Forage and Grain

A College of Agriculture and Life Sciences Report

Report Summary

Full Report is Available online at:
cals.arizona.edu/pubs/crops/az1442

Cooperative Extension
Agricultural Experiment Station
The University of Arizona, Tucson
U.S. Department of Agriculture

The University of Arizona
College of Agriculture and Life Sciences

Contributing Authors to the 2007 Forage and Grain Report and their Supporting Organization

Clay, P. A. ..... Agriculture Agent, Maricopa County Cooperative Extension, Phoenix
Grimm, Anna ..... Lab Helper, Riverside County Cooperative Extension, Blythe, CA
Husman, S. H..... Agriculture Agent, Pinal County Cooperative Extension, Casa Grande
Ottman, M. J. ..... Extension Agronomist, Plant Sci. Department, U of Ariz., Tucson
Rethwisch, Michael D. ..... Farm Advisor, Riverside County Cooperative Extension, Blythe, CA
Smith, S. E..... Professor, School of Natural Resources, U of Ariz, Tucson
Williams, Michael..... Lab Helper, Riverside County Cooperative Extension, Blythe, CA

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ALFALFA

INSECTS

Comparisons of Prism®, Trilogy®, Baythroid® XL, and Steward® for Control of Summer Alfalfa Insects

Michael D. Rethwisch, Anna Grimm and Michael T. Williams

Three insecticides and one herbicide (Prism®) were evaluated efficacy againstsummer alfalfa insects using small plots. Usage of the insecticide Steward®resulted in excellent control of alfalfa caterpillars and beet armyworms, as well asexcellent initial control of Empoasca leafhoppers. Usage of Steward® also reduced nymphal lygus bugs, but also resulted in lowest numbers of bigeyed bugs. Application of the insecticide Baythroid® XL was noted to result in excellent control of Empoasca leafhoppers throughout the study, excellent control of palestriped flea beetles early in the study, but also reduced populations of damsel bugs early in the study. Reduction of threecornered alfalfa hoppers was also noted, as was excellent control of alfalfa caterpillars at one and seven days post treatment with this chemistry, although this was not noted at four days after treatment. Data indicate the herbicide treatment (Prism® + Hasten®) significantly reduced damsel bug populations and large lygus bug nymphs for one day post treatment, and resulted in a slight numerical decrease in beet armyworms and palestriped flea beetles. Clover leafhopper numbers where higher at seven days post treatment in alfalfa receiving this treatment than the untreated check. Application of Trilogy®, expected to be a slow acting treatment, did result in some slight initial reductions (25%) of palestriped flea beetles, threecornered alfalfa hoppers and beet armyworms, but these red uctions were not apparent at four days post treatment. Usage of Trilogy® resulted in highest Empoasca leafhopper populations at seven days post treatment, although the reason for this observation is unknown.

VARIETIES

Alfalfa Variety Performance at Tucson, 2005-2006

M. J. Ottman and S. E. Smith

New alfalfa varieties are constantly being introduced into the marketplace. The number of varieties available for low-elevation desert areas in Arizona in the non-dormant and very non-dormant class is close to 50. New varieties are introduced each year and unbiased yield comparisons are helpful to the grower to base the decision of whether or not to sow a new variety. The study reported here is part of the on-going effort to evaluate alfalfa variety performance in Arizona. A summary of small grain variety trials conducted by the University of Arizona can be found online at http://ag.arizona.edu/pubs/crops/az1267.pdf

BARLEY AND WHEAT

DURUM PRODUCTION PRACTICES

Survey of Durum Production Practices, 2004

M. J. Ottman

Durum growers were surveyed in cooperation with the USDA's National Agricultural Statistics Service to determine production practices and their effects on yield and protein in the 2004 growing season. The survey was conducted in two regions: West (Yuma and La Paz counties) and Central (Maricopa, Pinal, and Pima counties). These two regions represent about 96% of the durum acreage. We obtained responses from 91 out of an estimated 195 durum growers (47%) representing about 38,000 out of 95,500 acres (40%). Durum was grown following cotton (48%), vegetables (43%), or other crops. The predominant soil texture was a sandy loam (36%), followed by clay loam (26%) and sandy clay loam (26%). Herbicide was applied on 67% of the acreage. The major varieties were Kronos (20%), WestBred 881 (18%), Kofa (14%), and Duraking (11%). Border flood irrigation accounted for 77% of the acreage, followed by furrow (11%), and level basin (10%). The crop was typically irrigated 6 to 7 times. The average planting date (irrigation applied) was December 19 in the Central region and January 7 in the West region. The seed was planted at an average rate of 163 lbs/acre. Phosphorus was applied to only a third of the acreage, but when it was applied, the rate averaged 67 lbs P2O5/acre. Nitrogen rate averaged 210 lbs N/acre. Grain yield tended to be higher following crops other than cotton grown on clay loam to sandy clay loam soils. Increased yield was associated with early planting, certain varieties, high N rate, and irrigation frequency. Higher protein content was associated with previous crops other than cotton, border irrigation, early planting, and N rate. This survey documents associations, not cause-and-effect relationships, among durum production practices, yield, and protein.

Survey of Durum Production Practices, 2005

M. J. Ottman

Durum growers were surveyed in cooperation with the USDA's National Agricultural Statistics Service to determine production practices and their effects on yield and protein in the 2005 growing season. The survey was conducted in two regions: West (Yuma and La Paz counties) and Central (Maricopa, Pinal, and Pima counties). These two regions represent about 95% of the durum acreage. We obtained responses from 97 out of an estimated 195 durum growers (50%) representing 42,920 out of 75,400 acres (57%). Durum was grown following cotton (38%), lettuce (24%), vegetables (21%), or other crops. The predominant soil texture was a sandy loam (42%), followed by sandy clay loam (31%) and clay loam (21%). Herbicide was applied on 57% of the acreage. The major varieties were Kronos (21%), Alamo (16%), and Orita (16%). Level basin irrigation accounted for 52% of the acreage, followed by border flood (36%), and furrow (12%). The crop was typically irrigated 6 to 7 times. The average planting date (irrigation applied) was December 28 in the Central region and January 14 in the West region. The seed was planted at an average rate of 167 lbs/acre. Phosphorus was applied to only a third of the acreage, but when it was applied, the rate averaged 71 lbs P2O5/acre. Nitrogen rate averaged 213 lbs N/acre. Increased yield was associated with previous crops other than cotton, certain varieties, level basin irrigation, early planting in the Central region, a seeding rate between 140 and 160 lbs N per acre, N rate between 100 and 200 lbs N per acre, and an irrigation number of less than six in the West and seven in the Central Region. Grain protein was associated with varieties. This survey documents associations, not cause-and-effect relationships, among durum production practices, yield, and protein.

Survey of Durum Production Practices, 2006

M. J. Ottman

Durum growers were surveyed in cooperation with the USDA's National Agricultural Statistics Service to determine production practices and their effects on yield and protein in the 2006 growing season. The survey was conducted in two regions: West (Yuma and La Paz counties) and Central (Maricopa, Pinal, and Pima counties). These two regions represent about 95% of the durum acreage. We obtained responses from 85 out of an estimated 170 durum growers (50%) representing 40,580 out of 70,000 acres (58%). Durum was grown following vegetables (42%), cotton (41%), lettuce (12%), or other crops. The predominant soil texture was a sandy clay loam (47%), followed by sandy loam (30%) and clay loam (16%). Herbicide was applied on 52% of the acreage. The major varieties were Kronos (26%), Ocotillo (20%), Alamo (16%), and Orita (16%). Flood irrigation systems accounted for 87% of the acreage, followed by furrow (11%). The crop was typically irrigated 6 times. The average planting date (irrigation applied) was December 27 in the Central region and January 4 in the West region. The seed was planted at an average rate of 160 lbs/acre. Phosphorus was applied to only a quarter of the acreage, but when it was applied, the rate averaged 65 lbs P2O5/acre. Nitrogen rate averaged 224 lbs N/acre. Increased yield was associated with previous crops other than cotton in the West region, certain varieties, lack of herbicide application, planting in January in the West region and November or December in the Central region, a seeding rate between 100 and 160 lbs N per acre, and an N rate between 200 and 300 lbs N per acre. Increased grain protein was associated with a previous crop of vegetables or lettuce in the West region, lack of herbicide application in the Central region, manure application, clay loam or sandy clay loam soil, December planting in the West region, lack of phosphorus application, and fewer irrigations. This survey documents associations, not cause-and-effect relationships, among durum production practices, yield, and protein.

STEM NITRATE FLUCTUATION

Fluctuation in Lower Stem Nitrate Concentration in Small Grains, 2004

M. J. Ottman

Lower stem nitrate concentration is used as a guide for fertilization of small grains in Arizona. The objective of this study is to determine if the timing of stem sampling has an appreciable effect on stem nitrate and corresponding fertilizer recommendations. Durum and barley were grown at the Maricopa Agricultural Center and lower stems were analyzed for nitrate from 3-leaf to maturity. Stem nitrate concentration varied considerably between the 3-leaf and 2 node stages, but thereafter was relatively constant and low (averaged 765 ppm). Stem nitrate increased after rain or N application on a few occasions, but not consistently. In this study, the timing of the stem sampling could have affected fertilizer recommendations before the 2-node stage, but after the 2-node stage, fluctuations in stem nitrate would have resulted in relatively minor differences in fertilizer recommendations.

Fluctuation in Lower Stem Nitrate Concentration in Small Grains, 2005

M. J. Ottman

Lower stem nitrate concentration is used as a guide for fertilization of small grains in Arizona. The objective of this study is to determine if the timing of stem sampling has an appreciable effect on stem nitrate and corresponding fertilizer recommendations. Durum and barley were grown at the Maricopa Agricultural Center and lower stems were analyzed for nitrate from 3-leaf to maturity. Stem nitrate concentration varied considerably between the 3-leaf and preboot stages, but thereafter was relatively constant and low (averaged 736 ppm). In this study, the timing of the stem sampling could have affected fertilizer recommendations before the pre-boot stage, but afterwards fluctuations in stem nitrate would have resulted in relatively minor differences in fertilizer recommendations.

Fluctuation in Lower Stem Nitrate Concentration in Small Grains, 2006

M. J. Ottman

Lower stem nitrate concentration is used as a guide for fertilization of small grains in Arizona. The objective of this study is to determine if the timing of stem sampling has an appreciable effect on stem nitrate and corresponding fertilizer recommendations. Durum and barley were grown at the Maricopa Agricultural Center and lower stems were analyzed for nitrate from 3-leaf to maturity. The lower stem nitrate concentration initially climbed from 3000 ppm at 3-leaf to 10,000 ppm around the 2-node stage. It then gradually declined from the 2-node stage until maturity when it fell to less than 3000 ppm In this study, the timing of the stem sampling would not have affected fertilizer recommendations, although considerable fluctuation in stem nitrate concentration was measured.

TISSUE TESTING TO PREVENT LOW GRAIN PROTEIN

Use of Tissue Testing to Prevent Low Grain Protein Content in Durum, 2003

M. J. Ottman, S. H. Husman, and P. A. Clay

Low grain protein content in durum can be prevented by applying nitrogen fertilizer after heading. Tentative guidelines were established from previous research for nitrogen fertilizer applications after heading based on the lower stem nitrate content near heading. Ten commercial durum fields were selected for testing the use of these guidelines to ensure grain protein contents greater than 13%. Only one field had grain protein content less than 13% (12.83%), and this field had herbicide damage and had to be over-irrigated due to surface unevenness. The average protein content was 13.62% but the amount of nitrogen fertilizer actually applied by the growers after heading averaged 74.5 lbs N/acre, whereas the amount recommended by the tentative guidelines averaged 53.1 lbs N/acre. If the tentative guidelines had been followed, we estimate that the average grain protein content would have been about 13.04%. Our tentative nitrogen fertilizer recommendations based on stem samples near heading appear accurate, but another year of testing would add more certainty.

Use of Tissue Testing to Prevent Low Grain Protein Content in Durum, 2004

M. J. Ottman, S. H. Husman, and P. A. Clay

Low grain protein content in durum can be prevented by applying nitrogen fertilizer after heading. Tentative guidelines were established from previous research for nitrogen fertilizer applications after heading based on the lower stem nitrate content near heading. Ten commercial durum fields were selected for testing the use of these guidelines to ensure grain protein contents greater than 13%. The average protein content was 14.00%, the amount of nitrogen fertilizer actually applied by the growers after heading averaged 44.5 lbs N/acre, whereas the amount recommended by the tentative guidelines averaged 41.5 lbs N/acre. If the tentative guidelines had been followed, we estimate that the average grain protein content would have been about 13.92%, and two fields would have been slightly below 13% protein (about 12.8% protein). Our tentative nitrogen fertilizer recommendations based on stem samples near heading appear accurate.

Use of Tissue Testing to Prevent Low Grain Protein Content in Durum, 2005

M. J. Ottman and S. H. Husman

Low grain protein content in durum can be prevented by applying nitrogen fertilizer after heading. Tentative guidelines were established from previous research for nitrogen fertilizer applications after heading based on the lower stem nitrate content near heading. Three durum fields in Pinal County were selected for testing the use of these guidelines for ensuring grain protein contents greater than 13%. These fields were split into plots that either received late N fertilization after heading or not. The stem nitrate content at heading for two of the fields averaged 6337 ppm, indicating no need for late N fertilizer application to achieve grain protein content above 13%, and the grain protein content for these fields averaged 15.1% with or without late N fertilizer. The stem nitrate content at heading was 894 ppm for the third field, the stem nitrate guidelines called for a late N application of about 63 lbs N/a, and a late N application of 46 lbs N/a increased grain yield protein from 11.54 to 13.34%. Our tentative nitrogen fertilizer recommendations based on stem samples near heading appear accurate.

VARIETIES - LOW INPUT

Testing Low Input Barley and Wheat Lines, 2002

M. J. Ottman

This work represents the first year of a 3-year testing program to identify low input wheat and barley entries with higher test weight and less lodging than Solum barley. Twenty lines each of barley and wheat were grown at the Maricopa Agricultural Center with one, two, or seven irrigations. Several barley entries yielded similar to Solum but had much higher test weight and less lodging. None of the wheat entries were as productive as Solum with one or two irrigations this year, but several exhibited good yield potential and lodging resistance with seven irrigations.

Testing Low Input Barley and Wheat Lines, 2003

M. J. Ottman

This work represents the second year of a 3-year testing program to identify low input wheat and barley entries with higher test weight and less lodging than Solum barley. Twenty lines each of barley and wheat were grown at the Maricopa Agricultural Center with one, two, or seven irrigations. Several barley entries yielded similar to Solum but had higher test weight and less lodging. Several wheat entries exhibited good yield potential and lodging resistance.

Testing low input barley and wheat lines, 2004

M. J. Ottman

This work represents the third year of a 3-year testing program to identify low input wheat and barley entries with higher test weight and less lodging than Solum barley. Twenty lines each of barley and wheat were grown at the Maricopa Agricultural Center with one, two, or seven irrigations. Several barley entries yielded similar to Solum but had higher test weight and less lodging. Several wheat entries exhibited good yield potential, test weight, and lodging resistance.

Testing low input barley and wheat lines, 2005

M. J. Ottman

Head rows of 4 experimental lines each of barley and wheat were grown at the Maricopa Agricultural Center. One barley and one wheat line were harvested and the seed retained as breeders seed. The barley line is significantly improved in yield, test weight, and lodging resistance compared to Solum. The wheat line does not represent a significant improvement over Yecora rojo, and may not be released.

Variety Mixtures for Reduced Input Barley, 2006

M. J. Ottman

Variety mixtures may lessen competition among plants and reduce effects of stress particularly in environments where resources are limiting. Mixtures of four barley varieties were grown under low input conditions at the Maricopa Agricultural Center. The barley varieties seeded were Barcott, Solum, Solar, and an experimental low input line designated Entry 9. The highest yields were not obtained with mixtures in this experiment, but rather when the varieties were grown alone. Barcott and Entry 9 decreased yield when part of the mixture more than Solum or Solar. When Solum was grown in a mixture rather than alone, test weight and lodging were improved, but yield was decreased.

VARIETIES - FULL PRODUCTION

Small Grains Variety Evaluation at Maricopa and Yuma, 2006

M. J. Ottman

Small grain varieties are evaluated each year by University of Arizona personnel. The purpose of these tests is to characterize varieties in terms of yield and other attributes. Variety performance varies greatly from year to year and several site-years are necessary to adequately characterize the yield potential of a variety. A summary of small grain variety trials conducted by the University of Arizona can be found online at http://ag.arizona.edu/pubs/crops/az1265.pdf.

Small Grains Variety Evaluation at Yuma, 2007

M. J. Ottman

Small grain varieties are evaluated each year by University of Arizona personnel. The purpose of these tests is to characterize varieties in terms of yield and other attributes. Variety performance varies greatly from year to year and several site-years are necessary to adequately characterize the yield potential of a variety. A summary of small grain variety trials conducted by the University of Arizona can be found online at http://ag.arizona.edu/pubs/crops/az1265.pdf.