International Journal of Chemistry Studies
www.chemistryjournal.in
ISSN: 2581-348X
Received: 02-11-2021, Accepted: 19-11-2021, Published: 03-12-2021
Volume 5, Issue 2, 2021, Page No. 41-43

Influence of Nitrogen levels and weed control methods on quality of transplanted African Sarson

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Abstract
The experiment was conducted at Lovely Professional University, Phagwara on "Influence of Nitrogen levels and weed control methods on quality of transplanted African sarson". The field study was conducted in Split Plot Design with four nitrogen levels in main plot (0, 75, 100, 125 kg/ha) and four weed control treatments in sub plot (T1= Pendimethalin 0.375 kg/ha followed by H.W. 40 DAT, T2= Straw mulching 8 t/ha, T3= H.W. 40DAT, T4= Weedy check). The crop gave significantly higher yield with use of 125 kg N/ha and quality parameters also increased with use of 125 kg N/ha but oil content decrease with increased in nitrogen doses. The chlorophyll content recorded at 45 and 75 DAT was higher in 125 kg N/ha. The protein content was significantly more with use of high level of nitrogen and oil content inversely proportional to protein content. The oil content was maximum recorded at 100 kg N/ha. The chlorophyll content, oil content and protein content was recorded significantly higher in all weed control treatments as compared to unweeded (control).

Keywords: nitrogen, sarson, weed, quality

Introduction

The protein, carbohydrates, fats, vitamins, other micro and macro nutrients are necessary for our health. Apart from these, the oils are one of the major sources important in our diet and they play big role in Indian agriculture and in our economy. The various types of oil seeds are developed in India like safflower, groundnut, sunflower, soybean, linseed, rapeseed-mustard etc. The rapeseed-mustard is the second most important oil-seed crop after groundnut. The rapeseed derived from Latin word rapum means turnip and mustard derived from Latin word must means hot. The different types of rapeseed-mustard are Indian mustard called Raya and three strains of Indian rape like *Brassica rapa* (toria), *Brassica oleifera* (yellow sarson), *Brassica compestris* (brown sarson) and others are *Brassica napus* (gobhi sarson), *Brassica carinata* (African sarson). The brassica have 3500 spp. and 350 genera in the world. The African sarson and raya comes under mustard group but other oil seed gobhi sarson, taramira, toria under rapeseed. India is the third producer of mustard after Canada and China and they produce the 11% of total world's production and area of world in India is 7.49 million hectare (33.8%) (Anonymous 2020). The production of rapeseed-mustard during 2010-11 was 61.63 mt which increased in 2018- 19 62.41 mton, yield in 2010-11 was 1841 kg/ha and in 2018-19 1979 kg/ha (USDA). The rapeseed-mustard grown in Punjab 30.5 thousand ha, yield 15.25 q/ha, production 46.5 thousand ton (PAU, Package of practice, 2018-2019). The agroclimatic conditions of Punjab are suitable for cultivation of rapeseed and mustard crop. Weeds are unfortunate plants and crop is invaded with both grass and wide leaved weeds and if not managed at appropriate time it might result in decline the yield and growth of crop. Beside the decline in yield, the weeds may reduce the standard or grade of fodder and create the health issues. During initial crop growth stages the weeds inhibit yield by 15-20% (Brar *et al*.1991) [2]. The weeds are known as major crucial factor in rapeseed- mustard areas. Weedy check conditions decline mustard yield by 68% as compare to controlled weed conditions (Degra 2011). In mustard crop the prior period upto 15-40% days is basic period for crop weed opposition. The mustard is mainly plagued with broad leaved weeds and grasses like *Chenopodium album*, *Medicago sativa*, *Phalaris minor*, *Rumex denticulatus*, *Cornopus didymus*, *Spergula arvensis*, *Cynodon dactylon*, *Cyperus rotundus*, *Melilotus indica*, *Anagallis arvensis*, *Vicia sativa*, *Avena ludoviciana etc.*

Crop production generally relies upon development of high yielding cultivar and need based use of supplements. The fertilizer requirement is one of the major factor to play the wide role for enhancing the productivity. The crop give better response by using of need based fertilizer, application of fertilizer, fertilizer doses, method of fertilizer, time of application. The various type of major and micronutrients are essential for plant growth and development. Apart from these, the Nitrogen is most significant supplement for growth and development of plants and also essential for oil seed crops. It is first most important nutrient for vegetative growth, needed in more quantity for plant growth and plays role in metabolism. It is constituent of chemicals, proteins, amino acids, cellular material, nucleotides and gives the gigantic edge of flower and pods. The nitrogen deficiency affect the plant growth, plant height, blossoming, pods, seed shattering, seed standardization, protein synthesis, photosynthetic activity (Yasari *et al*.2006) [12].

Material and Methods

The investigation of field study conducted at research farm, Department of Agronomy, Lovely Proffessional University, Phagwara during Rabi season 2019-2021. The soil was clay loam and alkaline nature having medium organic carbon (0.64%), available nitrogen (226kg/ha), available phosphorus (22.3 kg/ha), available potassium (121.4 kg/ha) with pH 8.02. The field study was managed in Split Plot Design with three replications. The four different nitrogen levels in main plots (N1= no nitrogen, N2= 75 kg, N3= 100

kg, N4= 125 kg) and four different weed control treatments in sub plots (T1= Pendimethalin 0.375 kg/ha followed by H.W. 40 DAT, T2= Straw mulching 8 t/ha, T3= H.W. 40DAT, T4= Weedy check). The pendimethalin was applied as pre-emergence of crop. The variety PC-6 developed by Punjab Agriculture University, Ludhiana was sown. The main character of this variety is less pod shattering than other species. The nursery was sown on 25 oct. 2019 and germinate after 4-5 days. After, 25-30 days the nursery was ready for transplanting. The crop was transplanted on 27 Nov. 2019. The row to row and plant to plant spacing was 45cm and 10cm. Fertilizers were applied according to the treatments. The nitrogen was applied in three split doses. The first dose was applied on 2 December 2019, second on 11 Dec. 2019 and third was applied on 2 Jan. 2020. The hand weeding was done after 40 days of transplanting with use of *Khurpa*. The first irrigation was applied immediately after transplanting and second after 30 days of transplanting and other was applied at time of flowering.

All plant protective measures were applied. The crop was sprayed with chlorpyriphos 20 EC at the rate 200 ml/acre to avoid the attack of aphids and jassids. The crop was harvested 140-145DAT. The harvesting was done with sickles after judging the observations like golden-brownish colour of stem, seed colour, change siliqua colour branches. Then harvested crop tied in bundles and kept for sun drying. After loss of moisture the crop was threshed with sticks and seeds were collected and obtained the seed yield. The seeds were weighed and expressed in q/ha. Randomly five plant were selected from each plot and chlorophyll content was measured with SPAD at 45 and 75 DAT. Then calculate the average values of chlorophyll content. The oil content was determined with oil expeller or oil extractor machine and calculated by giving constant weight. For estimation of protein content firstly N extract was estimated from the seeds with Kjeldhal method, then N values multiply with constant (6.2) and calculated the protein content. The statistical data was determined with OPSTAT.

Result and Discussion

It was observed that the significantly higher seed yield was obtained with increase in nitrogen doses and higher seed yield (1476.8 kg/ha) obtained at 125 kg N/ha, which was statistically at par with 75 kg/ha (1113.0 kg/ha) and 100 kg/ha (1282.8 kg/ha). These finding were similar with Cheema *et al*. 2010 [3]. The chlorophyll content increased with use of high nitrogen doses because nitrogen is important for vegetative growth of plant and they provide the dark green colour to plants. The higher chlorophyll content (45.4) at application of 125 kg N/ha, which was significantly at par with 75 and 100 kg N/ha and poor chlorophyll content observed at no nitrogen levels at 45 and 75 DAT. The oil content decreased with use of more nitrogen doses. Significantly higher oil content (37.3%) with use of 100 kg N/ha at par with 125 kg N/ha (35.8%) and 75 kg N/ha (31.7%). Shergill *et al*. 2012 [10] also reported these findings. The protein content also increase with increase nitrogen levels but oil content was inversely proportional to protein content. The protein content increase and oil content decrease with use of more nitrogen application. The higher protein content (21%) observed at application of 125 kg N/ha i.e. at par with use of 75 and 100 kg N/ha. Similar findings were described by Pan *et al*. 2012 [8].

Among weed control treatments pendimethalin 0.375 kg/ha followed by hand weeding at 40 DAT, straw mulching 8 t/ha, hand weeding 40 DAT, weedy check the higher seed yield (1352.3 kg/ha) was observed in pendimethalin 0.375 kg/ha followed by hand weeding 40 DAT which was significantly at par with straw mulching (1228.6 kg/ha) and hand weeding (1287.5 kg/ha) 40 DAT and also reported by Kumar *et al*. 2017 [7]. The chlorophyll content at 45 and 75 DAT significantly higher with use of pendimethalin 0.375 kg/ha followed by hand weeding at 40 DAT because weed population reduce in pendimethalin treatment and higher the all yield and quality parameters by use of pre- emergence application of pendimethalin and this treatment was significantly at par with other weed control treatments. The less chlorophyll content was observed in weedy check as compared to other treatments. The oil content was significantly higher (35.7%) which was observed in pendimethalin 0.375 kg/ha followed by hand weeding at 40 DAT at par with hand weeding (32.7%) and straw mulching (31.7%) and lowest recorded in weedy check (28.4%). The protein content was significantly also higher in pendimethalin 0.375 kg/ha followed by hand weeding at 40 DAT than other treatments. These findings were similar with Kaur *et al*. 2013 [6], Jangir *et al*. 2017 [5], Singh *et al*. 2006 [9].

Table 1: Influence of nitrogen levels and weed control treatments on quality parameters of transplanted African sarson

Treatments	Seed yield (kg/ha)	Chlorophyll 45 DAT	Content 75 DAT	Oil content (%)	Protein content (%)
Nitrogen levels kg/ha					
0	951.4	35.1	36.2	23.6	14.5
75	1113.0	41.3	41.9	31.7	16.4
100	1282.8	42.6	42.2	37.3	19.3
125	1476.8	45.4	44.2	35.8	21.0
C.D. at 5%	19.9	3.11	2.67	1.41	0.45
Weed control treatments					
Pendimethalin 0.375 kg/ha followed by H.W. 40 DAT	1352.3	44.2	45.7	35.7	18.6
Straw mulching 8t/ha	1228.6	40.6	40.3	31.7	17.5
H.W. at 40 DAT	1287.5	41.8	41.1	32.7	18.2
Weedy check	955.7	37.9	37.6	28.4	16.9
C.D. at 5%	20.4	0.87	1.16	0.92	0.33
Interactions	NS	NS	NS	NS	NS

NS= Non-significant

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