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SHORT COMMUNICATION

EFFECT OF DATE OF SOWING ON SEED YIELD AND QUALITY OF OAT

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SUMMARY

The effect of sowing date on the performance of oat (variety HJ 8) under three different dates of sowing was studied at Research Farm, Department Seed Science & Technology, Chaudhary Charan Singh Haryana Agricultural University, Hisar (Haryana), India. The experiment was laid out in factorial randomized block design in three replicates. The results revealed that the crop sown at normal date of sowing showed its superiority in yield and yield components over late and very late sowing by registering maximum seedling establishment (82%), plant height at maturity (170.53 cm), length of inflorescence (44.20 cm), flower per inflorescence (76.50), ovule to seed ratio (0.949), number of seeds per inflorescence (72.60), 1000 seed weight (26.54 g), standard germination (96%), field emergence index (5.5) and seed yield (19 q/ha). It was concluded from the study that maximum yield can be achieved by sowing the crop timely in the first fortnight of November.

Key words : Oat, seed quality, sowing date

Oat (*Avena sativa* L.) locally known as "Javi" is an important *rabi* fodder crop usually cultivated under irrigated conditions of Northern and North-Western region of India. Oat is most important winter cereal fodder crop which is a rich source of energy, protein, vitamin B_1, phosphorus, iron and other minerals. Oat is grown on 1,00,000 hectares of area with productivity of 35-40 tonnes of green fodder per hectare. In India, it is mainly grown in *rabi* season mostly for fodder in U.P, Punjab, Bihar, Haryana and M.P. (Anonymous, 2014). Seed is a vital and the cheapest input in crop production and key to agriculture progress. Crop status largely depends on the seed materials used for sowing. It produces very high green fodder per unit area and per unit time with minimum irrigation. The fodder of oat is mostly fed as green fodder and it may be converted into silage or hay for further use during fodder deficit period (Suttie and Reynolds, 2004). Response of other inputs in crop production depends on seed material used for sowing. It is estimated that good quality seeds of improved varieties can contribute about 20-25% increase in yield. This emphasises the need for increasing the areas under quality seed production. Production of quality seed dependes on various crop management practices such as cutting management, sowing dates, nutritional spray, fertilizer application, irrigation management etc. Among these sowing date is one of the important factors for producing good quality seed. Cultivation of oats at proper sowing date and harvesting schedule can help in improving the yield as well as availability of quality green fodder during different months of winter and spring season.

The study was conducted on oat variety HJ 8 during *Rabi* 2016-17. The sowing of oat on three dates were done following recommended package and practices in a plot size of 5 m^2 (4.0 m x 1.25 m) with row to row spacing of 25 cm for each treatment Freshly harvested seeds were procured from Forage Section, Department of Genetics and Plant Breeding and study was conducted in laboratory of department of Seed Science & Technology CCS Haryana Agricultural University, Hisar. Observations on flower per inflorescence, seed per inflorescence, ovule to seed ratio, length of inflorescence (cm), seed yield (q/ha), 1000 seed weight, standard germination, seedling length (cm), seedling dry weight (mg),field emergence index, seedling establishment were recorded. Laboratory observation like seedling length, seedling dry weight, vigour index were recorded on the seeds harvested from the different time sown crops. For field emergence index, the number of seedlings emerged were counted on each day and continued up to the seedling establishment and field emergence index also

termed as the speed of emergence was calculated by the method as described by Maguire (1962). Seedling establishment (%) was determined by counting the total number of seedlings when the seedling emergence was completed or there was no further increase in total seedling emergence. Seedling length (cm) was calculated by measuring the root and shoot length after final count day. Standard germination (%) was calculated by counting the normal seedlings by testing samples in between paper method. Total number of flowers were counted in five plants and their average was taken as number of flower per inflorescence. For plant height calculation, randomly five plants were selected and their average height was taken. Number of seeds per panicle was computed as the average number of seeds of five randomly taken panicles from the plot area at crop harvest. Statistical analysis of data was carried out by three-factor randomized complete block design combined over different sowing using OPSTAT. Fischer and Yates tables were consulted for comparison of 'F' values and't' for determination of critical differences at 5% level of significance.

The meteorological data was obtained from Department of Agrometeorology, CCS Haryana Agricultural University, Hisar is situated between 29°10′ North latitude and 75°46′ East longitudes and 215.2 m above mean sea level.This tract is characterized by semi-arid climate, hot and dry winds during summer and dry severe cold in winter. The research trial was conducted at laboratory and research farm of the Seed Science and Technology department, CCS Haryana Agricultural University, Hisar. The field was in upland situation, irrigation facilities and proper drainage system were assured. The experimental site, having tropical hot and dry climate, is situated just north of Tropic of Cancer. Meteorological data on temperature (^{0}C), relative humidity (%), rainfall (mm) during the crop season is given in Fig. 1.

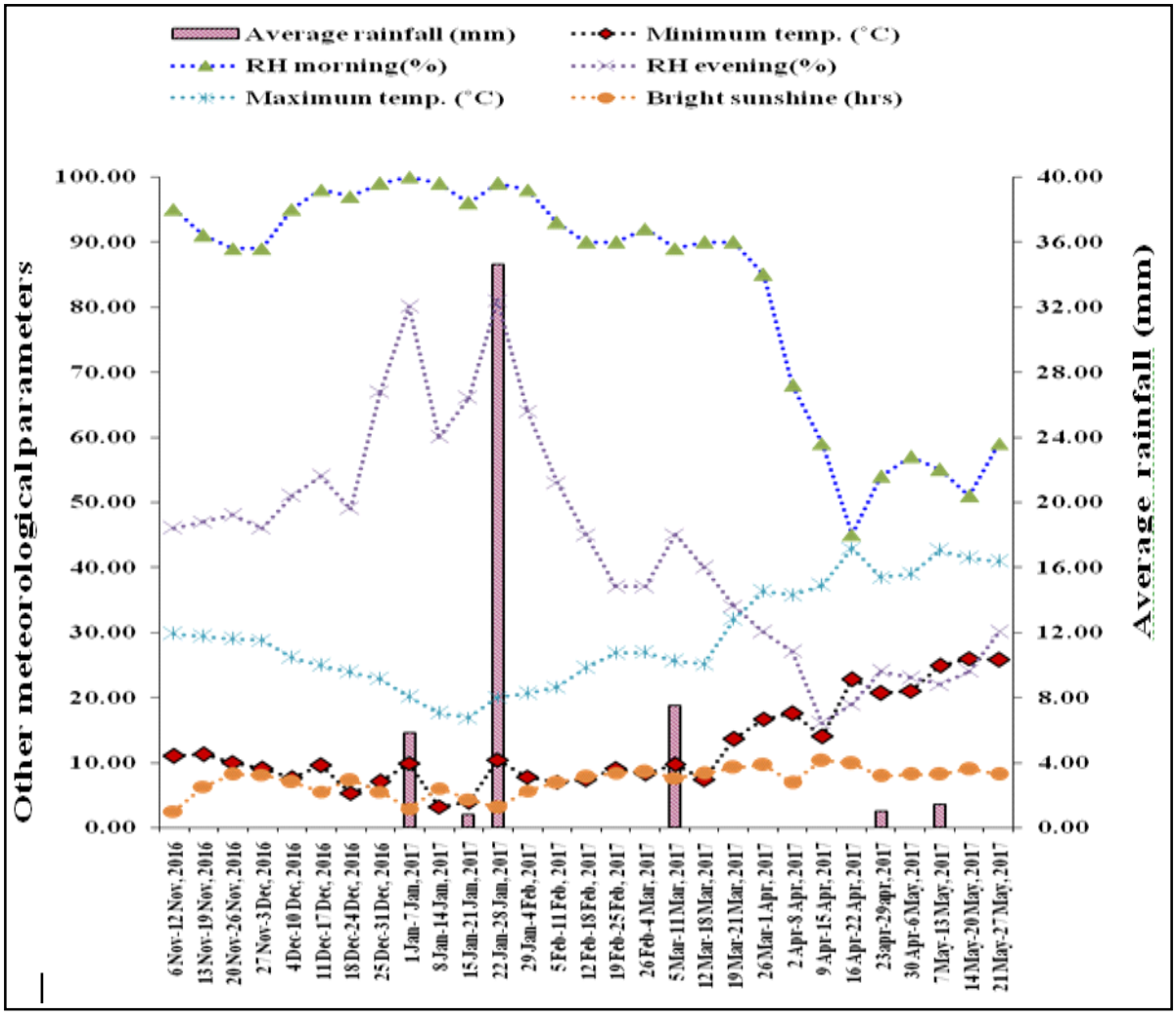

Fig. 1. Weekly weather parameters during the crop duration.

Yield attributing characters

The results (Table 1) revealed that the crop sown during first week of November (timely) showed its superiority in yield and yield components over 2 December (late) and 2 January (very late) sowing by registering maximum field emergence index (5.5), seedling establishment (82%), Flower per inflorescence (76.50), seed per inflorescence (72.60), ovule to seed ratio (0.949), length of inflorescence (44.20 cm), seed yield (19 q/ha), plant height at maturity (170.53 cm), panicle length (44.20 cm), In late sown crop field emergence index was found to be 4.41which dropped to 3.38 in very late sowing. Days to 50% flowering were maximum in normal date sowing, the sowing which were done late (113) and very late (94) took less time than normal sowing. The normal date sown crop took maximum time to maturity (170), while late (159) and very late (128) time took less time due to enforced maturity. Similar results were obtained by Ahmed *et al.*, (2011) in an experiment conducted during *Kharif* 2008 to evaluate the effect of sowing dates and methods on maize. Sowing dates affected days to maturity, number of plants per hectare, biological yield, grains ear^{-1}, grain yield and 1000 grains weight significantly. Maize took more days to maturity (115), biological yield (12010 kg/ha) and thousand grains weight (234.55 g) from early sown plots (6th June). Seedling establishment decreased to 79% in late sowing and 62% in very late sowing. Plant height also decreased with the delay in sowing time. It was maximum (170.53cm) in timely sown crop while decreased to 161.73 cm and 146.03 cm in late and very late sowing respectively. Similar results were obtained by Rashid *et al.* (2007) that early sowing produced significantly taller plants (86.63 cm) in barley over late sowing (71.92 cm). However, number of tillers/plant remained unaffected with different sowing dates. Flower per inflorescence (avg.) decreased to 69.20 and 56.30 in late and very late sowing. Seed per inflorescence also reduced in late and very late sowing as compared to timely sown crop. It was 64.20 in late and 45.48 in very late sowing. Ovule to seed ratio was decreased to 0.928 in late sowing and 0.808 in very late sowing. Length of inflorescence was reduced to 35.40 cm in late sowing and it was found minimum in very late sowing (28.20 cm). Seed yield reduced to 17.07 q/ha in late and 7.40q/ha in very late sowing. May *et al.*, (2004) also evaluated the effects of sowing dates and cultivar on grain yield components, grain yield and grain quality of oat under a direct sowing system. Yield was more responsive when oat was sown in early May versus early June. Physical seed quality decreased (plump seed decreased and thin seed increased) with delayed sowing time. In a study conducted on oat similar results were obtained by Sharma *et al* (2017) that sowing of crop on 15th October recorded significantly higher yield than that of 30th October and 14th November sowing.

TABLE 1
Effect of date of sowing on seed yield and its parameters in oat

Plant character	Normal	Late	Very late	Mean	CD at 5%
Plant height (cm)	170.53	161.73	146.03	159.43	0.545
Days to 50% flowering	131.00	113.00	94.00	112.00	0.692
Days to maturity	170.00	159.00	128.00	152.00	0.677
Flower per inflorescence	76.50	69.20	56.30	67.33	0.611
Seed per inflorescence	72.60	64.20	45.48	60.76	0.541
Ovule to seed ratio	0.949	0.928	0.808	0.895	0.041
Length of inflorescence	44.20	35.40	28.20	35.93	0.722
Seed yield (q/ha)	19.00	17.07	7.40	14.49	0.393
1000-seed weight (g)	26.54	29.86	32.58	29.66	0.449
Standard germination (%)	96.00	93.33	70.67	86.67	1.280
Seedling length (cm)	41.23	40.31	33.67	38.40	0.303
Seedling dry weight (mg)	340.00	310.00	250.00	300.00	7.213
Vigour index I	3957.00	3762.00	2379.00	3366.00	47.352
Vigour index II	1015.00	991.00	594.00	867.00	23.520
Field emergence index	5.50	4.41	3.38	4.43	0.008
Seedling establishment	820	79.00	62.00	74.33	0.709

Seed quality parameters

The results revealed that the crop sown during first week of November (timely) showed its superiority in yield and yield components over 2 December (*late) and* 2 Jan *(very late)* sowing. It registered maximum standard germination (96%) as compared to late (93.33%) and very late sowing (70.67%). Seedling length was maximum (41.23 cm) in timely sown crop as compared to late (40.31 cm) and very late (33.67 cm) sown crop. Seedling dry weight was also found maximum (340 mg) in timely sown crop. It reduced to 310 mg and 250 mg in late and very late sown crop. Vigour index I was found maximum (3957) in timely sown crop seeds and it reduced to 3762 in late and 2379 in very late sown crop. Vigour index II was found maximum (1015) in timely sown crop and minimum (594) in very late sown crop seeds. In the present study, the results revealed that various field and laboratory parameters declined with the delay in the sowing time. The seed crop sown in first week of November (D_1) was found to be optimum time for oat seed production and recorded maximum seed yield, it further results in higher plant height, number of flowers per inflorescence, number of seeds per inflorescence, ovule to seed ratio, length of inflorescence as compared to the delayed sowing done in first week December (D_2) and a further decline in the above parameters mentioned was observed with the very late sowing in first week of January (D_3). Similar findings were reported by Chaudhary *et al*., (1988) and Ahuja *et al*., (1996) in wheat, Singh *et al.,* (1997) in oat and Auskalnis (2002) in barley.

The probable reason for maximum yield in normal sowing may be due to the benefit of longer period available for plant growth and seed development. The relatively longer period available from heading to maturity was very conducive for achieving higher yield. The decline in seed yield and quality due to delayed sowing may be the result of short growing period available to crop growth and seed development, indicated by 1000- seed weight, germination percentage, seedling length seedling dry weight, vigour indices, field emergence index and seedling establishment. The decrease in the yield and quality in late and very late sowing might be due to high temperature during the last phases of growth which ultimately resulted in forced maturity of developing seed in lesser time.

From this study, it can be concluded that for getting a plentiful amount of seed, the sowing of oat crop in north Indian conditions should be done during first fortnight of November month.

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