

From: [Lloyd Rooney](#)
To: wlr@tamu.edu
Subject: need info?
Date: Tuesday, November 10, 2009 8:56:16 AM

1. Do the GCP funds have a deadline to be spent by May 31? Our check off funds finally were approved and now they say they need to be spent by May 31. ??? Is this really true?

2. Anything going on with Harris? I have not heard anything?

3. Are you going to the INTSORMIL Tech Transfer mtg?

4. Are you going to CA in Dec?

Thanks lwr

From: [Virgil Smail](#)
To: lrooney@tamu.edu; dbaltensperger@tamu.edu; wlr@tamu.edu; d-gilliland@tamu.edu
Cc: [Virgil Smail](#); [Jeff Dahlberg](#); [Tim Lust](#)
Subject: Needed update and clarification on USCP/TAMU contract R0031A
Date: Wednesday, October 14, 2009 4:54:09 PM

Lloyd, This email is to ask for an update and some action on the contract with USCP/TAMU (R0031A) "Development of new uses for sorghum in healthy foods and neuticeuticals" for \$51,213. On September 17th we sent you notification that the USDA had approved the contract. Per the contract we need to have TAMU invoice USCP for 50% of the value of the contract (\$25,607) so that we know the contract has been activated with USCP. The project completion date is May 20, 2010. We would like to get an update on your research progress and once we do we can be invoiced for an additional 25% of the contract value. Once we receive a final report for the entire project (joint with Dr. Haub at KSU) we can then be invoiced for the final 25%. Please expedite this invoice with TAMU so that we know the project has been implemented. Thanks.

Dr. Virgil W. Smail
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Lubbock, TX 79403
Tel. 806-687-8727
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From: [Culligan, Ursula \(ELS-AMS\)](#)
To: john.angus@csiro.au; [REDACTED]; rbell@essun1.murdoch.edu.au; r.buresh@cgiar.org; djconnor@unimelb.edu.au; p.q.craufurd@reading.ac.uk; ruthdm@tc.umn.edu; [REDACTED]; lfqm@ugr.es; shaefe@cgiar.org; hall@ifeva.edu.ar; hungria@cnpso.embrapa.br; Geoff.Inman-Bamber@cse.csiro.au; jamiesonp@crop.cri.nz; robert.lawn@jcu.edu.au; s.peng@cgiar.org; Greg.Rebetzke@csiro.au; wlr@tamu.edu; sadras.victor@saugov.sa.gov.au; trsincl@mail.ifas.ufl.edu; slafer@pvcf.udl.es; snapp@msu.edu; huub.spiertz@wur.nl; Warwick.Stiller@csiro.au; mtollena@uoguelph.ca; h.upadhyaya@cgiar.org; lwade@csu.au; Jeffrey.White@ars.usda.gov; j.r.witcombe@bangor.ac.uk
Cc: Jillian.Lenne; dchatel@it.net.au; cvankessel@ucdavis.edu
Subject: New Editor-in-Chief for FIELD
Date: Monday, August 24, 2009 7:15:11 AM
Attachments: [Announcement_CVK-FCR.doc](#)

Dear All,

I am very pleased to announce that as of 1 August 2009 Chris van Kessel has taken on the role of Editor-in-Chief for Field Crops Research for the Americas and Africa. I have attached the Publisher's Note announcing Chris' appointment which will appear in the journal.

I would also like to take this opportunity to thank both Jill and David for taking on the extra workload and handling papers from the Americas and Africa in the interim period between Chris being appointed and Peter sadly passing away.

Best wishes

Ursula

Ursula Culligan
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Publisher's note

We are pleased to announce that Professor Chris van Kessel, department of Plant Sciences, University of California at Davis, U.S.A., has agreed to join the team of Editors as of 1 August 2009. Professor Van Kessel received his doctorate from the University of Nijmegen, the Netherlands, in 1983. After graduation, he joined the University of Hawaii for 3 years before he moved to the University of Saskatchewan, Canada. In 1996 he joined the University of California as Professor in agronomy. Since 2002, he has been the chairperson of the department. He is a Fellow of the American Society of Agronomy, the Crop Science Society of America, the Soil Science Society of America, and the American Association of the Advancement of Science.

Professor Van Kessel currently directs a research program on nutrient cycling in agroecosystems with an emphasis on C and N. He has published extensively in areas related to the impact of climate change on soil N and C cycling, alternative residue management practices in flooded rice systems, rotational benefits of legumes in cropping systems, greenhouse gas emissions across scales, and biological N₂ fixation of legumes. He teaches courses on cropping systems.

We are sure you will all join us in welcoming Professor Van Kessel to this position, in which he will no doubt make significant contributions to further strengthening the high reputation of the Journal.

Professor Van Kessel will succeed Dr Peter Graham who passed away suddenly on 9th May, 2009. During his many years as the Editor-in-Chief for the Americas and Africa he made a great contribution to improving the quality and impact factor of Field Crops Research and will be sorely missed.

From: [Sonnie Feagley](#)
To: [undisclosed-recipients:](#)
Subject: NEW INSURANCE CARD
Date: Wednesday, September 30, 2009 9:29:01 AM
Attachments: [Fleet Insurance Card 2010.pdf](#)
[Fleet Outline.pdf](#)

Good morning to all.

Attached is the new insurance card. Please print this off and place it in the folder in the vehicle(s) you are responsible for. State law requires that these be in all vehicles at all times.

Also attached is the Fleet Liability Policy Outline. This is for your information. You do not have to have it in the vehicle(s).

If you have any questions, please feel free to contact me.

JUST A REMINDER - ALL VEHICLE MILEAGE REPORTS ARE DUE IN OUR OFFICE BY THE 5TH OF EACH MONTH. IT IS AN AUDIT FIND IF WE DO NOT HAVE ALL MILEAGE REPORTS BY THIS DATE.

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This is intended to be a brief outline only. In any event, the terms and conditions of the policy will prevail. Please contact System Risk Management at (979) 458-6330 or by email at rms-insurance@tamu.edu for specific details or clarification.

From: [Bill Rooney](#)
To: ["George L Hodnett"](#)
Subject: new version
Date: Friday, August 28, 2009 4:46:00 PM
Attachments: [Hodnett et al 2009 Sorghum-Saccharum v5.1 \(final\).doc](#)

Dr. William L. Rooney
Professor, Sorghum Breeding and Genetics
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Elimination of a reproductive barrier facilitates intergeneric hybridization of
Sorghum bicolor and *Saccharum*

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and William L. Rooney¹

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Abstract:

Growing interest in bioenergy production has increased efforts to breed for greater biomass through intra- and inter-generic hybridization. Both sorghum (*Sorghum bicolor*) and sugarcane (*Saccharum spp.*) are now being bred to enhance the quantity and quality of biomass while maintaining or improving biotic and abiotic stress tolerances. The ability to consistently hybridize these species would facilitate the introgression of complementary traits that increase adaptability, yields, and sustainability of each species. Previous efforts to hybridize these crops have had limited success, but the discovery of a specific trait in sorghum has eliminated at least one prezygotic barrier to fertilization. Techniques to produce a significant amount of seed from crosses between sorghum and sugarcane are described. Using these methods, our programs have grown 1,371 sorghum/saccharum intergeneric hybrid plants. Seed set frequency in the intergeneric crosses was affected by sugarcane pollinators, implying that breeding and selection of sugarcane pollen parents could further enhance successful hybridization. The *Sorghum x Saccharum* hybrids described in this paper are now being used for introgression of traits into both species. Unlike previous attempts to hybridize these two genera, sufficient quantities of seedlings were produced to impose selection criteria with the goal of developing a new intergeneric cultivar with potential to be used for sugar or as a biomass feedstock. The long-term objective is to combine desirable traits of both sorghum and sugarcane.

INTRODUCTION

Both sorghum (*Sorghum bicolor*) and sugarcane (*Saccharum sp.*) have been identified as potentially dedicated bioenergy crops. Consequently, there have been increased efforts to develop sorghum and sugarcane germplasm with improved biomass quantity and quality. An ideal bioenergy crop has numerous characteristics which include but are not limited to high yield and quality input requirements that are as low as possible and stress tolerance (Perlack et al., 2005). Biomass feedstocks have been explored in the past as a source of renewable energy, and today there are increasing numbers of studies assessing their strengths and weaknesses (Lipinsky, 1978; Clark et al., 1981; Goldemberg, 2007; Burner et al., 2009).

Crop improvement through breeding relies on genetic variation within the species. When this variation does not exist or is limited, breeders turn toward wide hybridization or transgenic approaches to exploit genes from other sources. Transgenic approaches are effective for traits influenced by only a few genes and typically target a very specific trait. In addition, regulatory approval is cost prohibitive and public perception is sometimes a problem. For traits that are quantitatively inherited, introgression provides the most logical and effective approach to gene transfer, assuming that interspecific or intergeneric hybridization can be achieved. The probability of successfully hybridizing different crop species increases when the species are more closely related.

Sorghum is considered one of the closest relatives of the *Saccharum* complex, having diverged from a common ancestor as little as five million years ago (Al-Janabi et al., 1994). Guimaraes et al. (1997) illustrated this relationship by showing colinearity of 190 RFLP probes on genetic maps of *Sorghum* and *S. officinarum*. This close relationship has

been recognized for some time as *Saccharum* x *Sorghum* crosses have been reported with limited success (Venkatraman and Thomas, 1932; Bourne, 1935; Moriya, 1940; De Wet et al., 1976; Nair, 1999). Bourne (1935) attempted *Sorghum* x *Saccharum* crosses, (with sorghum as the female parent) but was not successful. More recently, Nair (1999) reported on the production of progeny from a *Sorghum* x *Saccharum* hybridization, but the frequency of viable progeny was low. From 3,670 well-pollinated florets only five seedlings were recovered. While there is obvious interest in creating and utilizing these hybrids between the two species, progress could be hastened by increased seed set and the ability to make selections among the resulting progeny.

The primary barrier to interspecific and intergeneric hybridization in sorghum is prezygotic; pollen tubes of alien species cease growth in pistils of sorghum before reaching the egg (Hodnett et al., 2005). Laurie and Bennett (1989) identified a sorghum trait, *iap* (*inhibition of alien pollen*), that permitted maize pollen tube growth to continue through the ovary to the micropyle when the sorghum female was homozygous for *iap*, but the recovery of sorghum-maize hybrids was not reported. Price et al. (2006) discovered that the same *iap* mutant removes the reproductive isolation between sorghum and several closely related wild taxa (*S. angustum*, *S. macrospermum* and *S. nitidum*) allowing the relatively easy production of new interspecific hybrids. Following this work, Kuhlman et al. (2008) documented the backcrossing of the previously described *S. macrospermum* hybrid to cultivated sorghum through the derivation of stable inbred lines with confirmed introgression from *S. macrospermum*. This introgression proves that large segments of chromosomes can be moved across Poaceae species, which can facilitate the intergeneric transfer of important and quantitatively inherited traits.

Given the potential benefits to sugarcane and sorghum crops and the renewed interest in both crops as bioenergy feedstocks, there is a logical interest in hybridization to combine their desirable characteristics. These characteristics include, but are not limited to, drought tolerance and wide adaptation from sorghum along with sugar concentration and perennial growth habit from sugarcane. Another potential benefit of wide hybridization between the species is the possibility of introducing the seed production capacity of sorghum into sugarcane and, in the long-term, developing a sugarcane variety that can be planted from true botanical seed as opposed to the current labor-intensive whole-stalk or billet planting methods. The objective of this study was to determine if sorghum germplasm possessing the *iap* mutant can be used to increase the frequency of sorghum/sugarcane hybrids and to assess the relative effect of sugarcane pollinators on seed set and progeny viability.

MATERIALS AND METHODS

Production of Sorghum/Sugarcane Hybrids: Seed of Tx3361, a line homozygous for *iap* and segregating for male sterility (Kuhlman and Rooney, in review), was planted in pots in the greenhouse from mid-July through mid-September to ensure flower synchronization between the sorghum and sugarcane plants. At the onset of anthesis, male sterile plants of Tx3361 were identified based on anther phenotype and isolated from unknown pollen by covering with a paper bag. Sorghum/sugarcane pollinations were made at the USDA-ARS Sugarcane Research Unit in Houma, Louisiana between late September and early November of 2007 and 2008. Additional pollinations were made in College Station, Tx in January and February of 2009. Tx3361 was used as the

female parent. A total of 67 basic and commercial sugarcane breeding clones were used as pollen parents.

In 2007 pollinations made in Houma were completed by dusting the sorghum panicle with freshly collected sugarcane pollen and by rubbing the sorghum panicle through the sugarcane tassel. Male parents included one commercial sugarcane cultivar, one released energy-cane cultivar (high-fiber sugarcane for biofuel production), three commercial breeding clones, four *S. spontaneum* accessions, and one *Erianthus* accession. Also included were six breeding clones that resulted from the following crosses: one *S. spontaneum* x sugarcane (F_1), one *S. officinarum* x sugarcane (F_1), one *S. spontaneum* x *S. spontaneum*, two F_1 x sugarcane (BC_1);, and one BC_1 x sugarcane (BC_2). In addition, one cross was made using multiple male parents (a polycross). In 2008, crosses were made by tapping tassels of a single sugarcane parent over the top of one to three sorghum panicles. To improve pollen load on the panicle, this was followed by rubbing the sorghum panicles into the sugarcane tassels. For a single cross, pollinations were repeated for 3-4 consecutive days during sugarcane anthesis. Males included five commercially released sugarcane cultivars, 24 sugarcane breeding clones, two *Erianthus* accessions, one *S. spontaneum* accession, and 13 basic breeding clones. The basic breeding lines included 12 F_1 hybrids between *S. spontaneum* and sugarcane and one BC_2 . One polycross was also included in 2008. Pollinated sorghum plants were returned to College Station for seed development and maturation. The sorghum x sugarcane crosses made in College Station were completed using five commercial sugarcane breeding clones from the Texas AgriLife sugarcane breeding program in Weslaco, TX.

Each sorghum panicle was pollinated only one time using the techniques developed in Houma in 2008.

Seed Harvest and Germination: Seed was allowed to develop and mature for 46, 41, and 27 days post pollination in 2007, 2008, and 2009, respectively. Seed from 2007 was stored from 30 to 90 d prior to germination. A high frequency of vivipary was observed in 2007 resulting in a loss of hybrids. To eliminate this problem in 2008 and 2009, seeds were not stored but were immediately germinated. Prior to germination seeds were surface sterilized by soaking them in a liquid suspension of CaptanTM and ApronTM (Syngenta, Wilmington, DE) for at least half an hour and then immersing them in a 30% solution of ChloroxTM (Proctor and Gamble, Oakland, CA) bleach for 20 minutes. Following surface sterilization, seeds were rinsed in sterile water and placed embryo side up in a petri dish containing a culture medium of Murashige-Skoog basal salts and vitamins (Murashige and Skoog, 1962) supplemented with 10 mg L⁻¹ glycine, 10 mg L⁻¹ L-arginine-HCl, 10 mg L⁻¹ L-tyrosine, 100 mg L⁻¹ inositol, and 30 g L⁻¹ sucrose, solidified with 0.7% agar (plant tissue culture grade, Phytotechnology Laboratories, Shawnee Mission, KS) (Sharma, 1999). Petri dishes were maintained between 27 and 30 C under Gro-LuxTM fluorescent lights (Sylvania, Danvers, MA) set to 14 h d⁻¹. All seeds that showed good root and shoot development were placed in 10.2 cm pots. Once established, plants were transferred to the greenhouse.

Confirmation of Intergeneric Hybrid Plants: Intergeneric hybrids were initially classified by morphology. As they developed, all hybrids exhibited numerous characteristics of sugarcane (e.g. height, tillering, and maturity) that the maternal parent did not possess. Plants assumed to be hybrids based on morphology were confirmed

using somatic chromosome numbers. Chromosome spreads were prepared from root tips using a method described by Jewell and Islam-Faridi (1994) with the following modifications. Young actively growing root tips were pretreated with a saturated aqueous solution of α -bromonaphthalene for 2.75 h at room temperature and fixed overnight in 95% ethanol/glacial acetic acid (3:1 v/v). Following fixation, root tips were rinsed several times with distilled water, hydrolyzed for 10 min in 0.2 M HCl and again rinsed in distilled water for 10 min. Cell walls were digested for 35 to 60 minutes at 37 C with an aqueous solution of 5% cellulase (Onozuka R-10, Yakult Honsha Co. Ltd., Tokyo) and 1.0% pectolyase Y-23 (Seishin Corporation, Tokyo) at pH 4.5 and subsequently rinsed three times with distilled water. Meristems were placed on a clean glass slide in an ethanol/glacial acetic acid (3:1) solution, macerated and spread with fine-tipped forceps, air-dried at room temperature for 2 d, and stained with Azure Blue. Root tip spreads were examined using a Zeiss Universal II microscope (Carl Zeiss Inc., Gottingen, Germany) with 63X and 100X apochromat objectives. Images were captured with an Optronics VI-470 system (Optronics Inc., Goleta, CA) and digitally stored and processed with Optimas (v. 6.1) image analysis software (Optimas Corp., Bothell, WA).

Effect of Sugarcane Pollinator on Hybrid Seed Set: For each cross made in Houma in 2008, the sugarcane parent, date of pollination, location of pollination, pollen rating, florets/panicle, seeds/panicle and seedlings produced were recorded. Pollen rating was a subjective measurement determined at the time hybrid seed was harvested by observing the amount of pollen present on stigmas of the sorghum panicle. The amount of pollen present on the stigmas was observed under a dissecting microscope and scored as 1, 2, or

3 with 1 being the least and 3 being the most. For each cross made in College Station in 2009 the sugarcane parent, seeds/panicle and seedlings produced were recorded.

To determine relative effect of location, date of pollination and sugarcane pollinator on seed set and pollen rating, PROC GLM in SAS v9.1 was used. Only sugarcane males that had been used in at least three pollinations were included in the analysis. All effects were considered fixed and only interactions involving the pollinator were included the analysis of variance.

RESULTS

2007 Hybrid Seed Production, Confirmation and Growth: In the fall of 2007, a total of 24 pollinations were made using 17 different pollinators (Table 1). Based on stigma reaction, it was apparent by two to three days post pollination that fertilization had occurred. Seed development was slower and the size was smaller when compared to intraspecific hybridization of sorghum. Embryo loss during seed development, and vivipary after development, became evident when the seed was prepared for germination. Further analysis revealed that these were common problems with 39% of the seed having no embryo, and 32% being viviparous. Seedlings were confirmed as intergeneric hybrids through chromosome counts. As the seedlings progressed in development, it became evident that they represented a wide range of phenotypes, which ranged from very poor in growth to highly vigorous.

From these pollinations, 23 hybrids were transplanted to pots and placed in the greenhouse. Somatic chromosome counts for these hybrids ranged from 56 to 64 (Fig. 1C). These hybrids displayed a wide range of phenotypes that included traits from both

Saccharum and Sorghum. All had numerous long narrow leaves like sugarcane and most tillered profusely. Two hybrids, L07-9S (Tx3361 x HoCP04-838) and L07-11S (Tx3361 x US06-9025) showed more vigorous growth than the others. In seven months, stalks of hybrid L07-9S were 2.7 m in height and those of L07-11S were 3.1 m (Fig. 1A) compared to the mean height of 1.1 m for the maternal Tx3361. Unlike Tx3361, both hybrids were photoperiod sensitive like sugarcane, and flowered from mid December through January in College Station whereas Tx3361 flowers in approximately 65 d regardless of planting date. The panicles on L07-9S and L07-11S were slightly more compact than those of sugarcane (Fig. 1B), and appeared male sterile; attempted pollinations onto Tx3361 did not produce seed. In August, several stalks of each hybrid were cut to test for the ability to vegetatively propagate and to assess the accumulation of soluble sugars and their distribution. Vegetative propagation through nodal cuttings was successful and internode brix values ranged from 8.5 to 19% with concentrations increasing with internode maturity as is seen in sugarcane (Whittaker and Botha, 1997).

2008/2009 Hybrid Seed Production and Enhancement of Process: In 2008 a total of 155 sorghum panicles (totaling 74,300 florets) were pollinated. From these pollinations, 10,347 seed were recovered, resulting in an average seed set of 14%. Percent seed set was not measured in the 2009 pollinations, but it appeared similar to that observed in 2008. Seed was harvested 40 d and 28 d post pollination in 2008 and 2009, respectively. Germination rates for the 2008 seed still suffered some from vivipary. In addition it was discovered that many of the embryos could not grow through the seed coat, which further limited germination rates in this year. In 2009 an additional decrease in maturation time further reduced vivipary, and excising the pericarp prior to planting removed the seed

coat barrier. These minor modifications significantly improved germination rates from 2.5% in 2007, to 5.7% in 2008, and to a much improved 33% in 2009.

From the combined 2008/2009 pollinations, a total of 1348 seedlings were transplanted to the greenhouse. The phenotypic variation present in these hybrids was extensive, but all were morphologically more like sugarcane than sorghum. These hybrids are expected to follow growth and development patterns observed in the limited set of hybrids evaluated from the 2007 crosses.

Effect of Pollinator Parent on Seed Set and Germination: Analysis of variance detected a significant effect of pollinator parent on seed set (Table 2), indicating that the source of sugarcane pollen is critical in the success of the production of intergeneric hybrids with Tx3361. Tx3361 had good seed set when pollinated with sugarcane clones L06-024, HoCP05-904, Ho06-562 and L01-283 which had seed set rates of 53.0%, 36.0%, 25.2%, and 24.9%, respectively. These pollinators are of particular interest for the production of intergeneric hybrids, while other clones with poor seed set percentages (i.e. <10%) should be avoided (Table 3).

Pollen rating in sugarcane (Table 2) is influenced by genotype and environment, with the date of pollination having a significant effect on pollen shed (Moore and Nuss, 1987). In our study, clones with a low mean pollen rating consistently produced crosses with low seed set, but using clones with a high mean pollen rating did not necessarily produce high seed set. Six of the top seven sugarcane pollinators (defined by seed set percentage) had an average or above average mean pollen rating, while mean pollen ratings in males producing below average seed set varied (Table 3). These results imply

that males must not only produce high pollen ratings but that they must also have favorable genetic and/or genomic compatibility with Tx3361.

Analysis of variance of the 2009 data indicated that once the seed was set, neither pollination environment nor sugarcane pollinator influenced percent germination. Based on the current methods of managing seed production and germination, it is reasonable to expect between 25-40% of seed to be viable regardless of which pollinator is used and where the pollination is made.

DISCUSSION

An average seed set of 53% when using sugarcane pollinator L06-024 was unexpectedly high for an intergeneric cross, considering attempts by previous researchers resulted in no more than a few plants (Nair, 1999). The high rate of seed production is attributed to the elimination of pre-fertilization barriers through the use of Tx3361 as well as compatibility of this line with particular sugarcane pollinators. Once produced, management of the hybrid seed prior to germination was critical to maximize production. Marked increases in viable seedlings were observed in each successive crossing year as problems affecting germination were identified. These increases resulted from the elimination of vivipary and physical barriers through early harvest and the removal of the pericarp.

Eliminating hybridization barriers and improving the germination rate has substantially increased the capacity to generate hybrids when compared to previous work. Nair (1999) “thoroughly pollinated” 3,670 florets and produced five seedlings for a success rate of 0.13%. In 2008, 16,813 florets were pollinated using males with a high

pollen rating. Of these pollinations, 162 plants were produced for a success rate of 1%. Assuming that “thoroughly pollinated” is equivalent to a high pollen rating, this represents a 7.7-fold increase in plant recovery between the 2008 crossing season over results reported by Nair (1999). As modifications were made to the seed treatment, an additional 6-fold increase in recoverable progeny was achieved in 2009. Thus, the combined increases resulted in approximately a 40-fold increase in recovered progeny when compared to the previous report.

A limited number of male parents were screened in the current study. It is logical to assume that further screening will uncover additional compatible sugarcane pollinators that will expand production of intergeneric hybrids by increasing seed set and by improving seed quality. Therefore continued screening of *Saccharum* pollinators will be necessary to identify the best males for intergeneric hybrid production. The capacity to produce large-scale quantities of intergeneric *Sorghum/Saccharum* hybrids opens a wide range of possibilities for genetic improvement of sugar and bioenergy crops. While successful hybridization between sorghum and sugarcane, *S. spontaneum*, and early generation *Saccharum* hybrids, are described in this study, there is a need to determine the range of germplasm that can be hybridized using the developed lines and techniques. It may be possible to hybridize sorghum with other grasses of the Poaceae (e.g. *Miscanthus*, *Erianthus*, etc.) to facilitate introgression of positive traits among the genera/species.

The genetic and phenotypic variation present among the newly developed *Sorghum/Saccharum* hybrids presents significant opportunities. Given the amount of variation present and the large numbers of hybrids produced, segregation is expected to

allow for the selection of elite hybrids. Even in 2007, the lowest of the three reported years for seedling production, there was enough variation among the 23 viable seedlings to select two that were visually superior to the others based on agronomic type. Further characterization of these two selected seedlings, as well as characterization of future selections is necessary to determine unique strengths and weaknesses of the hybrids.

Selected hybrids can be used to introgress large genomic regions that control valuable quantitative traits from one species to the other. For example, the potential to transfer drought tolerance from sorghum to sugarcane or to introgress enhanced sugar production from sugarcane into sorghum could significantly influence energy and sugar production throughout the world. Because the initial F₁ hybrids did not produce seed when crossed with sorghum, cytological manipulations will likely be needed, but established procedures provide approaches to mitigate this obstacle (Kuhlman et al., 2008).

If the F₁ hybrids possess unique and desirable agronomic characteristics and they perform well in agronomic trials, there is the potential to develop a new intergeneric hybrid crop. For example, a “sorcane” hybrid with high sugar accumulating capacity and enhanced water-use efficiency may be valuable as either a seed or vegetatively propagated crop. Additional research and development on sorghum seed parents and sugarcane pollinators must be completed to maximize seed production and development to make seed propagation a viable option. However, the germplasm and techniques described will produce seed quantities suitable for introgression, selection, and testing purposes.

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Table 1. Sugarcane parents used in the sorghum x sugarcane crosses listed by year and location of cross. Number of panicles pollinated, number of seed produced and number of seedlings grown are listed by pollinator. Male parents are described by generation as released energy cane (REC), commercial breeding clone (CBL), released sugarcane (RSC), *S. spontaneum* (spontaneum), *Erianthus*, F₁, BC₁, BC₂, or polycross. Total florets were counted in 2008.

Male	Generation	Panicles	Florets	Seed	Seedlings
<u>Houma 2007</u>					
Ho 00-961	REC	1		4	1
HoCP 01-517	CBC	1		8	1
HoCP 04-838	CBC	1		59	2
HoCP 96-540	RSC	1		46	2
MPTH 97-003	spontaneum	1		29	
MPTH 97-107	spontaneum	1		0	
MPTH 97-194	Erianthus	2		8	
MPTH 97-218	spontaneum	1		13	
MPTH 98-388	spontaneum	1		0	
Polycross	Polycross	3		69	3
	spontaneum				
US 03-145	complex	1		0	
US 03-165	F ₁	2		525	1
US 03-177	F ₁	2		210	1
Ho 06-9014	BC ₂	2		359	
Ho 06-9017	BC ₁	1		1	
Ho 06-9025	CBC	1		152	12
US 72-114	BC ₁	2		21	
Total		24		1504	23
<u>Houma 2008</u>					
Erianthus		1	544	0	0
HB03-364	F ₁	1	329	63	0
HB03-403	F ₁	5	2,025	256	0
Ho 01-564	CBC	5	3,275	334	16
Ho 05-961	CBC	23	8,976	1,691	160
Ho 06-525	CBC	6	2,765	301	19
Ho 06-530	CBC	1	975	0	0

Ho 06-543	CBC	2	592	9	1
Ho 06-552	CBC	2	978	10	0
Ho 06-562	CBC	4	1,725	480	13
Ho 06-563	CBC	1	281	85	3
Ho 06-565	CBC	2	408	199	0
Ho 07-613	CBC	2	1,131	316	1
Ho 95-988	RSC	1	760	43	0
HoCP 01-517	CBC	5	2,506	217	14
HoCP 04-803	CBC	1	393	19	1
HoCP 04-810	CBC	2	1,120	10	0
HoCP 04-838	CBC	8	5,152	603	91
HoCP 05-903	CBC	2	894	72	0
HoCP 05-904	CBC	3	2,074	581	34
HoCP 05-923	CBC	3	951	4	2
HoCP 06-502	CBC	1	159	13	0
HoCP 96-540	RSC	11	6,934	929	86
HoL 05-953	CBC	1	240	22	0
L 01-283	RSC	9	4,972	1,301	36
L 06-001	CBC	1	795	31	3
L 06-024	CBC	3	1,260	669	40
L 06-38	CBC	2	872	32	0
L 99-226	RSC	2	592	5	1
L 99-266	CBC	1	475	90	21
LCP 85-384	RSC	3	1,937	145	11
MPTH 97-209	spontaneum	5	2,401	195	3
MPTH 97-260	Erianthus	2	1,049	6	0
NG 77-214	Erianthus	1	433	0	0
Polycross	Polycross	2	125	93	1
US 02-840	CBC	1	557	2	0
Ho 07-9002	F ₁	1	532	156	2
Ho 07-9005	BC ₂	2	1,029	391	2
Ho 07-9014	F ₁	7	3,761	204	25
Ho 07-9016	F ₁	1	588	0	0
Ho 07-9017	F ₁	2	516	1	0
Ho 07-9018	F ₁	1	253	1	0
Ho 07-9019	F ₁	2	742	271	1
Ho 07-9020	F ₁	2	1,030	108	0
Ho 07-9023	F ₁	2	1,713	359	3
Ho 07-9025	F ₁	3	1,160	9	0
Ho 07-9026	F ₁	7	2,764	21	2
Total		155	74,743	10,347	592

		<u>Texas 2009</u>			
TCP 00-4521	CBC	16		28	9
TCP 01-4535	CBC	7		66	32
TCP 02-4622	CBC	11		362	128
TCP 03-4636	CBC	30		1,651	519
TCP 03-4645	CBC	9		203	68
Total		73		2,310	756
Grand Total		252	74,743	14,161	1371

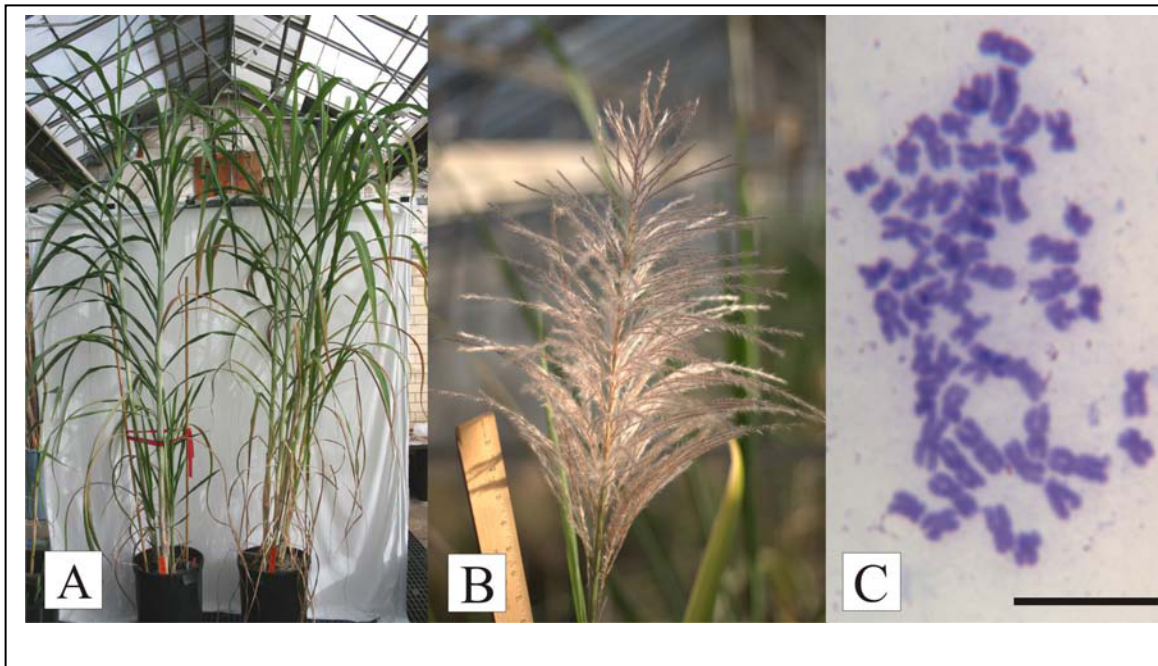
Table 2. Analysis of variance for seed set and pollen rating for seventeen sugarcane pollinators used to pollinate Tx3361 in Houma, La in the fall of 2008.

Source	Seed Set			Pollen Rating		
	df	MS	Pr>F	df	MS	Pr>F
Location	3	0.031	0.216	3	0.655	0.093
Date(Location)	14	0.025	0.283	15	0.631	0.019
Male	16	0.047	0.010	16	0.877	0.001
Male*Location	10	0.022	0.381	10	0.285	0.474
Male*Date(Location)	8	0.031	0.167	9	0.739	0.016
Error						

Table 3. Number of pollinations, percent seed set on Tx3361 and mean pollinator pollen rating for 17 different sugarcane cultivars and/or breeding clones in the fall of 2008 in Houma, La. Only pollinators that were used in at least three pollinations were included in this analysis. Pollen rating for each panicle was 1 (low), 2 (medium) or 3 (high).

<i>Saccharum</i> Pollinator	Pollinations	Seed set	Pollen Rating
	-----no.-----	---%---	
L 06-024	3	53.0	2.33
HoCP 05-904	3	36.0	2.67
Ho 06-562	4	25.2	2.50
L 01-283	9	24.9	2.00
Ho 05-961	23	18.2	1.65
HB03-403	5	15.6	1.80
HoCP 04-838	8	15.3	2.10
HoCP 96-540	11	13.6	1.64
HoCP 01-517	5	10.1	1.40
Ho 01-564	5	8.9	1.40
Ho 06-525	5	8.6	1.80
MPTH97-209	4	8.2	2.00
LCP85-384	3	7.5	3.00
Ho 07-9014	7	5.7	1.86
Ho 07-9026	7	0.7	1.00
Ho 07-9025	3	0.6	1.67
HoCP 05-923	3	0.4	1.00
Mean		14.8	1.80
L.S.D.		18.5	0.70

Figure 1. Photographs of sorghum x sugarcane intergeneric hybrids grown in College Station, Texas. (A) Two seven month old sorghum x sugarcane hybrids; (B) An inflorescence of a sorghum x sugarcane hybrid; and (C) mitotic chromosome spread from a sorghum x sugarcane hybrid. Scale bar = 10 μ m.



From: [Jeff Dahlberg](#)
To: [Richard A. Frederiksen](#); [Lloyd W. Rooney](#); [Fred R. Miller](#); [Charlie Woodfin](#); [Gary N. Odvody](#); [Bill Rooney](#)
Subject: News on Darrell
Date: Friday, September 25, 2009 3:56:43 PM

As if he needed this. Got this from Christi:

Dad is battling a serious infection. DES don't want to operate and will try to fight with antibiotics.

He needs lots of prayers.

Jeff
Sent from my iPhone

From: [Avant, Bob](#)
To: [Anna J Fox](#)
Cc: [Judy Young](#); dbaltensperger@ag.tamu.edu; bmccutchen@tamu.edu; [Bill Rooney](#)
Subject: Nomination Materials for 2009 Vice Chancellor's Awards in Excellence for Bill Rooney
Date: Monday, October 26, 2009 10:28:52 AM
Attachments: [Rooney.doc](#)
[NOMINATION FORM rva.doc](#)

Anna,

Attached is the nomination form and a draft of the letter I prepared for David Baltensperger. Jeff Dahlberg, Richard Hamilton, and Bill McCutchen will be preparing letters of recommendation.

I will be traveling for the next three weeks and will only be checking emails periodically. Please advise me if I need to do anything else.

Bob Avant
Program Director
Texas AgriLife Research
979/845-2908
512/422-6171 (Cell)
bavant@tamu.edu
<http://agbioenergy.tamu.edu>

-----Original Message-----

From: Judy Young [<mailto:j-young@tamu.edu>]
Sent: Wednesday, October 14, 2009 11:46 AM
To: Avant, Bob
Subject: Fwd: Call for Nominations - 2009 Vice Chancellor's Awards inExcellence

Oct. 14, 2009

TO: Bob Avant

I appreciate your willingness to assist in the preparation of a nomination packet for Bill Rooney. As discussed by phone the nomination will be for Research (on campus) award. All needed information is in the attached material. I talked with Bill Rooney and he will be visiting with you by phone since both of you are traveling. We appreciate your assistance.

Mike Chandler

Nomination Form

NOMINEE (or name of team) Dr. William (Bill) Rooney
(Dr./Mr./Mrs./Ms.) (First Name, Middle Initial, Last Name)

DEPARTMENT, CENTER, UNIT OR DISTRICT Soil and Crop Sciences**AWARD CATEGORIES** *(Check only one)*

Teaching Awards

- ☐ Undergraduate teaching
☐ Graduate teaching
☐ Student counseling and relations
☐ Graduate student teaching

Research Awards

- ☒ Research (on campus)
☐ Research (off campus)
☐ Research team
☐ Graduate student research (on/off campus)

Extension Education and Service Awards

- ☐ Agriculture and natural resource programs
- ☐ Family and consumer sciences programs
- ☐ 4-H & youth programs
- ☐ Specialist serving state, region, or county
- ☐ Extension team

Support Personnel Awards

- ☐ Administrative support (on campus)
☐ Clerical support (on campus)
☐ Clerical/administrative support (off campus)
☐ Research support (on campus)
☐ Research support (off campus)
☐ Technical/Extension support (on campus)
☐ Technical/Extension support (off campus)

Professional Services Awards

- ___Special Services
___Forester (Texas Forest Service)

Partnership Awards

- ☐ System Academic Partnership
☐ Industry/Agency/University/Association

Diversity Award

International Involvement Award

Administration Award

NOMINATOR Robert V. Avant, Jr., P.E.

NOMINATOR'S MAILING ADDRESS 100C, Centeq Building, 1500 Research Parkway, College Station

NOMINATOR'S PHONE # 845-2980, 512/422-6171 (cell) **E-MAIL** bavant@tamu.edu

DEPARTMENT OR UNIT NAME Corporate Relations DATE October 26, 2009

CHECK-LIST FOR A SUCCESSFUL NOMINATION (v)

- ___ Nomination form *(use prescribed form provided on award website)*
- ___ Vita Form *(use prescribed form provided on award website; limited to 2 pages for individual award or 4 pages for team award)*
- ___ Publications List *(required for research nominations; optional for teaching, extension, partnership and diversity nominations; use prescribed form provided on award website)*
- ___ Letter of nomination *(2 page limit; from department head, unit administrator or awards committee chair)*
- ___ Letters of Support/Recommendation *(no more than three letters; one-page maximum each)*
- ___ Compile nomination in order as listed above *(nomination form, vita form, publications, letter of nomination, letters of support)*
- ___ Save in one file (.PDF file format) as follows: Award Category-Name of nominee.pdf *(Research-John Jones.pdf)*
- SUBMIT ONE (1) ELECTRONIC FILE TO VCOffice@ag.tamu.edu no later than noon on Wednesday, November 4.**

(NOTE: Late applications or changes in the nomination package after the deadline are not permitted. Separate attachments such as resumes, biographical information or publications should not be included and will not be considered.)

DRAFT FOR Dr. Baltensperger

November 1, 2009

Vice Chancellor's Awards Committee
College of Agriculture and Life Sciences
Texas A&M University
College Station, Texas

It is with great pleasure that I nominate Dr. William "Bill" Rooney for the 2009 Vice Chancellor's Awards in Excellence for the On-campus Research category. Bill is Professor of Plant Breeding and Genetics in the Soil and Crop Sciences Department. He received his Ph.D. at the University of Minnesota in 1992 after receiving B.S. and M.S. degrees at A&M. Bill has both teaching and research appointments.

His teaching responsibilities include graduate advising (AGRO 691) and Agro 642 – Plant Breeding II a 3 credit hour course graduate level course on statistical and genetic issues in plant breeding. He also teaches AGRO 306, an undergraduate course on production agriculture. He has received excellent student evaluations. Bill has served as chair or co-chair for 12 M.S. students and for 12 PhD. students as well as serving on the committee of 26 other students who have completed graduate degrees. At the current time, he serves as a chair or co-chair for 7 graduate students and is on the committee of 5 other graduate students.

Bill has one of the strongest research programs in terms of funding in the College of Agriculture and Life Sciences with support from such diverse sources as Ceres, Chevron, Sorghum Producers Checkoff Board, Texas Advanced Technology Research Program, U.S. Agency for International Development, USDA-NRI, USDOE, and NSF. His sorghum breeding and genetics research focuses on three areas: a) research and publication in the genetics of important traits in sorghum and sorghum germplasm; b) germplasm development and application in U.S. and world sorghum production systems; and c) the training of graduate students in plant breeding and genetics using the sorghum breeding program as a platform. The results and germplasm feed directly into the sorghum breeding program and the goal of the sorghum breeding program is to develop and release sorghum germplasm that is improved for use as grain sorghum, forage sorghum and more recently as a bioenergy crop.

The interest in sorghum as a bioenergy feedstock has grown exponentially in the past three years. In 2007, Bill received a \$5 million sponsored research agreement with Ceres to develop bioenergy sorghum and since 2008 approximately 75% of all the breeding nursery plots have been devoted to bioenergy line development. Bill is a strong

proponent of multi-unit, cross discipline team research and has developed critical collaborations with faculty from other academic departments at Texas A&M and at Texas AgriLife Research Centers that involve over \$30 million in existing or proposed sponsored research projects in the area of strategic bioenergy crops. In the past ten years, his program has had seven releases which included one population, one parental line, and twenty germplasms and some have been utilized by private industry in commercial grain, forage sorghum hybrids, and bioenergy sorghums.

Bill is a member of Crop Science Society of America Journal, Agronomy Journal, Sorghum Improvement Conference of America, and the USDA Sorghum Germplasm Committee, is Associate Editor, Field Crops Research, and is Chairman, Texas AgriLife Research Plant Release Committee. He has 66 refereed journal publications, 6 book chapters, 11 station publications, 12 invited, conference or symposium proceedings, 17 abstracts/papers, and over 100 presentations at producer and commodity meetings.

Bill is an excellent educator, researcher, and communicator. He is in demand is a presenter at numerous national and international meetings and is recognized as one of the leading experts in the world in sorghum development for feed, food, forage, and fuel uses. He is frequently asked by administration to meet with major corporate sponsors and has a unique ability to communicate highly complex technical processes to corporate executives in a way that relates to their bottom line. Bill is respected by his students in class, student workers, graduate students, faculty, staff, and administration and his diplomacy is appreciated throughout the Texas A&M Agriculture family. I strongly recommend Dr. Bill Rooney for the 2009 Vice Chancellor's Awards in Excellence for the On-campus Research. Please feel free to contact me if you have any questions.

Sincerely,

David D Baltensperger
Professor and Head

From: [Vilma Ruth Calderon](#)
To: [LLoyd Rooney](#); [Bill Rooney](#)
Cc: [Rene Clara](#); [Kris Duville](#); [Lily Marisol Lopez](#)
Subject: Norman Bourloag Fellowship
Date: Friday, October 16, 2009 10:29:35 AM

Dr Rooney

As you know i got a Norman Bourloag scholarship and i am in kentucky State University right now. I arrived yesterday and i will start my program on monday morning. They changed the dates of my program and i will spent 2 months here. The program will start on monday october 19 and will finish on december 18, 2009.

kris Duville and Lily Lopez are in charge of the sorghum project right now and they are attending trainings and all the activiites from the project until i come back.

We almost have a distributor for the Omega Vi mills. kris is helping Le Ann to find it as soon as possible. we had two more workshops before i left and people continue interested in the mills.

Maybe i will be traveling to Texas A&M to visit some places there.....i will let you know

thank you

Vilma Ruth

From: [John Mullet](#)
To: [Bill Rooney](#)
Subject: Note from Mazur/Pioneer
Date: Saturday, September 19, 2009 12:07:47 PM

Bill,

The note below is from Barbara Mazur at DuPont/Pioneer.

John

I spoke to Marc Albertsen again about this, and he said that he would get in touch with you, John. He was recently in South Africa for the sorghum project, and I think it is taking more of his time than he expected. The program needs to start working on their phase II grant soon. I also saw Debby Delmer recently; she is working for the NSF this year on the Gates projects, and said that the program was receiving a lot of interest.

From: [Plant breeding activities and graduate students at TAMU](#) on behalf of [C. Wayne Smith](#)
To: TAMU-PLANTBREEDING@LISTSERV.TAMU.EDU
Subject: November 2009 Plant Breeding Bulletin
Date: Monday, November 09, 2009 10:06:50 AM
Attachments: [Plant Breeding Bulletin November 09.pdf](#)
[C. Wayne Smith2.vcf](#)

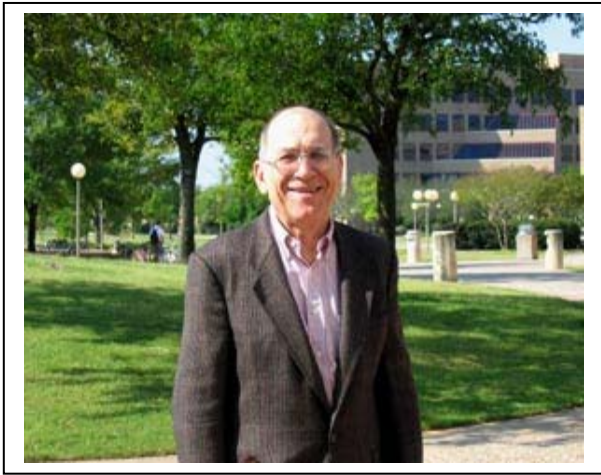
Attached is the November 2009 Plant Breeding Bulletin highlighting Dr. Lloyd Rooney who has been a part of our grain improvement program in Soil and Crop Sciences and AgriLife Research for the past 44 years. I hope that you enjoy learning more about Lloyd's program and accomplishments.

Regards,

Wayne

C. Wayne Smith
Professor, Cotton Breeding
Associate Department Head
Department of Soil and Crop Sciences
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TEXAS A&M PLANT BREEDING
November 2009



Dr. Lloyd Rooney has been a vital part of our wheat and sorghum breeding programs for 44 years. His expertise in determining food and feed quality attributes of sorghum, corn, wheat, and pearl millet have been instrumental in the development of large numbers of wheat varieties, sorghum lines and hybrids, and corn hybrids with improved processing quality for alkaline

cooking and dry milling. He has collaborated with a large number of colleagues domestically and internationally.

Lloyd's research interests include cereal improvement through genetics as a collaborator with Texas AgriLife Research plant breeders, processing of feed and food products, food and feed quality attributes, and understanding physiological mechanisms that influence cereal quality. Lloyd's research group has used light fluorescence, scanning electron microscopy (SEM), and environmental scanning electron microscopy (ESEM) for analyzing food microstructure as affected by process modifications for a variety of products and processes including pretzels, tortilla chips, extruded snacks, popped and puffed products and ready-to-eat breakfast foods.

Lloyd's work with breeders includes evaluation of wheat lines for bread and tortilla using small-scale tests of preliminary and advanced genotypes. The most promising lines are tested further in USDA-ARS testing. Sorghum nutritional value, composition, and processing properties for food, feed, and industrial processing has been extensively evaluated in collaborative research with sorghum improvement programs around the world. He pioneered methods for evaluation of processing qualities of grains that have been used to develop grains with improved food properties involving some unique phytochemicals that are important for human health.

His group has documented that special sorghums have higher levels of antioxidants than blueberries and produce healthy products with natural dark color and increased dietary fiber. Some of these special sorghums have high levels of flavanones, flavones, 3-deoxyanthocyanins and condensed tannins.

Lloyd has been a major player in the INTSORMIL CRSP since its inception in 1979. He has provided expertise in developing methods to evaluate the processing quality of grains that have been applied in sorghum and millet breeding programs from India to Africa and Central America. His efforts in improving food processing properties of sorghum and millets led to profitable value-added processed food products for urban consumers. He has traveled extensively in sorghum, maize and millet consuming areas of the world and has many former students in those areas.

Dr. Rooney's graduate level courses provide an in-depth understanding of chemical and biochemical properties of cereals and prepare students for academic, industry, or government sector careers. Lloyd has mentored 83 MS and 44 PhD students during his lustrous career. "Our best legacy is our former graduate students located around the world interacting with breeders, geneticists, biotechnologists, and others to improve crop quality."

His teaching reaches beyond the classroom and graduate student guidance through workshops, seminars and publications to transfer useful information. Extensive collaboration with Professor Taylor and others at the University of Pretoria occurs in the area of graduate training and related items. Collaborative efforts continue with Dr. Serna-Saldivar at ITESM in Monterrey Mexico.

He is an international member of the Mexican Academy of Sciences because of his group's research on corn nixtamalization and tortilla quality. This work was partially funded by the Snack Food Association (SFA) and the Tortilla Industry Association (TIA). Prior to TIA, Dr.

Rooney's Cereal Quality Lab hosted three workshops on Mexican Food Ingredients which emphasized corn and flour tortilla quality. Lloyd has co-edited a Snack Foods Processing book, edited an SFA Corn Quality Assurance Manual for the Snack Foods Association, edited several workshop proceedings, and has written several book chapters on sorghum quality.

Other areas of activity include troubleshooting for causes of product defects and changes during processing that affect structure and product quality. This includes extrusion, flaking, micronizing, and other processes. The Cereal Quality Lab pioneered in understanding the process of nixtamalization to produce tortillas and chips from maize and sorghum.

Collaboratively with the late Dr. Ralph Waniska, fundamental understanding of flour tortilla production and its chemistry was developed at Texas A&M. Factors affecting the texture and staling of tortillas were documented and additives to prevent staling were evaluated. Methods of evaluating food corn quality were devised which led breeders to develop hybrids with improved snack food processing quality. Improved methods were developed for dry masa evaluation involving industrial in-plant trials, pilot-plant research, and sensory panels determined how corn properties affect its processing.

Lloyd is an integral part of our plant improvement program at Texas A&M. You can find additional information at <http://soilcrop.tamu.edu>.

Monsanto supported PhD Graduate Assistantships:

Texas A&M University Department of Soil and Crop Sciences and Monsanto announces the availability of Monsanto Ph.D. Graduate Assistantships in Plant Breeding. Applicants must have earned a minimum 3.5 GPA on their M.S. course work, demonstrated an aptitude for research, and meet all other requirements for admission to Texas A&M, including completion of the GRE. Successful candidates will be required to register for nine hours of course work each fall and spring semester and six hours during the summer. Annualized salary is \$ 24,000, all tuition and required fees are paid by the assistantship, and group health insurance is available. Dissertation research will be in the area of crop improvement through the

application of breeding and genetics. Additional information and application protocol can be found at <http://soilcrop.tamu.edu> or by contacting Dr. Wayne Smith, Soil and Crop Sciences, 2474 Texas A&M University, College Station, TX 77843-2474, (979-845-3450 or cwsmith@tamu.edu).

Please direct comments concerning this bulletin to Wayne Smith, cwsmith@tamu.edu or 979.845.3450.

From: [Robert Harris](#)
To: [Lloyd Rooney](#)
Cc: [Peter B. Harris](#); [Bill Rooney](#)
Subject: Oatmeal with enhanced veg protein and antioxidants
Date: Thursday, November 12, 2009 4:48:05 PM

I've been making an oatmeal lately at home after reading some very favorable reviews about buckwheat. I used about 70% old fashioned oats (Silver Palate makes very good thicker oat flakes) 20 to 25% buckwheat and 5 to 10% sorghum bran. Oats are good for taste.

Another very important project is using our whole grain HTS perhaps with a little extra bran with whole oats with or without buckwheat.

Using the whole grain HTS is important for us since we paid for 100% of the crop and use only 15% or so of it and hard to make any money at that rate. So, if we can get your help to develop whole grain stuff, that would be just great. What do you think?

How does the Aggie football team look this year? Maybe we can help and get to be the officioal breakfast of the team. Great on defense. Nothing can get thru with all that fiber.

Bob

Bob

From: [Frank Caropreso](#)
To: wlr@tamu.edu
Subject: Oats Agronomist Search
Date: Wednesday, September 09, 2009 10:45:56 AM
Attachments: [Prog. Mgr Res. Agronomist Agriculture Research - Oats.doc](#)

Bill

Thanks for your time today; it was a pleasure speaking with you. Per our conversation, I'm attaching the job descriptions for the position at Pepsi. If you are interested I would appreciate a copy of your resume. If you are not interested, I would appreciate referrals for anyone that might be a good fit for this position..

Thanks

Frank

Frank E. Caropreso, PhD
Partner

"Recruiting the Future in Technology"

Hollander Horizon International
Research Park
16 Wall Street
Princeton, NJ 08540

Ph: 609 924-7577 x13
Fax: 609 924-8626

<http://www.hhsearch.com>

Requisitions - View External Posting

External Posting for Req 17991: Program Manager -Research Agronomist,
Agriculture Research - Oats (Status: Open)

[Change](#)

Posting Information

Requisition Title: Research Agronomist, Agriculture Research - Oats

The incumbent in this position will be responsible for applying solid technical expertise to independently plan, implement and manage oat based research and project activity related to crop and ingredient technology. Successful completion of project assignments will be measured by the extent to which they support Quaker Foods & Snacks initiatives with specific emphasis on oat agronomy / production, milling yield improvement, product quality which translates into consumer preferred products.

The incumbent will be expected to provide technical innovation through demonstrating an understanding of small grains breeding, agronomic practices, physical and chemical characteristics of the grain, the application of milling technology and understanding of consumer needs as relates to the inherent quality of the based grain that will drive business value. The incumbent will have responsibility for the following:

Working with a cross-functional business team to develop a robust oat research strategy. This will include:

Design, coordination and execution of various agronomic trials such as genetic by environment trials, regional variety trials and variety registration trials. Utilizing physical, analytical and consumer data to develop next logical steps. Provide leadership and actively manage external oat research with universities and governmental agencies.

Facilitating the development of near and long-term strategies to create and support a PepsiCo Agricultural Research Team.

Description: Acting as a key agronomic expert on multi-functional project teams assembled to execute Quaker Foods & Snacks related initiatives.

Independently planning and executing small grain variety project milestones with a thorough analysis of test results and recommendation of next steps to resolve technical issues.

Establishing a cooperative and supportive relationship with plant breeders, research personnel, university leaders and internal business unit members by seeking and placing value on their input.

Developing a web based technology strategy to drive the enhancement of research efficiency and crop production which will provide competitive advantage for Quaker in product quality, milling yield and consumer preference.

Assessment of cutting edge technology that is specific to small grains breeding, environmental prediction modeling, data collection and providing recommendations to improve program timing and deliverables.

Assessment of small grains quality parameters and utilizing the Quaker Quality Oat Definition (QQOD) to determine improved variety performance to meet processing and consumer needs.

Initiative to explore business models, make recommendations and execute agreed to business deliverables that will result in procurement, processing and consumer quality improvements.

Thorough understanding of processing and finished product quality parameters for PepsiCo grain based products (Oatmeal, white and yellow corn products and other applicable small grains).

Requirements: Minimum of M.S. degree in a Science or Agriculture related field or PhD is

preferred. Minimum 3 to 5 years experience in a grain based related field required. Self-starter with excellent oral and written communication skills, the ability to work with various personalities and work styles, and good influence management skills. Positive learner - highly creative individual with desire to gain and apply knowledge to new processes and products. Working knowledge of the methods used to assess financial performance, project tracking and deliverables. Ability to seek out, engage and work with resources, both internal and external to Quaker in order to drive projects to a successful conclusion. Willingness to travel domestically and international to research locations.

Work Location

City: Rhinelander

State/Province: Wisconsin

Country: United States of America

Postal Code: 54501

262

Area Code:

Contact: Frank Caropreso
Hollander Horizon International
Phone: 609 924 7577 x 13
E-mail: [REDACTED]

[Change](#)

From: [Plant breeding activities and graduate students at TAMU](#) on behalf of [C. Wayne Smith](#)
To: TAMU-PLANTBREEDING@LISTSERV.TAMU.EDU
Subject: October Plant Breeding Bulletin
Date: Tuesday, October 06, 2009 9:07:18 AM
Attachments: [Plant Breeding Bulletin October 09.pdf](#)
[Plant Breeding Bulletin October Nelson.doc](#)
[C. Wayne Smith1.vcf](#)

Attached is the October Texas A&M Plant Breeding Bulletin. Dr. Lloyd Nelson has had a distinguished career and made significant contributions to plant improvement. I hope that you enjoy reading about his accomplishments.

Regards,
Wayne

C. Wayne Smith
Professor, Cotton Breeding
Associate Department Head
Department of Soil and Crop Sciences
2474 TAMU
Texas A&M University
College Station, TX 77843-2474
979.845.3450
cwsmith@tamu.edu

TEXAS A&M PLANT BREEDING

October 2009



Dr. Lloyd Nelson began his career with Soil and Crop Sciences at the Texas AgriLife Research and Extension Center at Overton in 1976. He has co-advised graduate students and served on several graduate students committees. He initially conducted plant breeding in soft red winter wheat for grain and forage yield improvement, and annual ryegrass (*Lolium multiflorum*) for forage production. Much of his early wheat research was focused on fungal diseases of wheat in the high rainfall region of east Texas, such as leaf rust, powdery mildew, and glume blotch (*Stagnospora nodorum*). This research effort resulted in the release of germplasm having partial resistance to *S. nodorum*. He also served as a consultant on Septoria diseases in Brazil, Argentina, Bolivia, Paraguay, Uruguay and Chile. He has written a chapter in *Advances in Agronomy* (Vol. 44) entitled "Breeding Wheat for Resistance to *Septoria nodorum* and *Septoria tritici*". Located in east Texas, Lloyd has and continues to have a deep interest in forage potential of small grains. He has conducted forage clipping evaluations on wheat, oats, rye, and triticale for the past 33 years. Oftentimes these forage clipping experiments have been ideal environments for epidemics of powdery mildew, leaf rust, and stem and stripe rust. Disease data gathered on experimental lines has often been useful to the Texas small grain breeders from dryer areas of Texas. He has cooperated closely with all small grain breeders in Texas and adjoining states to evaluate their advanced lines for forage potential and disease resistance. This cooperation has resulted in Lloyd being listed as a co-author in the release of many small grain cultivars over the past 30 years.

Lloyd's research since 1995 has concentrated on breeding annual ryegrass for improved forage potential and improving the turfgrass quality of annual ryegrass. Gulf ryegrass, released by in 1963 by R.M. Weihing at the Beaumont Center and expressing improved Crown Rust resistance, was the leading annual ryegrass grown by Texas producers from the mid 1960s until the early 1990s. However, Gulf would often winterkill when grown in central and north Texas. Lloyd made a 3-way cross between Gulf (for its crown rust resistance), cultivar Marshall for winter hardiness, and an experimental ryegrass derived out of Dr. Ethan Holt's (retired Texas A&M Plant Breeder) program which had high forage yield potential in 1976 that provided progeny that lead to the selection of TAM 90 annual ryegrass. The

progenitor of TAM 90 was grown at the Texas AgriLife Research and Extension Center at Amarillo with the cooperation of Dr. Kenneth Porter and screened for winter hardiness and also was screened at the Research Station at Angleton for crown rust resistance. TAM 90 was released in 1990 and became a highly successful annual ryegrass cultivar for Texas.



More recent forage breeding efforts involved the release of tetraploid ryegrass cultivars. Earlier cultivars, such as Gulf and TAM 90 are diploids. Germplasm derived from TAM 90 was treated with chemicals to effect a doubling of chromosomes from 14 to 28. This 4x germplasm was crossed with other 4x germplasm to produce new populations. Selections for superior forage producing lines were screened at Overton and Beaumont, Texas for forage yield potential and crown rust resistance. This research resulted in the release of TAMTBO and Tetrapro cultivars and his latest release, TXR2006-T22 will be named Nelson and marketed by Wax Seed Company.

Dr. Nelson began selecting dwarf type ryegrass germplasm for its potential as a cool season turfgrass in the early 1990s. Forage type ryegrass cultivars such as Gulf and TAM 90 were and are far too vigorous and fast growing to be used for overseeding warm season turfgrass. After several years of testing his first turf annual ryegrass cultivar was released in 2000 as Axcella. While Axcella was greatly improved for dwarfiness, it did not have the desirable dark green color found in most perennial ryegrass cultivars. Subsequently, he released Panterra turf ryegrass in 2003 and Axcella 2 in 2006. Both cultivars were significantly improved for color, leaf fineness, and other turf quality traits. These cultivars are used to overseed warm season turf on football and soccer fields and to provide a green turf year around. Panterra ryegrass has been overseeded on Kyle Field and the soccer field at Texas A&M University. He anticipates the release of Intercross ryegrass in 2009, which is a cross between Axcella and an Intermediate height ryegrass. Intercross ryegrass is similar to some perennial ryegrass cultivars except that it will transition out, or die, as an annual ryegrass so as not to damage the perennial warm season turf. Presently he has crossed annuals with perennial ryegrass and is selecting for turf quality comparable to perennial, yet with a transition date similar to a late annual.

Another objective of his annual ryegrass turf breeding program is to breed for tolerance to high salinity soils and irrigation water. Grant funds provided by USGA are supporting screening of ryegrass germplasm both in the greenhouse and in the field at Pecos, Texas. Greenhouse screening methods include growing ryegrass in cone-tainers placed in high salinity water in salt tanks. This technique has been modified presently whereby germplasm is being grown in soil in flats which are immersed in salt water every 3 days to simulate high salinity. Salt concentration is gradually increased over time until severe salt damage can be recorded on each entry.

You can find more information on Dr. Lloyd Nelson's breeding program at <http://overtan.tamu.edu/ryegrass> Dr. Nelson can be contacted at lr-nelson@tamu.edu.

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Please direct comments concerning this bulletin to Wayne Smith, cwsmith@tamu.edu or 979.845.3450.

From: [Calvin L Trostle](#)
To: [Mark Marsalis](#); [David R Drake](#); [Juerg Blumenthal](#); [REDACTED]; [REDACTED];
[REDACTED]; [Richard L. Vanderlip](#); [Scott Staggenborg](#); [REDACTED];
[REDACTED]; [Dennis Pietsch](#); [Chad Godsey](#); [David A. Peterson](#); [Rodney Carpenter](#); [Rick Kochenower](#);
[REDACTED]; [Dr. Jeff Dahlberg](#); [Tim Lust](#); [REDACTED]; [Brent Bean](#); [Dan](#)
[Fromme](#); [Gary C Peterson](#); [John W Sij](#); [Todd Baughman](#); [Bill L Rooney](#)
Subject: Old Texas A&M Document on Sorghum Off-Types
Date: Wednesday, November 04, 2009 6:12:31 AM
Attachments: [Off-Type Sorghum Plants A&M MP-885 Aug1968.pdf](#)

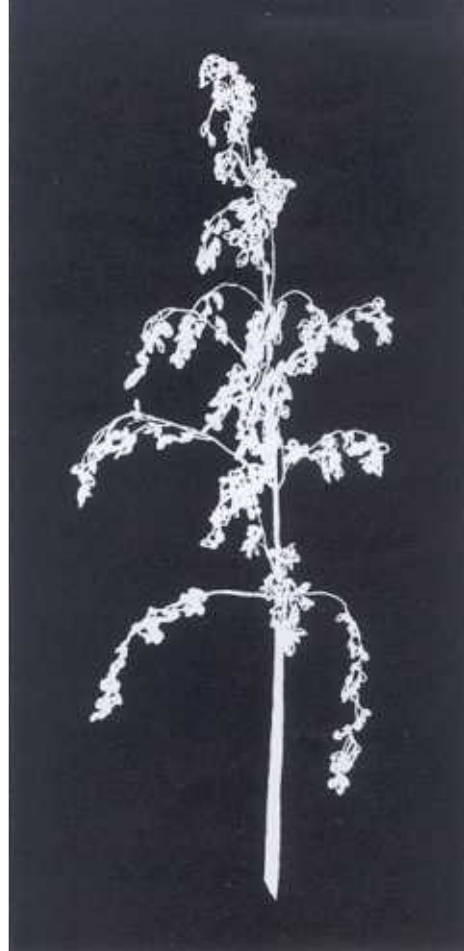
Dear Colleagues: Attached is a PDF copy of a 1968 Texas A&M document entitled "Off-Types in Grain Sorghum" (publication MP-885, August 1968) by Ed Clark and Darrell Rosenow. This document came to me out of the files of one of our seed companies, who commented that they had received some questions about sorghum off types this year, and they asked if there was anything more updated or might have more recent, higher resolution color photographs.

Do any of you know of anything more recent? I will read through this on my next rainy day, but I wanted to call this to your attention. As far as A&M is concerned this document was essentially lost, so I appreciate the opportunity to bring it to light again.

Calvin

Calvin Trostle, Ph.D.
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Texas Cooperative Extension/Texas A&M--Lubbock
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MP-885
August 1968



OFF-TYPE SORGHUM PLANTS

TEXAS A&M UNIVERSITY
TEXAS AGRICULTURAL EXPERIMENT STATION
H. O. Kunkel, Acting Director
College Station, Texas



1-A



1-B

Figure 1. Tall mutants. Figure 1A. A field with tall-mutant plants; Figure 1B. A closeup of two normal plants and one tall-mutant plant. Tall-mutant plants occur in all grain sorghum hybrids, and they are identical to the hybrid in which they are found except that they are 1 to 2 feet taller. They occur as a result of spontaneous genetic change (mutation) in one or both parents of the hybrid and do not result from contaminating pollen. They usually occur in relatively small numbers and are of little consequence with respect to production and harvesting, although they give fields a nonuniform appearance. There is no greater volunteer problem with seed from these tall mutants than with normal grain sorghum, and there is little advantage to roguing them out of a field other than to obtain a uniform appearance.



2

Figure 2. Off-type or off-color heads. Figure 2. A field of red grain sorghum with numerous white heads. These off-type grain sorghum plants are similar in height to the grain hybrid in which they are found but may be extremely variable for head type and grain color. The grain color may be white, yellow, red, brown or intermediate shades. These plants may develop from seed that are planted, or some may be volunteer plants. Off-type plants developing from seed that are planted are outcrosses originating from foreign pollen contaminating the seed production field. The foreign pollen may be from fertile plants (shedders) in the male-sterile seed row, or from other grain sorghum fields located near the seed production field (usually a mile or closer). Usually there is little, if any, greater volunteer problem with off-type grain sorghum than with normal grain sorghum, and there is little advantage to roguing out these off-types.



3-A



3-B

Figure 3. Forage types. Figure 3A. A field with some forage-type plants; Figure 3B. A close-up of a forage-type plant. These are tall, vigorous plants with coarse stems and fairly compact grain-type heads, and their maturity may be similar to the grain sorghum or much later. These plants may develop from seed planted with the crop, or they may be volunteer plants. Off-type plants developing from planted seed are outcrosses, resulting from pollen of forage-type plants contaminating the seed production field. The forage-type plants referred to here include such types as forage hybrids made with grain sorghum and hegari, or sorgo types such as Atlas, Sumac, Orange, or the varieties themselves, which have fairly compact heads and whose seed thresh free of the glumes. Plants in this group are more objectionable than the previous ones, because they frequently cause loss of grain in the combining operation. These tall plants may be pushed under the combine and carry considerable grain sorghum with them. Seed from these plants usually are not any more dormant than grain sorghum, but since their seed frequently are not harvested, they provide a potential source of additional volunteer plants in succeeding crops. These off-type plants should be rogued out of a field before seed are formed, or the plants should be completely removed from the field after seed are formed, instead of leaving them in the field as in the usual roguing process.



4-A



4-B

Figure 4. Rhizomatous grassy types. Figure 4A. A comparison of johnsongrass (left) and a grain sorghum X johnsongrass hybrid (right); Figure 4B. Variation in head type—hybrids of grain sorghum with: johnsongrass (two heads on left), sorghum alnum (middle), sudangrass (two heads on right); Figure 4C. Root system of a grain sorghum X sorghum alnum hybrid showing rhizomes; Figure 4D. Root system of a grain sorghum X sudangrass hybrid with no rhizomes. These rhizomatous grassy hybrid plants usually are taller than the grain sorghum, and have slender stalks with many tillers. The heads are very loose and open, like johnsongrass or sorghum alnum, and produce few or no seed because the plants are genetically unbalanced and highly sterile. Compared to johnsongrass, these plants usually have short, weak rhizomes (underground stems).

Plants in this group may develop from seed planted with the crop, or they may be volunteer plants from seed or rhizomes. If they are from seed planted with the crop, they result from johnsongrass or sorghum alnum pollen contaminating the seed production field. If they are volunteer plants, they may result from the few seed that can be produced by the off-type hybrids, or they may volunteer from rhizomes which overwinter.

Although plants in this group seldom produce seed, the seed that are produced are protected by long glumes, and most of the seed are dormant for long periods, partly because of the persistent glumes. Some of the rhizomes may overwinter, especially in areas with mild winters, and produce plants the following year. Deep plowing, preferably in the fall, digging up the rhizomes or chemical control may be necessary.

Regardless of the source of these plants, they should be rogued out of any field in which they are found. They should be destroyed as soon as they are recognizable to avoid establishment of rhizomes. Roguing can be accomplished by digging the plants out or by spot spraying with chemicals. The rhizomes and any seed that may be formed should be completely destroyed or removed from the field.



4-C



4-D

Figure 5. **Non-rhizomatous grassy types.** Figure 5A. A field with numerous non-rhizomatous grassy-type plants; Figure 5B. A single plant of a grain sorghum X sudangrass hybrid with three tillers; Figure 5C. Variation in head type of grain sorghum X sudangrass hybrids; Figure 5D. A field with numerous grassy-type plants with the seed shattered from the heads. These plants commonly referred to as shattercane are normally taller than grain sorghum. Many tillers usually are produced, and each tiller produces a head that is loose and open.

These plants are completely fertile and produce many seed which may volunteer in succeeding crops. They may be present in a grain sorghum field as volunteers or may result from seed planted with the crop. If they are from the latter source they result from pollen from sudangrass, sorghum-sudangrass hybrids, Honey sorgho or Amber sorgho types contaminating the seed production fields. The plants in this group are extremely variable with respect to height and other plant characteristics. However, the type that tends to persist after one or more years of volunteering is tall with slender stalks, loose heads, and seed covered with long dark brown or black glumes.

Plants in group 5 probably are the most objectionable of all the off-types. This is because they produce so many seed which are protected by long glumes and which may remain dormant in the soil for several years. The volunteer problem with this type is very severe. The source of these volunteers originally may be from seed planted with grain sorghum. However, many of the volunteers may originate in acreage previously planted to sorghum-sudangrass hybrids, either for grazing or diverted acreage. Other sources of seed of this type causing volunteer problems include cattle and bird droppings, flood water and irrigation water. Seed of these plants also may be carried into a field by machinery, particularly harvesting equipment. Still another source of off-types is mixing planting seed, particularly carryover seed from the previous year which may have the labels removed.

Plants in groups 3 through 5 may produce seed which shatter easily; however, the shattering problem is most severe in groups 4 and 5. These seed usually shatter before harvest and plants in group 5 provide a tremendous number of seed, many of which may produce volunteer plants. This is illustrated in Figures 5D and 6. Plants in group 5 should be rogued out of fields before they produce seed. Seed are potentially germinable as soon as 10 days after flowering. Therefore, off-type plants must be removed at flowering time, or at least, no later than a week after flowering. They should be cut at or below ground level to avoid regrowth. If some plants are missed and seed are formed, these plants must be carefully removed from the field to avoid a volunteer problem.



5-A



5-B



5-C



5-D



Figure 6. Seed deposited on ground from shattering type plants shown in Figure 5D.



Figure 7. Large circular patch of volunteer grassy type sorghum plants.



Figure 8. Volunteer sorghum in a soybean field.

OFF-TYPE SORGHUM PLANTS

L. E. Clark and D. T. Rosenow*

Off-type sorghum plants compete with grain sorghum and other crops for water, nutrients and sunlight. These plants not only compete with the current crop, but some may produce seed that will contribute to a severe volunteer problem in succeeding years. The off-type plants that contribute most to a volunteer problem should be controlled the same as other weeds.

There are two main sources of off-type sorghum plants: (1) Volunteer plants from seed present in the soil from previous years. Plants from this source have been present as long as sorghum has been grown. (2) Seed present in the planting seed that will produce off-type plants. Plants from this source have increased since the advent of sorghum hybrids in 1957. The reason for this is that male-sterile plants (plants that

produce no pollen) must be used in the production of hybrid seed. Male-sterile and male-fertile plants are grown in alternate rows in a crossing block. Pollen from the fertile plants is carried by wind to the male-sterile plants where pollination occurs and hybrid seed are formed. Pollen from undesirable plants can be carried in the air for long distances and can also pollinate male-sterile plants. The hybrid seed resulting from foreign pollen appear the same as the desirable hybrid seed and cannot be detected in laboratory tests for pure seed. Plants from these seed are called outcrosses.

The five major groups of off-type sorghum plants are illustrated in the following photographs. A description and the possible origin of plants in each group are presented with each photograph.

DISCUSSION

At present, it is not possible to completely avoid off-type plants in hybrid grain sorghum. Few, if any, sources of planting seed are completely free of off-types. Because these off-types in planting seed are hybrid seed, they are not distinguishable from desirable grain sorghum seed in laboratory tests. However, the Texas Department of Agriculture provides winter grow-out tests in which these off-types can be detected. Most producers of hybrid grain sorghum seed either avail themselves of this service or conduct their own grow-out tests. Every attempt should be made to buy seed with a minimum number of objectionable off-type plants, keeping in mind that all other quality factors of purity, germination and hybrid performance also must be considered.

It is important to determine whether off-type plants in a grain sorghum field are volunteers or from planted seed. To determine this, the following should be observed:

1. If the off-type plants are from planted seed, they will be individual plants uniformly distributed over the entire field. These plants will be in the seed furrow with the grain sorghum.
2. If the off-type plants are volunteers, they will be in circular patches of several to many plants and normally will be concentrated in certain areas of the field in which smaller patches were located in previous years. This is illustrated in Figure 7. Some of the volunteer plants will be to the side of the seed furrow, but many will be in the seed furrow due to normal cultivating practices.

To control volunteer plants from seed already in the soil, rotations should be used if possible. Rotating

with broad-leaved crops such as cotton or soybeans combined with herbicides recommended for controlling grasses in these crops is a good practice to control volunteer sorghum. Seed already in the soil may produce volunteer plants for several years. Therefore, 1 or 2 years out of grain sorghum is not always sufficient to control volunteer sorghum. The number of years plants will volunteer from seed already in the soil is influenced by weather conditions from year to year and by different geographical locations. The volunteer problem is more severe in areas that have a short growing season. Cold weather early in the fall and/or low rainfall during the off-season will not permit plants to volunteer so they can be plowed up in the fall and before planting in the spring. These conditions will cause the volunteer problem to be more severe as is evident in Figure 8 which shows grain sorghum, as well as grassy type, volunteers in a soybean field after an extremely dry winter in the High Plains of Texas. On the other hand, longer growing seasons combined with mild winters with adequate rainfall will permit much of the volunteer to be plowed out during the fall and possibly again in the spring before planting. To encourage volunteering in the fall, it is a good practice to shred and disc immediately after harvest.

Buying good seed, continuous roguing in grain sorghum fields, and appropriate control measures in rotations are the only approaches to reducing the problem of off-type sorghums.

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