme weight. Plots received 10 number of irrigation attained highest (2.76 g) receme weight while the lowest (2.02 g) receme weight was recorded when plots received 2 number of irrigation. These results are in line with the findings of Ciricofolo *et al*., (1997) who reported that decrease (43%) receme weight with decreasing irrigation number from 14 to 5.

Number of seeds $head^{-1}$

Statistical analysis of the data indicated in table 1 that number of seeds $head^{-1}$ was significantly affected by sowing dates and irrigation schedule while the interaction between D x I had non significant effect on seeds $head^{-1}$. Mean value of sowing dates indicated that crop sown on 15th November produced maximum (45) number of seeds $head^{-1}$ while minimum (29.08) number of seeds $head^{-1}$ were recorded when crop sown on 15th February. The reason could be that early sowing crop which has prolonged photoperiod as a result more assimilates was going toward head and produced maximum number of seeds $head^{-1}$. Similar results were reported by Varendra *et al*., (2000) who recorded higher (48) number of seeds $head^{-1}$ in early sowing as compared to late sowing. Irrigation schedule had significant effect on number of seeds $head^{-1}$. Plots received 10 number of irrigation attained highest (40.33) number of seeds $head^{-1}$ while the lowest (33.33) number of seeds $head^{-1}$ was recorded when plots received 2 number of irrigation but statistically at par with 5 number of irrigation. These results

confirm the findings of Dost (1997) who reported that (47%) reduction in seeds head^{-1} with decreasing irrigation from 10 to 4 numbers this might have been due to abscission of flowers and head under moisture stress.

Thousand seeds weight (g)

Mean values of sowing dates indicated in table 1 that crop sown on 15th November produced heavier (3.52 g) seeds weight but statistically at par when crop sown on 15th December while minimum (2.63 g) seeds weight was obtained when crop sown on 15th February. Earlier sown crop gained prolonged growth period with ideal growth condition as result heavier seeds were produced as compared to late sown. Similar notations were reported by Lalia *et al*., (1999) who reported that early sowing 10th November significantly improved seed weight as compared to late sowing 20th February. Irrigation schedule had significant effect on thousand seeds weight. Plots received 10 number of irrigation produced heavier (3.55 g) seeds weight while the minimum (2.74 g) seeds weight was recorded when plots received 2 number of irrigation but statistically at par with 5 and 7 number of irrigation. These results agree with Hatam (1997) who reported that significantly decreased in 1000 seed weight occur with decrease irrigation from 9 to 2 numbers.

Seed yield (kg ha^{-1})

Data regarding seed yield are presented in table 1. Mean value of sowing dates indicated that seed yield significantly reduced with delay in sowing. Plots sown on 15th November had significantly maximum seed yield (653 kg ha^{-1}) while minimum seed yield (220 kg ha^{-1}) was recorded when crop sown on 15th February. It is due to the fact that more suitable environmental condition likes temperature rain. When sown was done earlier. Similar result was give by Attaran (1989), who reported that early planting gave highest seed yield while the late planting decreased the seed yield. These result are also supported by the results of Virender and Singh (1994) and Lalia *et al*., (1999). Early sowing had longer growth period as a result more seed yield was produced as compared to late sown these finding are in line with those of Narwal and Sardan, (2000). Irrigation schedule had significant effect on seed yield. Plots received 10 number of irrigation produced maximum (508 kg ha^{-1}) seed yield while the minimum (429 kg ha^{-1}) seed yield was recorded when plots received 2 number of irrigation but statistically at par with 5 number of irrigation. These results are also conformity with the findings of Mukarjee *et al*, .(2000) who reported that plots received 12 number of irrigation increase (71.2%) seed yield as compared with those plots which received 3 number of irrigation. The interaction between D x I indicated in fig. 1 that delayed in sowing dates from November to February, their was significant reduction in seed yield for all irrigation numbers. Early sown crop had maximum seed yield even when minimum number of irrigation applied to crop as compared with late sown crop which received maximum number of irrigation. But a maximum increase was recorded for seed yield when berseem was sown on 15th November and supplied 10 number of irrigation.

Biological yield (kg ha^{-1})

Mean value of sowing dates indicated in table 1 that crop sown on 15th November had significantly maximum biological yield (8003 kg ha^{-1}) while minimum seed yield (5011 kg ha^{-1}) was recorded when crop sown on 15th February. These results agree with those of Virender and Singh (1994). who reported that early sowing (10th November) produced taller plants and more number of branches plant^{-1} and increased vegetative growth of plant under favorable weather as a resulted more biological yield as compared to late sowing. Irrigation schedule had significant effect on biological yield. Plots received 10 number of irrigation produced maximum (8530 kg ha^{-1}) biological yield while the minimum (4806 kg ha^{-1}) biological yield was recorded when plots received 2 number of irrigation. These results were similar to those reported by Ehrmann and Cocks (1996) who reported that plots received 14 number of irrigation increase (47.3%) biological yield as compared with those plots which received minimum 3 number of irrigation. The interaction between D x I indicated in fig. 2 that delayed in sowing dates from November to February, their was significant reduction in biological yield for all irrigation numbers. Early sown crop had maximum biological yield even when minimum number of irrigation applied to crop as compared with late sown crop which received maximum number of irrigation. But a linear increase was recorded for biological yield when berseem was sown on 15th November and supplied 10 number of irrigation.

Table I. Receme weight (g), seeds head^{-1}, thousand seeds weight (g), seeds yield (kg ha^{-1}), biological yield (kg ha^{-1}) and harvest index % of berseem as affected by sowing dates and irrigation number

Treatment	Receme weight (g)	Seeds head^{-1}	1000 seeds weight (g)	Seed yield (kg ha^{-1})	Biological yield (kg ha^{-1})
Sowing dates					
15-Nov	2.99a	45.00a	3.52a	653a	8003a
15-Dec	2.33b	38.92b	3.42a	614a	6901b
15-Jan	1.99bc	33.17c	3.18ab	337b	5961c
15-Feb	1.73c	29.08d	2.63b	220c	5011d
LSD (0.05)	0.36	2.43	0.65	89.60	131
Irrigation number					
Two	2.02b	33.33c	2.74b	429c	4806d
Five	2.04b	34.33c	3.00b	433c	5782c
Seven	2.29b	38.17b	3.18b	454b	6759b
Ten	2.79a	40.33a	3.55a	508a	8530a
LSD (0.05)	0.45	1.49	0.33	21.65	155
Interaction					
D x I	ns	ns	ns	*	*

Means in the same category followed by different letters are significantly different at P ≤0.05 levels. ns = non-significant

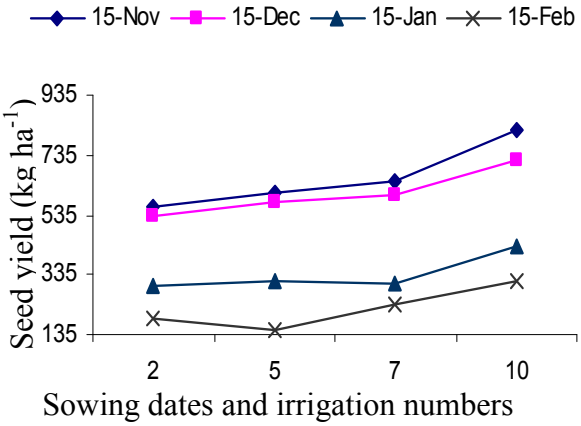

Fig. 1. Seed yield of berseem is affected by sowing dates and irrigation numbers.

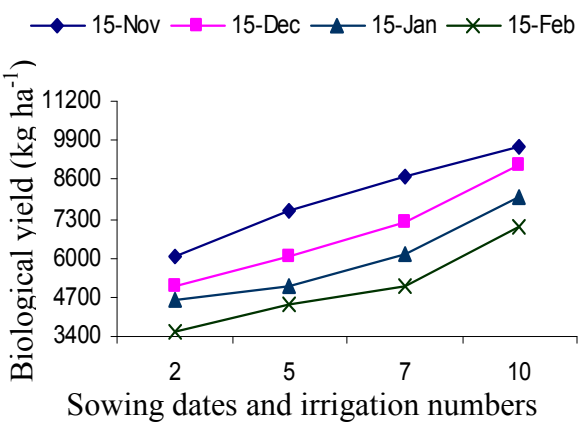

Fig. 2. Biological yield of maize is affected by sowing dates and irrigation numbers.

CONCLUSION

It was concluded from present research work that berseem sown on 15th November and treated with 10 number of irrigation produced maximum receme weight, number of seeds head^{-1}, 1000 seeds weight, seeds yield and biological yield significantly and therefore, it is recommended that berseem should be sown on 15th November and treated with 10 number of irrigation under the conditions of the current study area for improve yield and yield components.

REFERENCES

Amanullah, A. Khan, S. Alam and H. Khan. 2005. Performance of berseem varieties at Peshawar. Sarhad J. Agric. 21 (3): 317-321.

Attaran, M, H. 1989. Determination of the most suitable date for berseem clover at Karaj, Iran. Seed and Plant. 7(1):25-31.

Chaudhry, A. R., A. Ghani and M. A. Mukhtar. 1994. Evaluation of two new high- yielding varieties of berseem. Pak. J. Agric. Res. 12(1):35-39.

Circiofolo, E. and U. Bonciaralli. 1997. Production of berseem, clover seed. Part I: Effect of sowing dates and irrigation on flowering of berseem. Italian J. Argon. 43(1): 25-29.

Dost, M. 1997. Pakistan: Forage resource profile. Food and Agriculture Organization. Available at www.fao.org/ag/agf/agpc/counprofile.pakistan/pakistan.htm.

Economic Survey of Pakistan. 2007. Ministry of Finance, Government of Pakistan,

Ehrmann, T. P.S. Cocks, 1996. Reproductive patterns in annual legume species effect on irrigation schedule on

an aridity gradient. Vegetation 122, 47–59.
Graves, W., B. Williams, and C. Thomson. 1996. Berseem clover: winter annual forage for California agriculture. DANAR Publisher, USA: pp. 15-22.
Hattam, M. 1997. Effect of irrigation numbers and frequency of cutting on the yield and growth of berseem. Frontier J. Agric.5:15-19.
Islamabad. pp. 21-23.
Khalil, I. A. 2008. Crops in cropping in Pakistan. Higher Education Commission Islamabad. Pakistan. pp. 323-326.
Lalia, R., C. Rakpacovoc, and R. Ristic. 1999. Effect of sowing dates on the yield and quality of berseem. J. Agric. Sci. 29(3-4): 73-193.
MINFA, 2011. Agriculture statistic of Pakistan, Ministry of food, agriculture and Livestock,Govt. of Pakistan, Islamabad.
Mukherjee, A.K., S. R. Mandal and B. C. Patra. 2000. Effect of planting date, irrigation intervals and level of phosphorous application on seed yield of shaftal. Environmental Ecology. 18(2): 506-508.
Narwal, S. S. and V. Sardana. 2000. Effect of planting dates and seed rates on the green forage, seed yield and quality of late sown berseem and shaftal. J. Maharashtra Agri. Univ. 25(2): 181-182.
Statistix., Statistix for Windows Analytical Softwares, Version 8.0, USA (2005).
Virender, P. and N. Singh. 1994. Effect of planting dates, fertilizer levels and irrigation frequencies on forage and seed production of berseem, Ind. J. Pl. Phys. 7(6): 198-201.
Virendra, S., S. Narwal and V. Sardana. 2000. Influence of time of sowing and last cut on fodder on seed yield of berseem clover. J. Agric. Sci. 3(134): 285-291.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Recent conferences: http://www.iiste.org/conference/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar