



Pest Management Needs Assessment for Oklahoma Grain Sorghum Producers

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Grain sorghum represents a significant row crop for Oklahoma growers. Grain sorghum (milo) is grown predominantly in north-central Oklahoma and the Oklahoma Panhandle. Acreage devoted to sorghum production has slightly declined during the past 10 years, averaging 462,000 acres planted from 1996 through 2000 to 354,000 acres planted from 2001 through 2005. Yields have remained steady averaging 46.8 bushels per acre from 1996 through 2005 (NASS, 2006). In 2006, producers harvested 270,000 acres of grain sorghum (NASS, 2008), which produced an average yield of 34 bushels per acre. The top five counties for grain sorghum production included Texas, Cimarron, Garfield, Alfalfa, and Kay (NASS 2008).

A self-administered mailed survey (Dillman, 2007) was developed by T. Franke and K. Kelsey in consultation with OCES faculty who had expertise in entomology, plant pathology, and plant and soil sciences. The objective of this survey was to identify pest management needs of Oklahoma grain sorghum producers to guide Oklahoma State University's research and Extension programs in addressing their most critical needs. The survey asked Oklahoma grain sorghum producers to provide information about their production management practices in regard to soil fertility, insects, and weeds. The population for the study consisted of 850 Oklahoma grain sorghum producers in 2006 and the sample consisted of a randomly stratified sample ($n = 265$). Eighty-nine (89) of the 265 surveys were returned (34 percent response rate). The 89 respondents planted 29,432 acres of grain sorghum in 2006 (average of 330 acres per producer), representing about 11 percent of the total grain sorghum grown. It should be noted that 2006 was a severe drought year, following several drought years, which may have affected the responses to the survey.

Findings

The issues identified by respondents that were of greatest concern with growing grain sorghum are listed in Table 1.

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Table 1. Top concerns with grain sorghum production identified by Oklahoma survey-respondents.*

Issue	High Concern	Moderate Concern	Low Concern	No Concern
Weeds	65.6%	27.8%	5.6%	1.1%
Soil fertility	54.3%	40.2%	4.3%	1.1%
Harvest	49.4%	34.5%	12.6%	3.4%
Insects	38.5%	36.3%	24.2%	1.1%
Diseases	31.8%	31.8%	34.1%	2.3%
Bird damage	28.2%	34.1%	22.4%	15.3%

*Other concerns noted by producers (1 each) included: feed, yield (marked high concern), dry weather, discrimination vs. corn on feed value - discount price, and hog damage (marked low concern).

Weeds

Respondents (65.6 percent) identified weeds as the top issue with growing grain sorghum. They listed pigweed ($f = 54$) as the most frequent weed problem, followed by field bindweed ($f = 34$) as their top two weed problems (Table 2). Table 3 notes the herbicides used by respondents to treat weed problems in grain sorghum during 2006.

Table 2. Weeds encountered in grain sorghum by Oklahoma survey respondents.

Weeds	Frequency (f)
Pigweeds	54
Field bindweed	34
Large crabgrass	28
Johnsongrass	28
Field sandbur	23
Common cocklebur	17
Barnyardgrass	13
Yellow foxtail	5
Shattercane	3
Musk-Canadian Thistle, Clammy groundcherry, Walls Panicum, Green Foxtail, Panicum spp., Marestalk, Purslane,	1 each
Other	1 each

Table 3. Herbicides and number of applications used for weed control in grain sorghum by Oklahoma survey-respondents.*

Chemical	Air	Ground	Unspecified
2,4-D®	1	12	4
Bicep II Magnum® (atrazine + metolachlor)	0	12	1
Atrazine® (atrazine)	1	8	1
Cinch ATZ® (cynmethylin + atrazine)	0	8	2
Ally+2, 4-D® (metsulfuron + 2, 4-D)	0	6	2
Roundup® (glyphosate)	0	9	2
Lasso® (alachlor)	0	2	0
RT Master II® (glyphosate + 2, 4-D)	0	1	0
Shotgun® (atrazine)	0	1	0
Oil	0	1	0
Medal® (metolachlor)	0	1	0
TS Metolachlor® (metolachlor)	0	1	0
Banvel® (dicamba)	0	1	0
Atrep® (atrazine)	0	1	0
Peak® (prosulfuron)	0	1	0
Dep	1	0	0
Ally® (metsulfuron)	1	0	0
2, 4-D Amine®	0	0	1
Total	4	66	13

*One respondent noted "We sprayed two fields. One stayed clean. One was terribly infested by weeds and grass. Local coop says chemical didn't work because dry weather? Don't know what they used."

Soil Fertility

More than half of the respondents (54.3 percent) listed soil fertility as an issue of high concern for growing grain sorghum. The most frequent issue was with nitrogen deficiency ($f=61$), followed by phosphorus ($f=33$). Table 4 shows other soil fertility issues identified by respondents while growing sorghum.

Table 4. Soil fertility issues associated with growing grain sorghum as identified by Oklahoma survey respondents.*

Element	Frequency (f)
Nitrogen	61
Phosphorus	33
Low pH (acid soil)	20
Potassium	12
Zinc	9
Sulfur	8
Salinity	5

*One respondent noted he applied 40# of N, 4# of Zinc, and 20# of Phosphorus for grain sorghum. One respondent noted he had high low pH (acid soil) problems. One respondent noted he only had problems with phosphorus on sandy soils. One respondent noted he wasn't sure if he had sulfur problems.

Harvest

Harvest issues were identified as an issue of high concern by nearly 50 percent of respondents. However, respondents were not asked to specify issues associated with harvest. The response shows this issue should be of continued effort for research and Extension educational programs

Insects and Other Arthropods

Insects were not perceived to be an issue of high concern by a majority of survey respondents in 2006, but insect problems were considered to be an issue of high or moderate concern combined by more than 70 percent of the respondents. Producers noted fall armyworms as the most frequent insect problem ($f=7$), followed by chinch bugs ($f=6$) (Table 5). Insecticides used to treat insect problems and the methods of application are specified in Table 6.

Plant Diseases

Plant diseases were not listed as an issue of high concern by a majority of sorghum growers. However, more than 60 percent listed diseases as an issue of high or moderate concern.

Table 5. Insect pests encountered in grain sorghum by Oklahoma survey respondents.

Insect	Frequency (f)
Fall armyworms	7
Chinch bugs	6
Corn earworms	4
Cutworms	2
Spider mites	2
Grasshoppers	2
Lesser cornstalk borer	1
Sorghum midge	1
Southwestern corn borer	1
White grubs	1
Greenbugs	1

Table 6. Insecticides used in grain sorghum for insect control by Oklahoma survey respondents.

Chemical	Air	Ground	Unspecified
Gaucho® (imidacloprid)	0	3	1
Lorsban® (chlorpyrifos)	1	0	1
Warrior/Karate® (lambda cyhalothrin)	1	1	1
Mustang MAX® (zeta cypermethrin)	0	1	0
Asana® (esfenvalerate)	1	0	0
Di-Syston® (disulfoton)	1	0	0
Malathion® (malathion)	1	0	0
Total	5	5	3

*One respondent noted "With the drought in 2006, we didn't spray insecticides. We always scout for chinch bugs corn earworms midge grasshoppers (early)."

concern combined. Detailed information was not collected on disease problems because of the low likelihood of fungicide application (other than fungicide seed treatments) to sorghum in Oklahoma. However, development of research and Extension programs addressing plant disease problems in sorghum would be valuable to sorghum producers, based on this survey.

Bird Damage

A majority of respondents did not list damage from birds feeding as an issue of high concern, but more than 50 percent indicated it was an issue of high or moderate concern combined.

Summary and Conclusions

The average Oklahoma grain sorghum producer who responded to this survey grew 330 acres of grain sorghum in 2006 and identified weeds and soil fertility as their top issues of concern. Pigweed was the most frequent weed problem encountered, followed by field bindweed, large crabgrass, and Johnsongrass. Soil fertility issues included nitrogen and phosphorous deficiencies. Insect, disease, and bird issues were of less concern.

These results suggest that grain sorghum producers could benefit from research and Extension programs addressing basic and specific pest management challenges. Oklahoma grain sorghum producers continue to benefit from information on effective management of weeds, soil fertility, and harvest. They are less concerned with insect and plant disease management; however a majority consider these issues of high or moderate concern and would benefit from up-to-date information on management of these pests. Producers also indicated that they could use information on discouraging damage caused by birds.

References

- Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(4), 297-334.
- Dillman, D. A. (2007). Mail and Internet surveys: The tailored design method. (2nd ed.). John Wiley & Sons, Inc.: Hoboken, NJ.
- Lindner, J. R., Murphy, T. H. & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education*, 42(4), 43-53.
- NASS Fact Finders for Agriculture. USDA (Washington, D.C.) 2006 Census of Agriculture State Profile. Retrieved May 18, 2007 from http://www.nass.usda.gov/QuickStats/PullData_US.jsp