EFFECT OF A GROWTH REGULATOR ON FORAGE PRODUCTION, QUALITY AND GROWING POINT ELONGATION IN WHEAT

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Story in Brief

Winter wheat was treated with an experimental plant growth regulator at rates of 0, 5, 10, 20, and 30 g/ha at jointing (March 20). Height of growing points, total forage production, regrowth forage production, and forage quality were measured during the grazeout period (late spring). Height of growing points and canopy height were both reduced by the plant growth regulator, particularly at the higher rates. Total forage production was reduced by plant growth regulator four weeks after application (April 17), but treatment differences were not present 11 weeks after application (June 4). Regrowth of wheat mowed to 5 cm on April 18 was greater after 11 weeks of growth for the 20 and 30 g/ha treatments than the lower rates or controls. Thus, the plant growth regulator has the potential to improve regrowth during the grazeout period. Plant growth regulator application improved forage quality early in the grazeout period (April 17), but by June 4 there was no consistent effect of plant growth regulator on quality of either total forage or regrowth forage.

(Key Words: Wheat Pasture, Grazeout, Regrowth, Forage Quality)

Introduction

The use of winter wheat as a dual crop, capable of producing forage for livestock gains and grain has achieved considerable popularity in Oklahoma. This system allows producers to consider cattle and grain markets in making management decisions. The option to grazeout wheat, that is, to use it for pasture until it is no longer capable of supporting livestock and forsaking the grain crop, adds flexibility. When grain prices are low (as they have been) and cattle prices are reasonable, grazeout is a viable alternative to grain production. However, availability and quality of forage generally pose limitations to maintenance of livestock gains during the latter portion of the grazeout period. During this time there is relatively little leaf production and much of the wheat plant's effort goes to seedhead production. However, it may be possible to use a plant growth regulator (PGR) to alter the development pattern of wheat and improve the quantity and/or quality of regrowth in a grazeout system. One advantage of using a PGR is the flexibility it allows. The decision to use a PGR need not be made until just prior to jointing, at which point the amount of grazeout acreage can be determined based on market trends, availability of complementary forages, current climatic and soil conditions, etc.

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Materials and Methods

The experimental PGR ACP-1900 (American Cyanamid[3]) was applied to winter wheat (cv. Tam 101) on March 20, 1985, just prior to jointing. The experiment was designed as a randomized block (3 blocks) with five treatments (0, 5, 10, 20, and 30 g/ha PGR). A surfactant (0.25% v/v) was added to the application mix. Each experimental unit was 3x3 m, with 1 m borders.

Height of growing point was measured at about weekly intervals from 10 days after application until early May. The measurements were taken on primary tillers, and represent the height of growing point above the root/shoot junction. This provided a more consistent measurement than height above ground level, because of the irregularity of the soil surface. However, at a height of 3-5 cm the growing points were at ground level. Four subsamples were taken in each experimental unit on each date. Height to the top of the canopy was measured on April 19, again with 4 subsamples per experimental unit.

Forage production was measured on April 17 by clipping all the wheat in 1/4 m^2 quadrats to ground level. Half of each plot was mowed to 5 cm on April 18, and both the mowed and unmowed portion of each plot were sampled for production on June 4. Two quadrats per experimental unit were taken on each date.

The samples clipped for forage production were also analyzed for neutral detergent fiber (NDF) and acid detergent fiber (ADF).

Results and Discussion

The PGR altered the growth pattern of winter wheat, especially at the two higher rates. Growing point elongation and canopy height were both reduced by the PGR (Table 1). The reduced canopy height on April 19 resulted in lower total forage production (Table 2). The 20 and 30 g/ha rates caused browning of the leaf tips which may account for the lower

Table 1. Height of growing point and canopy height of winter wheat treated with several levels of the plant growth regulator ACP-1900, on March 20.

	Height of growing point (cm)					Canopy Height (cm)
Level	April 1	April 8	April 15	April 23	May 2	April 19
0	10.7^{a}	15.3^{a}	25.6^{a}	40.6^{a}	60.3^{a}	61.9^{a}
5	9.7^{b}	13.2^{ab}	22.0^{ab}	35.5^{b}	59.3^{a}	57.7^{ab}
10	8.8^{b}	13.6^{abc}	22.1^{ab}	33.4^{bc}	56.5^{a}	55.5^{b}
20	8.3^{b}	12.0^{bc}	17.9^{bc}	30.7^{cd}	47.9^{b}	50.0^{c}
30	7.4^{b}	11.0^{c}	15.6^{c}	27.0^{d}	47.9^{b}	43.1^{d}

[abcd]Means in a column with different superscripts differ statistically ($P<0.05$).

Table 2. Forage production (kg/ha) and quality of winter wheat with several levels of the plant growth regulator ACP-1900. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) were from wheat forage clipped on April 17 or June 4. Regrowth was from plants that had been mowed to 5 cm on April 18.

	April 17			June 4			(REGROWTH) June 4		
Level	NDF	ADF	kg/ha	NDF	ADF	kg/ha	NDF	ADF	kg/ha
0	53.7[a]	32.4[a]	5964[a]	68.0[a]	43.1[ab]	10,720[a]	59.9[b]	41.6[a]	1780[a]
5	52.6[ab]	31.2[ab]	4948[ab]	65.1[a]	41.7[ab]	11,932[a]	61.5[a]	41.7[a]	1440[a]
10	52.1[ab]	30.7[ab]	4352[bc]	64.4[a]	38.9[b]	12,404[a]	62.6[a]	43.5[a]	1384[a]
20	50.8[bc]	29.9[bc]	3992[bc]	65.3[a]	41.7[ab]	11,160[a]	59.4[b]	43.4[a]	2524[b]
30	49.5[c]	29.0[c]	3272[c]	69.0[a]	45.8[a]	10,528[a]	60.1[b]	43.0[a]	2864[b]

[abc]Means in a column with different superscripts differ statistically ($P<.05$).

production. However, by June 4 there were no significant differences between treatments, indicating that treated plants had higher growth rates during the April 17 to June 4 period.

The important question regarding use of PGR during grazeout is not how it affects the growth of an intact wheat plant, but rather how it affects regrowth of grazed plants. In this study we used a severe mowing treatment to evaluate regrowth, and the higher rates of PGR application did produce significantly more regrowth during late spring (Table 2). Although the true test is response under grazing, the PGR showed potential for improving regrowth in a grazeout system.

Forage quality improved with the 30g/ha application rate on April 17 (Table 2). However, by June 4 the effects of PGR on forage quality were inconsistent for both total and regrowth forage. NDF was lower for regrowth forage, but the ADF values were very similar. This is surprising because regrowth is generally higher in quality than herbage from an uncut stand. However, our sampling frequency was such that we would have missed any beneficial effects of plant growth regulator soon after clipping.

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[3]Mention of a tradename does not indicate endorsement by USDA.