Asian Resonance

Suitability as Cereal-fodder of Wheat, Barley and Oat crops with reference to their Physiological performance

Deepika Verma
Dept.of Plant Physiology,
Jawaharlal Nehru Krishi
Vishwa Vidhyalaya,
Jabalpur , (M.P)

A.S.Gontia
Dept.of Plant Physiology,
Jawaharlal Nehru Krishi
Vishwa Vidhyalaya,
Jabalpur , (M.P)

Amit Jha
Dept.of Plant Physiology,
Jawaharlal Nehru Krishi
Vishwa Vidhyalaya,
Jabalpur , (M.P)

Abstract

A field trial was planted in Live Stock Farm, College of Agriculture, JNKVV, Jabalpur (M.P.) to ascertain the suitability as Cereal-fodder of Wheat, Barley and Oat crops with reference to their Physiological performance. This study was conducted for two years (2011-2013). The phenophasic phases - days to early leaf appearance (4-6), tillers initiation (36-37), stem elongation (52-53) days, and leaf senescence (66 days) studies revealed the better performance of wheat. There was a better increase of oat growth LAI (2.11), LAD (1677.19), SLA (199.87) and SLW (0.13). An enhanced amount of crude protein was also recorded in oat (5.63) in comparing to barley (3.92) and wheat (3.53).

Keywords: Cereal-fodder, Crude protein, Oat, Barley and Wheat

Introduction

Forage cereals, within the cereal species of oats, wheat, barley or triticale, have the potential to be an integral part of providing year round feed in a dry land dairy system. They can provide feed to overcome autumn and winter forage shortages, allow the making of whole crop cereal silage, and provide the dual options of grazing and grain production. Cereals are highly suited to dry land farming and can tolerate a wide spectrum of soil conditions. Although 24 treatments viz. 4 date of sowing , 3 seed rate (100, 125 and 50 kg/ha) and 2 cutting management (no cut left for grain production and cut at 45 days after sowing then left for grain production) were put in randomized block design with three replications Choubay et al (2002). In the vegetative phase they are similar in palatability and nutritive value to ryegrass for livestock. Barley posse's higher crude protein and digestible dry matter concentrations comparing to oats at all stages of maturity. Barley forage was more digestible than was oats largely due to a higher proportion of highly digestible inflorescence in the total dry matter of barley at all stages. Spring wheat also contained more crude protein than did oats. Wheat and oats had similar digestibility. Several barley cultivars are available as feed (grain for animal feeding) and as forage varieties, and can be sown later than oats, wheat and triticale. The highest plant population, plant height and effective tillers at harvest, spike length, highest number of spikelet/spike. While, 1000 grain weight did not influence significantly due to date of sowing and seed rate, however, cutting management significantly influenced 1000 grain weight and heaviest 1000 grain weight was recorded under no cut treatment. Choubay, S. K., et al (2011).During the log phase of growth the cuttings of crops for forage results in hampering the growth of the plants. The investigations to ascertain the extent to which the damage may occur or otherwise the damage may be repairable are needed to justify the utility of crops as fodder as well as grain without affecting the productivity. The role of morpho-physiological traits is also required to be investigated. Keeping in view the above facts the present investigation was under taken to study the physiological efficiency and productivity in Wheat, Barley and Oat crops under various cutting management practices. The First fodder cut was taken at 45, 60 and 75 days after sowing for first, second and third cutting management Sharma, N., (2007).

Methods and materials

The present investigations were carried out at the experimental field of All India Co-ordinated Research Project on forage crops, Live Stock Farm, Department of Agronomy, College of Agriculture, JNKVV, Jabalpur (M.P.). This work was carried out in Rabi of 2011-12 and 12-13 in a split plot design (SPD) replicated thrice. The experimental material consisted of 3 cereal crops *viz.;* wheat (VL829),Oat (RD2552), Barley (JO1) as main plot

treatments and 4 cutting dates *i.e.* no cutting ,single cutting at 50 days after sowing (DAS),single cutting 60 (DAS) and single cutting at 70 (DAS) respectively as sub plot treatment. Parameters contributing the morphoframe of the crops were recorded periodically.

Phonological events of the crop (Days to leaf appearance, Days to tiller initiation, Days to full stem elongation, Days to leaf senescence, Days to booting, Days to ear emergence ,Days to milking, Days to physiological maturity, Days to physical maturity) in both the year. For growth analysis, plants from 1-m row per plot were cut at the soil surface level and dried at 70°C to constant weight to determine total dry matter (TDM) accumulation. Initial. Leaf area index was determined at the full heading stage. At physiological maturity, plants from a 1-m row area were cut at the ground level, counted for the seed-bearing heads, and then oven-dried to constant weight for the determinations of grain dry matter and above-ground biomass. Harvest index was then calculated as the grain dry matter over the total above-ground biomass. At maturity, central rows of each plot were combine harvested to estimate the grain yield in 2012 and 2013, grain yield of all plots was determined by hand harvesting an area of six rows by 2 m in length.

Fischer's method of analysis of variance was applied for the analysis of the data and Interpretation of results as suggested by Panse and Sukhatme (1967). The level of significance used in F and t test was P=0.05. Critical difference (CD) values were calculated at 5 per cent probability level, wherever F test was significant.

Results and discussion

All phenophasic characters are significantly (p> 0.05) varied**.** The wheat leaves were emerged in advance (4-6 days) followed by Barley (6-11days) and oat (6-12days).Barley and Oat are almost at par in this trait. As the wheat leaves emerged earlier, tillers were also in moved ahead in wheat (36-37days) in comparison to Barley (20-31days) and Oat (20-31 days) which were again at par in this trait. Fully stem elongation was observed within 52-53 days in wheat crop followed by oat (31-40days) and barley (31-40) for both the year. Persistency of the wheat crop for leaf senescence was recorded maximum (66 days) followed by Barley(40-66 days) and oat (45-66) days. Results indicated a powerful influence of fodder yield potential (6.69 t/h) of Oat in comparison to Barley (4.92 t/h) and wheat (2.61 t/h). Oat, owing to its better Plant Height (109.54 cm), LAI (2.11), LAD (8385.96) , SLA(999.33), and RGR(.0875) , has shown the growth supremacy over Wheat and Barley for green fodder. The forage quality was also a enhanced being crude protein content (16.65) in comparison to both the crops. Tiller initiation of Oat is faster than wheat but slower then Barley. This facilitate for early fodder cuttings. Persistency of the Oat leaf is longer than Barley but at par to Wheat so it can be used for the longer time as green fodder cutting. Late milking of grains and Physical maturity of oat crop also facilitate late green fodder cutting.

Since oat (21.41 q/h) yielded grain next to wheat (37.19 Q/h) it has reimbursed the C:B ratio (2.38) by green fodder**.** Sartaj et al.(1995) concluded that Oats harvested at booting stage and barley at 100% flowering stage gave the maximum green-fodder yields (79.45 and 63.10 t/ha respectively). In oat and barley both crops, the highest DM yields (15.54 and 13.75 t/ha respectively) were recorded at the early dough stage at Pakistan. Das (1994) studied that final mean straw yield was similar (about 2.9 t/ha) with and without earlier cutting, while green fodder yield 45d after sowing was 4.48 t/ha at West Bengal.

Fig No. 1. Effect of crop species on booting

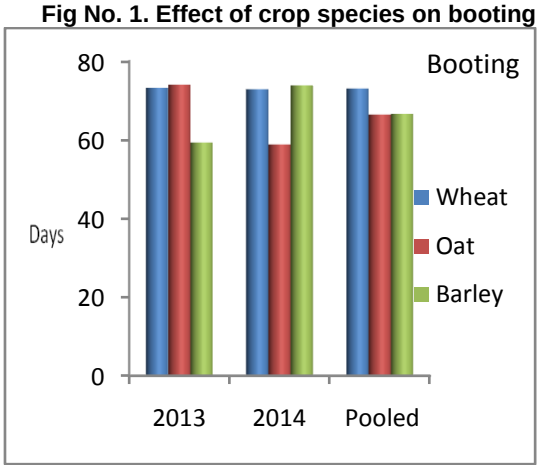


Fig No. 2 Effect of crop species on leaf senescence

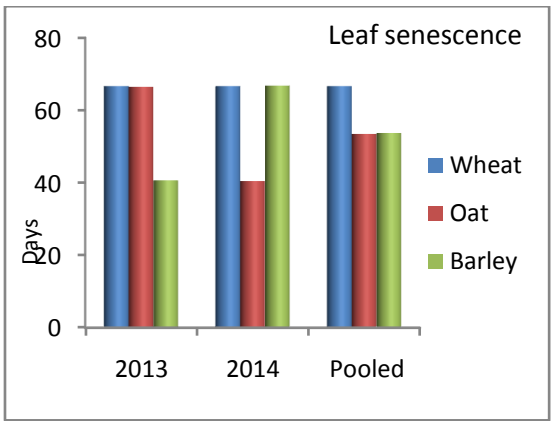


Fig No. 3 Effect of crop species on Stem Elongation

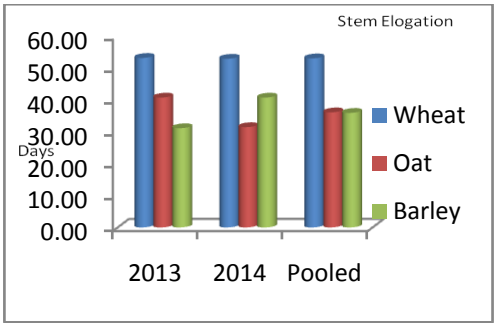


Fig No. 4 Effect of crop species on Tiller initiation

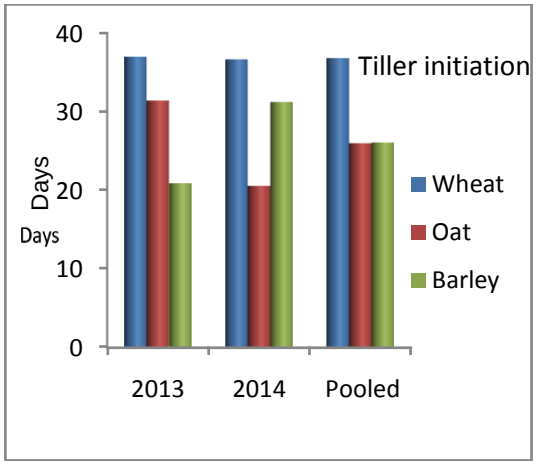


Fig No. 5 Effect of crop species on Leaf Appearance

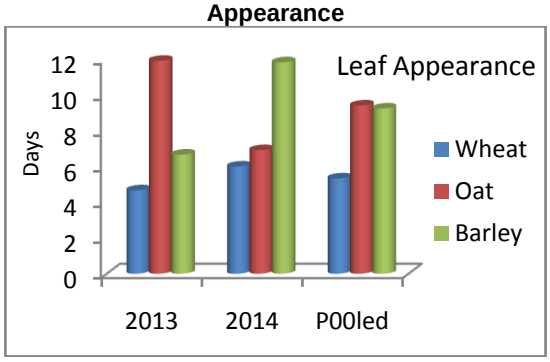
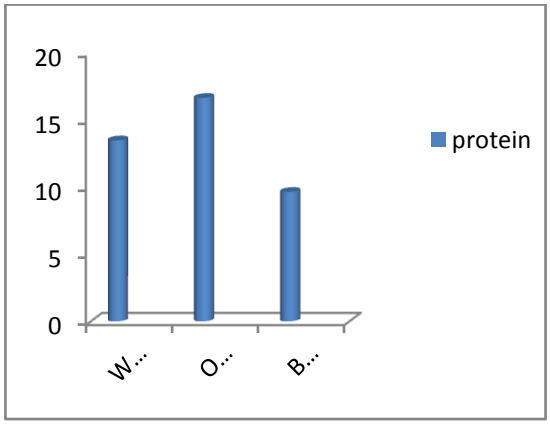


Fig No. 6 Effect of crop species and cutting schedule on protein %



Conclusion

Physiological Efficiency of Oat as cereal fodder was recorded superior over wheat and barley as it grow with better height, leaf appearance, stem elongation, ear emergence and milking and Physiological maturity and gave the highest green fodder yield. The Oat had a potential to be an integral part of providing year round feed in a dry land dairy system. This crop also gave the better compensation over wheat and Barley when used as cereal- fodder.

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