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Sorghum stover as ruminant food in Ethiopia: effect of cultivar, site of growth, pre-harvest leaf stripping and storage on yield and morphology

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Introduction

The development of bird-resistant varieties (BR) of sorghum has resulted in varieties which could have different yields and botanical composition of stover compared with non bird-resistant (non-BR) ones. Farmers in Ethiopia practise leaf stripping before harvest to provide additional food for livestock. Choice of sorghum variety therefore depends not only on grain yield but also on the feeding value of the stover produced. Stovers are fed for up to 6 months after harvest; little is known about changes in nutritive value (e.g. leaf loss) during this period.

The experiment undertaken therefore investigated effect of cultivar and site of growing sorghum upon yield and composition of stover. The effects of pre-harvest leaf stripping and post-harvest storage were also studied.

Table 1 *Effect of site and cultivar on yield of stover and proportion of leaf plus sheath in stover†*

	Debre Zeit		Melkassa	
Cultivar	tDM per ha	Leaf + sheath proportion	tDM per ha	Leaf + sheath proportion
Bird-resistant				
Aligider wodi ferega	2·87	0·327	4·21	0·254
Framida	4·17	0·341	4·28	0·335
Ikinyaruka	7·28	0·315	4·07	0·352
MW5020	3·09	0·618	2·77	0·584
Ruffe	5·03	0·388	8·77	0·364
Seredo	2·97	0·466	3·28	0·388
Serena	3·55	0·506	4·03	0·486
X3524	3·59	0·394	3·07	0·425
Non-bird-resistant				
ACC69391	3·83	0·316	7·32	0·355
ACC69447	4·00	0·311	2·83	0·321
Dinkamash	2·46	0·347	1·75	0·342
Gambella	2·69	0·311	4·28	0·428
PGRCE222880	2·81	0·305	2·29	0·296
(SC423 × CS3541 × E35 – 1)-2-1	1·87	0·448	0·83	0·400

† s.e.d. for comparing any pair of means of stover yield = 1·48. Coefficient of variation (based on residual s.d.) of stover yield = 0·488.

Material and methods

Fourteen varieties of sorghum were grown in 1990 at two sites (Debre Zeit: 1700 m and 700 to 900 mm rainfall; Melkassa: 1500 m and 500 to 800 mm rainfall) using three replicate plots per cultivar and site. At harvest, grain and stover yields were recorded and the stover fractionated into leaf, sheath and stem. A subplot investigated the effects upon grain and stover yields of four leaf stripping regimes viz. (1) no stripping; (2) five lower leaves removed at 50% flowering stage; (3) five lower leaves removed at the black layer stage; and (4) three lower leaves removed at 50% flowering and two removed at the black layer stage. At the Debre Zeit site, another subplot investigated the changes in botanical fractions of stover during field storage and barn storage, after harvesting.

Results

Yields of stover (Table 1) were highly variable but there were significant effects of cultivar ($P < 0.0001$) but not of site ($P > 0.05$). However, for grain yields there were significant effects of site ($P = 0.005$), cultivar ($P = 0.0001$) and site × cultivar ($P = 0.023$). Proportions of leaf plus sheath in stovers were also highly variable (Table 1).

Table 2 *Effect of leaf stripping on grain yield (t dry matter per ha)*†

Treatment	Mean (across variety)	
	Debre Zeit	Melkassa
1. No stripping	1·28	1·61
2. Five lower leaves at 50% flowering	1·34	1·44
3. Five lower leaves at black layer	1·25	1·50
4. Three lower leaves at 50% flowering and two lower leaves at black layer	1·19	1·56

† s.e.d. for comparing any pair of means = 0·08. Coefficient of variation (based on residual s.d.) = 0·253.

Grain yields were not significantly affected by leaf stripping (Table 2) but there was much variation. Storage of stover caused loss of leaf and sheath.

Conclusions

Yield and composition of sorghum stovers were highly variable but nevertheless significantly affected by cultivar. Pre-harvest leaf stripping did not affect grain yield. Post-harvest storage of stover was associated with loss of leaf. There is a need for further research to develop management strategies for using sorghum stover as food.