

NOTE

A POSSIBLE USE OF BROWN-SEEDED GRAIN SORGHUM IN ANIMAL FEED¹

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ABSTRACT

Grain tannin content was evaluated 17 to 42 days after pollination in a bird-resistant sorghum [*Sorghum bicolor* (L.) Moench] hybrid GA 615, grown in the field in Athens, Georgia, USA. The pattern of tannin development during grain maturation was studied. It was shown that by harvesting brown-seeded grain sorghum at 30% moisture content a highly digestible feed could be produced without significant loss in grain yield.

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امکان استفاده از ذرت خوشه‌ای بذرقه‌های درتغذیه‌دام

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خلاصه

ذرت خوشه‌ای دورگه با بذرقه‌های و خوشه‌های باز برای شرایط رشد مناطق مرطوب جنوب شرقی آمریکا مناسب‌تر از ارقامی است که بذور آنها زرد یا قرمز بوده و خوشه‌ها یشان متراکم میباشند. بعلاوه ارقام بذرقه‌های نسبت به پرندگان آسیب‌پذیری کمتری دارند. برعکس مقدار تانن این ارقام زیادتر بوده و سبب کاهش کیفیت علوفه برای چهارپایان و مصرف مرغدارینها میشود. در این تحقیق با استفاده از یک رقم ذرت خوشه‌ای دورگه چگونگی تغییرات میزان تانن در فاصله ۱۷ تا ۴۲ روز پس از گرده افشانی مورد بررسی واقع شد. اطلاعات حاصله نشان دادند که اگر ذرت بذرقه‌های هنگامیکه ۳۰٪ رطوبت دارد و از لحاظ فیزیولوژیکی رسیده محسوب میگردد برداشت شود، ماده غذایی بسیار قابل هضمی برای دام تولید خواهد کرد بدون آنکه کاهش محسوسی در میزان عملکرد آن بوجود آید.

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INTRODUCTION

Grain sorghum [*Sorghum bicolor* (L.) Moench] hybrids with brown seed testas and open panicles have been found to be more suitable to growing conditions in the humid southeast USA than the red-and yellow-seeded hybrids with more compact panicles which predominate in the more arid regions. The open panicles permit rapid drying at maturity and fungal and insect damage are kept to a minimum due to good light penetration. The brown-seeded hybrids appear more resistant to birds and weathering than those with lighter colored seed coats and are characteristically much higher in tannin. Tannin is associated with brown testa of the seed and its presence has been reported to retard preharvest seed germination and seed molding (5). Such a high level of tannin in grain sorghum reduces the feed value of the grain when fed to livestock and poultry (2, 4, 6). The tannin content has been reported to increase, remain constant or decrease depending upon cultivar (7).

Even though brown-seeded grain sorghum hybrids are well adapted to growing conditions in the humid southeast USA, southern sorghum growers have experienced difficulty in finding buyers for the brown-seeded types (1).

The objective of this study was to determine the pattern of tannin development during grain maturation. This information would be helpful in determining how to best utilize brown-seeded grain sorghums.

MATERIALS AND METHODS

A bird resistant grain sorghum hybrid GA 615, was planted in the field at Experiment, Georgia, USA on June 14, 1972. Three hundred panicles were tagged at random at pollination (flowering). From these tagged panicles, six were randomly collected from each replication at 17, 22, 27, 32, 37 and 42 days after pollination. Therefore, each sample consisted of three replications of seed varying about five days in maturity. The panicles from each harvest were allowed to dry for several months

in the greenhouse before being threshed and cleaned.

Samples were ground using a Wiley mill to pass a 20-mesh screen. Tannin content of the ground grain from each harvest date was determined on duplicate samples by the vanillin-hydrochloric acid method as outlined by Burns (3). Tannin content was expressed as percent catechin equivalent and is a relative measure of astringency.

RESULTS AND DISCUSSION

Tannin content of GA 615 grain at various intervals after pollination is shown in Fig. 1. Grain harvested 17 days after pollination contained 0.4% tannin. Tannin content changed

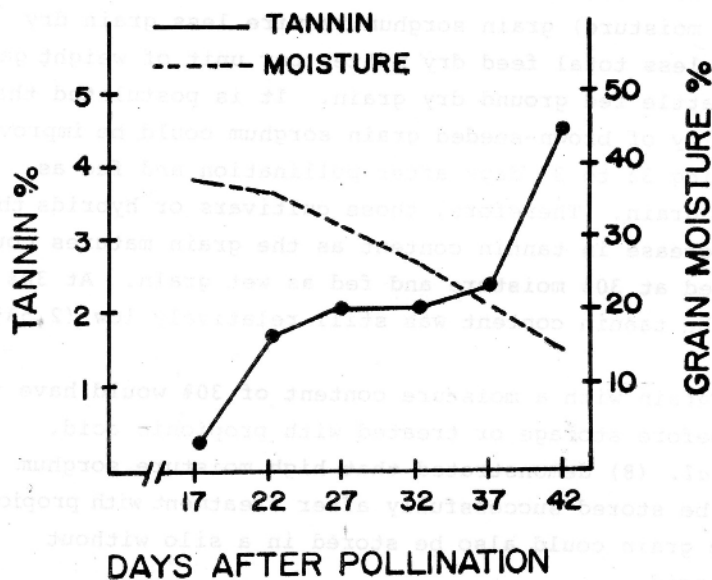


Fig. 1. Relationship between percent tannin and moisture at various intervals after pollination in GA 615.

significantly between 17 and 27 days after pollination, increasing from 0.4 to 2.2%. There was no significant difference in tannin content from days 27 through 37 after pollination. Tannin content again increased significantly from 2.5 to 4.6% from 37 to 42 days after pollination.

Smart *et al.* (10) reported that tannins in sericea lespedeza (*Lespedeza cuneata*) acted as a cellulase inhibitor and thus digestibility of plant material was reduced as tannin content increased. An amylase inhibitor from the grain of 'Lebti' sorghum (a brown-seeded cultivar) was identified by Strumeyer and Malin (11). Therefore, the decreased digestibility of bird-resistant grain sorghum could be due to this amylase inhibitor.

Riggs *et al.* (9) have demonstrated that cattle fed ground moist (30% moisture) grain sorghum require less grain dry matter and less total feed dry matter per unit of weight gain than did cattle fed ground dry grain. It is postulated that digestibility of brown-seeded grain sorghum could be improved by harvesting 32 to 37 days after pollination and fed as ground wet grain. Therefore, those cultivars or hybrids that show an increase in tannin content as the grain matures could be harvested at 30% moisture and fed as wet grain. At 30% moisture the tannin content was still relatively low (2.5%) (Fig. 1).

Sorghum grain with a moisture content of 30% would have to be dried before storage or treated with propionic acid. Nelson *et al.* (8) demonstrated that high moisture sorghum grain can be stored successfully after treatment with propionic acid. The grain could also be stored in a silo without propionic acid.

By harvesting brown-seeded grain sorghum at 30% moisture, a farmer would have a highly digestible product. Grain sorghum seed is physiologically mature at 30% moisture; therefore, grain yields would not be reduced when harvested at this moisture level. To harvest grain at 30% moisture, a farmer would have to pay close attention to the combine cylinder speed

in order to avoid kernel damage.

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