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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Topping in Wheat: Effect on Green Fodder, Plant Growth and Seed Yield under Rodh Kohi Condition

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Abstract: Field experiment was carried out on wheat crop during 2000-01 to determine the effect of topping in local and improved cv. Inqilab-91 at different stages for fodder and then after re-growth on seed yield. Topping level in wheat at tillering stage significantly produced a maximum green fodder of 13510 kg ha⁻¹ followed by wheat topped at 6-8 leaf stage with a fodder of 8750 kg ha⁻¹, whereas improved cv. Inqilab-91 gave a maximum green fodder of 8433 kg ha⁻¹ and 7750 kg ha⁻¹ at said stages. Plant height, spike length and grains spike⁻¹ were significantly reduced with topping in both the varieties except tiller plant⁻¹. Maturity was delayed 3-5 days in local wheat variety whereas 7-9 days in improved c.v. Inqilab-91 as compared to control (un-cut), respectively. Concerned to seed yield 2-3 fold reduction occurred in local wheat whereas in improved c.v. Inqilab-91, yield did not differ significantly between control (un-cut) and when it was topped at 6-8 leaf stage but 2 ½ fold yield reduced, when it was topped at tillering stage. Although local wheat variety gave maximum green fodder but its yield was severely reduced than improved wheat c.v. Inqilab-91.

Key words: Wheat cvs. local and improved Inqilab-91, topping stages, green fodder yield components and seed yield

Introduction

In Pakistan, 80% of its total land area of 79.61 m ha or about 25% of its cultivated hectare of 20.34 m ha is rainfed which produce 12.5% of the national wheat production annually (Alvi and Sharif, 1995). It is grown an area of 8376.5 (000) ha⁻¹ of Pakistan, (Anonymous, 1996). It is commonly cut as a green fodder for livestock in the Rodh-Kohi (Daman) area of D.I. Khan and some other area of Pakistan during autumn (December and January), when the other green grasses are not available in the areas. However livestock is the main stay of the barani farmers. They face acute shortage of fodder in winter as well as in summer. During winter the unavailability of fodder leaves the farmers with no option but to feed their animals the green crop of wheat. To overcome the problem of green fodder shortage, various measurements are planned and undertaken in rainfed area of Pakistan. Zahid *et al.* (1997) concluded that improved production technology produced 34516 kg ha⁻¹ green fodder as compared to local production technology (17321 kg ha⁻¹) which resulted an additional income of Rs. 2557 ha⁻¹ to the farmers. Harper and Compton (1980) found in Brassica crops used as a forage for autumn grazing provided an acceptable feed of high nutritive value at relatively low cost compared to conserved grass. Even and Wahab (1983) found in winter oil seed rape in the U.K. that leaf removal at various stages resulted in significant seed yield reductions with lowest yields being obtained by defoliation at the

beginning of stem elongation Khan *et al.* (1993) who reported in rape seed that removal of secondary branches at initial flowering did not generally affect seed yield but only small amount of fodder were obtained whereas Raut and Ali (1986) who found in mustard in India that defoliation of 50% of the lower leaves, partial detopping of 50% top growth, 45 and 60 days after sowing or complete detopping to ground level at 45 days after sowing, all decreased seed yield considerably Khan (1985) found in wheat fodder cutting trial 53 days after planting that local wheat variety produced substantially higher fresh weight of fodder than improved variety Barani-83 whereas yield reduced more than 50% by cutting fodder indicating a poor ability to recover in both the varieties. It is well known that cutting has direct affect on the plant growth because green leaves has positive role indirectly on the wheat yield but the farmer of the area don't realize that how much yield is reduced by cutting of green wheat. So, keeping in view the importance of plant growth in the rainfed areas, the present study was designed to evaluate the effect of topping in wheat on green fodder, yield component and seed yield of wheat under arid condition of Dera Ismail Khan.

Materials and Methods

The experiment was conducted during 2000-01 in Dahman area of Rodh Kohi system of irrigation at location Kot-musa, 75 km away towards South from District, D.I. Khan.

Table 1: Chemical and Physical status of the soil, where field trial was conducted

| Year | Location | O.M.% | pH | NH ₄ N (ppm) | P (ppm) | K (ppm) | Texture |
|---------|----------|-------|-----|-------------------------|---------|---------|-----------------|
| 2000-01 | Kot-Musa | 0.72 | 8.4 | 0.06 | 7.0 | - | Silty clay loam |

Table 2: Mean monthly temperature (C°) and monthly precipitation during 2000-01

| 2000-01 | | | | |
|-----------|------|------|-------|-------------|
| Temp (C°) | | | | |
| Month | Max. | Min. | Mean | Precip (mm) |
| October | 34 | 17 | 25.5 | -- |
| November | 27 | 10 | 18.5 | -- |
| December | 23 | 5 | 14.0 | 29.0 |
| January | 19 | 4 | 11.5 | -- |
| February | 21 | 6 | 13.5 | -- |
| March | 27 | 11 | 19.0 | 1.5 |
| April | 35 | 18 | 26.5 | 29.0 |
| | | | Total | 59.5 |

* Source: AZRI, Farm

Prior to seeding, soil samples were taken from the experimental area for analysis. Results of the physical and chemical analysis is presented in Table 1 whereas mean monthly temperature and precipitation in Table 2.

The fertilizer level 60-40-0 NPK kg ha⁻¹ was broadcast and incorporated into the soil. The wheat varieties local and Inqilab-91 were planted @ 100 kg ha⁻¹ by a manually operated single row drill on Nov 3, 2000. The experiment was laid out in randomized complete block design with 3 replications and plot size of 1.2 x 5 m (4 rows plot⁻¹).

The wheat crop was cut (½) for fodder at different stages, using the treatments as follows:

Cutting stages:

- 1 Control
- 2 6-8 leaf stage (½ plant cutting)
- 3 Tillering stage (½ plant cutting)

Data for green fodder, yield components, maturity and seed yield from all treatments were collected on the two central rows in each plot. Data were analyzed using the analysis of variance (ANOVA) procedure and LSD (P< 0.05) values were calculated for comparisons among means (Steel and Torrie, 1980).

Results and Discussions

Green fodder: In this test local and improved wheat cv. Inqilab-91 were evaluated for fodder production and after re-growth its effect on yield components and seed yield. The crop was cut at two stages i.e. 6-8 leaf stage and

tillering stage including control. The parameter for cutting was maintained to cut the plants of each variety at 50% level at each stage. Local variety had taller plants than improved variety which significantly produced the highest green fodder of 13510 kg at tillering and 8750 kg ha⁻¹ at 6-8 leaf stage as compared to improved variety Inqilab-91 gave with a fodder yield of 8433 and 7750 kg ha⁻¹ at the said stages respectively (Table 3). Its effects on seed yield on both the varieties is described in Table 4.

Seed yield: As for as yield is concerned, it was reduced significantly in the local wheat variety when it was cut at early i.e. 6-8 leaf and late at tillering stages where in case of improved cv. Inqilab-91 yield did not differ significantly between control (un-cut) and when the crop was topped at 6-8 leaf stage, even 7750 kg ha⁻¹ green fodder obtained additionally by cutting at this stage without involvement of any cost. Maturity was delayed 7-9 days in cv. Inqilab-91 where as 3-5 days in local variety by cutting Table 4.

It has been concluded from this study that seed yield is reduced significantly in local wheat variety but c.v. Inqilab appeared least affected than local when it was cut

Table 3: Effect of wheat topping on green fodder under kohi condition

| Topping level | Green fodder (kg ha ⁻¹) local | Green fodder (kg ha ⁻¹) improved |
|-----------------|---|--|
| Control | -- | -- |
| 6-8 leaf stage | 8750b | 7750d |
| Tillering stage | 13510a | 8433c |
| LSD (0.05) | 81 | |

Table 4: Effect of wheat topping on yield components and seed yield under roth kohi condition

| Topping level | Plant ht.(cm) | | Tillers/plant | | Spike length (cm) | | Grains/spike | | Days to maturity | | Seed yield kg ha ⁻¹ | |
|-----------------|---------------|-------|---------------|-----|-------------------|-------|--------------|------|------------------|------|--------------------------------|--------|
| | Local | Imp | Local | Imp | Local | Imp | Local | Imp | Local | Imp | Local | Imp |
| Control | 111.3a | 83.3c | 1 | 1 | 8.3bc | 10.7a | 38b | 49a | 164d | 157e | 3424b | 3781a |
| 6-8 late stage | 98.3b | 74.3d | 1 | 1 | 7.3c | 8.7b | 23c | 40ab | 167b | 164d | 1723c | 3503ab |
| Tillering stage | 90.3c | 66.0e | 1 | 1 | 8.0bc | 8.7b | 27c | 31bc | 169a | 166c | 1250d | 1558cd |
| LSD (0.05) | 7.8 | | NS | | 1.1 | | 10.0 | | 0.8 | | 327 | |

at 6-8 leaves stage. The said variety cut at this stage gave higher seed yield than control plot of local variety. It showed a great potential of improvement especially when it was cut at leaf stage for fodder Table 4.

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