

EVALUATION OF OAT GENOTYPES FOR FORAGE AND SEED PRODUCTION IN THE NORTHEAST REGION OF SÃO PAULO STATE-BRAZIL

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ABSTRACT

The DM production (DMP), chemical composition, and seed production of black oats (*Avena strigosa* Schreb.) and the yellow oat cultivars 'UPF₂', 'UPF₃' and 'UPF₇' (*A. byzantina* C. Kock.) were evaluated under two management systems: plants cut (60 days after sowing-DAS) and uncut for seed production. Oat genotypes were sown in 1993 and 1994. UPF₇ was the least productive. No difference was detected ($P > 0.05$) in the cell wall composition of the genotypes. High values of CP (22.9%) and IVDMD (77.6%) were determined across all genotypes. In 1994, cutting at 60 DAS affected the seed production of the cultivars. All oat genotypes presented satisfactory forage and grain production in both management systems. Seed production can be reduced in all genotypes evaluated due to variations in climatic conditions and leaf rust disease.

KEYWORDS

Avena, management, DM production, IVDMD, crude protein.

INTRODUCTION

Oats are valuable forages which can be grown during the winter period in the State of São Paulo, Brazil. Research programs are looking for oat cultivars resistant to pests and diseases and which can be used for forage and grain production (Floss, 1988; Godoy and Batista, 1990).

White and yellow oats are adapted to the production of forage or grain. In these species, tillering is stimulated by cutting and when the reproductive tillers are not removed an increase in seed production is expected.

The objective of this study was to evaluate the DM production, the chemical composition, and the seed production of black oats and three promising yellow oat cultivars (*A. byzantina*) under two management systems.

MATERIALS AND METHODS

The experiment was carried at UNESP, Campus de Jaboticabal in the Northeast region of the State of São Paulo, Brazil.

The black oats and the yellow cultivars 'UPF₂', 'UPF₃' and 'UPF₇' were sowed on May 10, 1993 and April 25, 1994, in a dark red Latossol. At sowing fertilizer was applied 250 kg ha⁻¹ in the formula 4-14-8. Thirty-five days after sowing (DAS) and after cutting, urea was applied at the rate of 20 kg ha⁻¹ of N. A spacing of 0.17 m was used between rows and a sowing rate of 80-90 seeds m⁻¹. The crops were irrigated by aspersion throughout the experimental period. The DM production (DMP) was evaluated by cutting the plants 60 days after sowing (DAS) at 10 cm above the soil surface. The percentages of CP and CF, were determined according to AOAC (1970). The percentages of NDF and ADF were determined as recommended by Goering and Van Soest (1970). The IVDMD was determined by the two-stage technique (Tilley and Terry, 1963).

Seed production (SP) was evaluated by harvesting the inflorescences by hand according to the two managements systems: 1)The seeds were harvested 120 to 130 DAS and 2) when the plants were cut 60 DAS, the seeds were harvested 77 to 90 days after the cutting.

The data were analysed according to a completely randomized block design with three replications.

RESULTS AND DISCUSSION

The analysis of Table 1 showed that the average DMP of the black oats (1904.5 kg ha⁻¹) was higher ($P < 0.05$) than the DMP of the UPF₇ (1466.5 kg ha⁻¹) and similar ($P > 0.05$) to the DMP's of the UPF₂ (1598.5 kg ha⁻¹) and UPF₃ (1601.5 kg ha⁻¹). There was also no significant difference ($P > 0.05$) in the chemical composition of the fibrous fractions overall the genotypes evaluated.

High percentages of CP were determined in all genotypes studied and these results are in agreement with the data reported by Cherney and Marten (1982) and Reis et al. (1993).

The IVDMD varied from 74.7 to 81.1%, showing the high quality of the forage in the four genotypes of oats in both years of evaluation.

In 1993, the seed-production of the UPF₂, UPF₃ and UPF₇ was higher ($P < 0.05$) than the production obtained from the black-oats (Table 2). On the other hand, in 1994, the seed production of the black-oats was similar ($P > 0.05$) to the seed production of UPF₂ and UPF₇, and both showed higher seed production than the cultivar UPF₃. This fact was probably due to the incidence of leaf rust disease (*Puccinia coronata*), in the UPF₃.

It was observed that seed production of the four genotypes studied was not reduced by cutting for forage in 1993. However, in 1994, cutting 60 DAS had a different effect on the seed production of the genotypes evaluated, being prejudicial for the black-oats and UPF₇, and beneficial for UPF₃.

It was concluded that the genotypes evaluated presented satisfactory forage production and grain production in both management systems. Seed production can be reduced in all genotypes evaluated due to climatic conditions and the presence of leaf rust disease.

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Table 1

Dry matter production and percentages of neutral detergent fiber, acid detergent fiber, crude fiber, crude protein and “in vitro” dry matter digestibility of black-oats (BO) and cultivars of yellow oats (UPF₂, UPF₃, UPF₇) planted two years and harvested 60 days after sowing.

Oats Genotypes	Sowing Date	DM (kg ha ⁻¹)	NDF (%)	ADF (%)	CF (%)	CP (%)	IVDMD (%)
BO	05/10/1993	1751 ab	—	—	23.6	25.3	76.4
BO	04/23/1994	2058 a	43.0	26.0	—	23.3	74.7
UPF ₂	05/10/1993	1332 b	—	—	21.3	24.2	81.1
UPF ₂	04/23/1994	1865 a	42.5	24.8	—	22.3	75.3
UPF ₃	05/10/1993	1573 ab	—	—	22.8	20.1	80.3
UPF ₃	04/23/1994	1630 ab	42.3	24.4	—	23.4	77.5
UPF ₇	05/10/1993	1537 b	—	—	23.1	24.5	80.7
UPF ₇	04/23/1994	1396 b	45.7	26.6	—	20.0	75.2

Means followed by the small letters in the columns are not different ($P > 0.05$) by the test of Tukey.

Table 2

Seed production (kg ha⁻¹) of black-oats (BO) and the yellow oat cultivars UPF₂, UPF₃, UPF₇ in 1993 and 1994.

Sowing date	Management System	Oats genotypes			
		BO	UPF ₂	UPF ₃	UPF ₇
05/10/1993	Uncut	576 B c	1366 B b	1233 A b	1863 A a
05/10/1993	Cut	844 A b	1627 A a	1082 A b	1767 A a
04/25/1994	Uncut	650 AB a	738 C a	205 C b	505 B a
04/25/1994	Cut	387 C b	752 C a	412 B a	212 C b

Means followed by the same capital letters in the columns or lower case letters in the lines, are not different ($P > 0.05$) by the test of Tukey.