

Effect of Cutting Stage on Yield and Quality of Triticale (x *Triticosecale* Witt.) Cultivars

A. Esen Celen and Nuran Celik

Summary

The aim of the research was to investigate the herbage yield and some characteristics of three triticale cultivars (Beaguelita, Eronga and Juanillo) harvested at the boot and milky-waxy ripeness stages in 1993~94 and 1994~95.

A randomized complete block design with three replications was used. Although there were no significant differences between the years and the cultivars, significant differences were found between the harvest stages and for most of the parameters studied superiority was observed for the late cutting (at milky-waxy ripeness). The highest crude protein (11.9%) and crude ash (9.4%) contents were obtained from the boot stage, whereas the highest yields for green matter, dry matter, crude protein and crude ash were obtained from the milky-waxy ripeness stage (34.94; 11.65; 0.96 and 0.92t/ha, respectively). Also, the dry matter content was higher at the late cutting (33.4%).

I . INTRODUCTION

Triticale(x *Triticosecale* Witt.), a man-made cross between wheat (*Triticum aestivum* L.) and rye (*Secale cereale* L.), has grain yield, vigorous growth and high grain lysine content, offering excellent feed potential for poultry (McGinnis et al., 1985). On the other hand, its adaptability to the poor soils which wheat can not be cultivated, increases the importance of triticale. Triticale can be cut during the vegetative stage for forage and later left to mature for grain. Ulitskaya (1993) reported that the lignification of the straw in triticale was only just beginning at the heading stage and that its green matter was suitable for fodder up to the milk-wax stage. Maiorana et al. (1993) stated that harvesting at the milky-waxy ripeness increased dry matter yield

and crude fibre content, but did not affect crude protein content of triticale, barley and *Triticum dicoccum* than that at boot stage. Also, Fearon et al. (1990) have shown that the crude protein and ash contents were consistently higher at tillering than at milk-ripe and dough stages and dry matter content was highest at the milk stage in triticale.

Although the rye cut very long time before heading gave good quality forage, because of low yields and conservation problems it is recommended that it should only be used to provide green forage during a temporary shortage(Daccord and Arrigo, 1993). Kim et al. (1988) have shown that the crude protein content of forage rye decreased, whereas its dry matter and crude protein yields increased with delaying the harvest time. Many reports have shown that delaying the harvest

untill full heading or end of heading of oats increased the green forage and dry matter yields but decreased the crude protein yield of barley+oats mixture (Mrowka, 1990; Dubey et al., 1995). Also Lee et al. (1991) indicated that the dry matter yield increased but, crude protein content decreased with time after heading in forage wheat.

The objective of this study was to determine the effect of harvest made at boot or milky-waxy ripeness on yield and some characteristics of three triticale cultivars.

II. MATERIALS AND METHODS

The research was carried out in the fields of Field Crops Department, Faculty of Agriculture, University

of Ege, Bornova (latitude 38.28 N, longitude 27.15 E, 27m above sea level), Izmir, Turkey in 1993~94 and 1994~95. The soils were clay loam in texture. The climate is typically Mediterranean with winter temperatures which can fall below 0°C and summer temperatures which can rise above 40°C. Rains are unevenly distributed during the year, concentrated in the winter months. The climatic data are given in Table 1.

Three triticale cultivars (A. Beaguelita, B. Eronga, C. Juanillo) were cut at boot stage (1) or at milky-waxy ripeness (2). The trial was set in randomized complete block design with three replications. Plot sizes were 2.4 m × 5 m and 2 m × 4 m were harvested.

Table 1. The climatic data of the experimental site for 1993~94, 1994~95 and long years' average

Months	1993~1994		1994~1995		Long years' average	
	Rain (mm)	Temp. (°C)	Rain (mm)	Temp. (°C)	Raim (mm)	Temp. (°C)
November	81.8	11.6	86.0	11.4	79.3	13.1
December	136.2	11.6	86.4	8.5	123.9	9.9
January	41.4	8.8	208.6	10.1	123.5	8.1
February	82.5	8.1	28.3	11.4	90.9	12.3
March	52.1	8.4	185.8	12.0	65.2	14.0
April	49.5	11.7	38.9	14.9	51.9	15.1
May	32.6	21.5	36.1	21.0	93.1	23.2

Seeds were sown on November in each year with driller in rows 20 cm apart. All plots received 100 kg P₂O₅ and 120 kg N/ha. Nitrogen was applied in two splits, at sowing and at the end of jointing stage.

A motor-scythe, with front-mounted cutter bar, leaving a stubble height of 5~6 cm was used for cutting. The dry matter content was measured on 500 g samples of green forage, oven-dried at 105°C for 24

hours taken from each plot. Crude protein (N kjeldahl × 6.25) and crude ash contents were also determined on the same samples (Bulgurlu and Ergul, 1978). The data was analyzed by applying the analysis of variance technics(Acikgöz, 1988).

III. RESULTS AND DISCUSSION

Experimental results related to the tested traits are given in Table 2. No significant differences between the years and cultivars were found.

Between the harvest times for most of the traits studied, superiority was observed for the milky-waxy ripeness stage. Only the quality traits such as the crude protein and crude ash contents gave better results for the early cutting at boot stage. Especially, a decrease

in the protein content at late harvest vs. early one (approx. -31%) has been indicated in many investigations (Fearon et al., 1990; Lee et al., 1991). On the other hand, some data contradict our findings such as the results obtained by Naiorana et al. (1993) who indicated that the harvests at boot and milky-waxy ripeness stages didn't affect the crude protein content of triticale.

Table 2. Effect of treatments on yield and yield characteristics

	Green matter (t/ha)	Dry matter (%)	Dry matter (t/ha)	Crude protein (%)	Crude protein (t/ha)	Crude ash (%)	Crude ash (t/ha)
Year							
1993~94	33.95	26.9	9.23	9.9	0.87	8.4	0.76
1994~95	32.82	26.7	8.88	10.2	0.86	8.8	0.77
Cultivar							
A	33.29	26.6	8.95	10.1	0.85	9.0	0.78
B	32.48	26.8	8.81	9.8	0.82	8.6	0.75
C	34.38	27.0	9.41	10.3	0.92	8.4	0.77
Harvest stage							
1	31.84b	20.3b	6.46b	11.9a	0.77b	9.4a	0.61b
2	34.94a	33.4a	11.65a	8.2b	0.96a	7.9b	0.92a
LSD	1.74	1.00	0.53	0.77	0.098	0.58	0.058

Means followed by the same letter do not differ significantly at the 0.05 probability level using LSD.

The highest yields of dry matter and crude protein were observed at the late cutting (11.65 and 0.96 t/ha, respectively) and these results were found similar to the results of previous investigations (Maiorana et al., 1993; Kim et al., 1988; Mrowka, 1990) however, our findings were no parallel with Mrowka (1990), who has stated that delaying the harvest time decreased the crude protein yield from the barley+oats mixture. Although low protein percentage was achieved at the 2nd harvesting, the higher crude protein yield was due to the higher dry matter yield at this harvest time. Daccord and Arrigo (1993) recommended that rye cut very long time before heading should only be used to

provide green forage because of conservation problems. Our results related to lower dry matter content (20.33%) before heading was confirmed by the results of the studies done by these researchers.

As the harvest time was delayed, the dry matter content increased. This result was similar to the results of previous investigations (Fearon et al., 1990; Lee et al., 1991).

Between harvest times the yield superiority of late cutting (milky-waxy ripeness) was evident. Because of the higher dry matter content at this harvest time triticale can not only be conserved as hay but also can be made into good quality silage. Ulitskaya (1993)

have also reported that the lignification in triticale was just beginning at the heading stage and that its green matter was suitable for fodder up to the milk-wax stage.

These results indicate that although lower crude protein content, the forage triticale must be cut at milky-waxy ripeness stage because of the higher dry matter and crude protein yields.

IV. 적 요

본 시험은 3가지 Triticale 품종 (Beaguelita, Eronga, Juanillo)을 공시하여 수확시기(수잉기, 유숙기)가 사초수량과 조단백질 생산량 등에 미치는 영향을 구명코자 1993~'94년과 1994~'95년에 터키 에게 대학에서 수행되었다.

시험결과, 수확연도와 품종간 수량과 사료가치는 차이가 없었으나 수확시기간에는 차이가 커서 수잉기 수확시 조단백질과 조회분 함량은 각각 11.9%와 9.4%로 유숙기때 보다 유의적으로 높았으며, 반면 생초수량, 건물수량, 조단백질 생산량, 조회분 생산량은 유숙기 수확에서 각각 ha당 34.94, 11.65, 0.96 및 0.92 톤으로 수잉기 수확에 비해 크게 높았고, 건물함량도 유숙기 수확에서 33.4%로 높았다.

V. REFERENCES

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