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in

Molina-Cano J.L. (ed.), Christou P. (ed.), Graner A. (ed.), Hammer K. (ed.), Jouve N. (ed.), Keller B. (ed.), Lasa J.M. (ed.), Powell W. (ed.), Royo C. (ed.), Shewry P. (ed.), Stanca A.M. (ed.).
Cereal science and technology for feeding ten billion people: genomics era and beyond

Zaragoza : CIHEAM / IRTA
Options Méditerranéennes : Série A. Séminaires Méditerranéens; n. 81

2008
pages 407-409

'Diomede', a winter barley for dual-purpose in comparison to oats grown in a Mediterranean environment[1]

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Introduction

In Mediterranean environments, forage production for livestock during all the year results very difficult, other than costly, due to erratic rainfall. In these conditions, barley, oats and triticale can be used as dual-purpose fall-sown cereals, for both winter grazing and grain for feed (Royo and Tribò, 1997; Delogu *et al.*, 2002). This study was aimed at estimating the influence of different management systems (dual-purpose with one and two grazings, soft-dough harvest for silage, full maturity grain only) on grain yield, forage and whole plant production, and on quality-related traits of a winter barley variety 'Diomede' and oat cultivar 'Rogar 8' (Francia *et al.*, 2006).

Methodology

The trials were conducted for two years (1998/99 and 1999/00) in Foggia, a Southern Italy Mediterranean environment. In each year, grazing was done by a flock of 342 sheep of 'Comisana' breed, whereas for analysing forage samples, plots were mechanically clipped to simulate the dual-purpose. Detailed description of the site, field trials, laboratory and statistical analyses can be found in Francia *et al.* (2006).

Results and discussion

The year effect was not significant, whereas both crops underwent significant reductions of grain yield, harvest index, thousand kernel weight (TKW) and seed number per m^2 in the dual-purpose compared with the grain only (Table 1). The most drastic yield reduction was recorded in 'Rogar 8' after two grazings in comparison to the ungrazed treatment (2.4 *vs* 3.9 t/ha). Grain protein content was independent from the number of grazings in 'Diomede'. In general 'Diomede' showed greater productions of total biomass and milk feed units than 'Rogar 8' in the dual-purpose management systems, except for both the soft-dough and the grain only treatments.

Moreover, 'Diomede' reacted positively to the dual-purpose utilization, even to the more intense one (two grazings), by increasing whole plant biomass (from 9.6 to 13.6 t/ha) and milk feed units (MFU) (from 7680 to 9216 MFU/ha) in comparison with the grain only (Table 2).

As a general observation on systems, no substantial nutritional differences existed between the two differently intensive dual-purpose managements: the number of cuts in fact was irrelevant for the nutritional quality of the whole plant in both species (Table 3).

[1] This work is dedicated to the memory of Dr Giovanni Delogu, who passed away in May 2005, and to Mr Giovanni Paoletta, who passed away in October 2006.

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Table 1. Grain yield and related quality traits in different management systems of dual-purpose barley and oat

Management system	Grain yield (t/ha)		Crude protein (g/kg DM)†		Harvest index (%)		TKW†† (g)		Seeds/m^2	
	Barley	Oat	Barley	Oat	Barley	Oat	Barley	Oat	Barley	Oat
Grain + straw (no. cuts)	5.2	3.9	105	122	45	35	34	29	15294	13000
Dual-purpose (one grazing)	4.5	3.8	96	132	41	36	33	27	13636	13214
Dual-purpose (two grazings)	3.7	2.4	93	145	36	29	30	30	12333	8571
Dual-purpose (two cuts – simulated)	3.7	2.4	95	142	37	30	31	28	11935	8621
$LSD_{0.05}$	0.4		6		3		1.1		736	

†DM: Dry matter.
††TKW: Total kernel weight.

Table 2. Total biomass (DM, t/ha) and energy yields (in terms of MFU, MFU/ha) of barley and oat whole plants in the different management systems

Management system	DM†		MFU†	
	Barley	Oat	Barley	Oat
Soft-dough stage whole plant (no cuts)	*9.6*	*9.3*	*7680*	*6646*
Grain + straw (no cuts)	*11.5*	*11.1*	*7590*	*6660*
Dual-purpose (one grazing)	*13.3*	*10.6*	*8950*	*6392*
Forage (first cut – simulated)	2.2	1.0	2068	920
Grain + straw (after one grazing)	11.1	9.6	6882	5472
Dual-purpose (two grazings)	*13.6*	*10.9*	*9216*	*7031*
Forage (first + second cut – simulated)	3.3	2.8	3036	2576
Grain + straw (after two grazings)	10.3	8.1	6180	4455
Dual-purpose (two cuts – simulated)	*13.3*	*10.7*	*8936*	*6921*
Forage (first + second cut – simulated)	3.3	2.8	3036	2576
Grain + straw (after two cuts – simulated)	10.0	7.9	5900	4345
$LSD_{0.05}$	0.8		509	

†DM: Dry matter; MFU: Milk feed units.
The results of the different management systems are reported in italics, while the forage and grain + straw components of a single treatment are in normal characters.

Table 3. Chemical composition and nutritional traits of barley and oat as green forage and whole plant in relation to management systems†

Management system	CP (g/kg DM)		NDF (g/kg DM)		ADF (g/kg DM)		ADL (g/kg DM)		MFU/kg DM	
	Barley	Oat	Barley	Oat	Barley	Oat	Barley	Oat	Barley	Oat
Forage (first cut – simulated)	234	245	376	376	229	242	24	22	0.94	0.92
Forage (second cut – simulated)	199	204	391	395	228	243	21	21	0.94	0.92
Soft-dough stage whole plant (no cuts)	60	70	506	568	316	366	45	41	0.80	0.72
Grain + straw (no cuts)	58	53	702	688	398	436	73	69	0.66	0.60
Grain + straw (after one grazing)	38	32	706	708	424	452	68	70	0.62	0.57
Grain + straw (after two grazings)	34	31	717	723	436	463	70	75	0.60	0.55
Grain + straw (after two cuts – simulated)	32	29	721	744	438	464	68	74	0.59	0.55
$LSD_{0.05}$	15		22		12		4		0.02	

†CP: Crude protein; NDF: Neutral detergent fibre; ADF: Acid detergent fibre; ADL: Acid detergent lignin; MFU: Milk feed units; DM: Dry matter.

Conclusions

Among the two crops, 'Diomede' demonstrated a clear superiority for the dual-purpose systems in Mediterranean environments and it should be largely preferred to oats.

References

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