Imperial County Agricultural Briefs

Features

From your Farm Advisors

March, 2007

Thrips Control and IYSV Disease Suppression in Onions

Eric T. Natwick and Tom Turini

Western flower thrips, *Frankliniella occidentalis*, and onion thrips, *Thrips tabaci*, are the main thrips species that occur in onions. Thrips are very small elongate insects with two pairs of fringed wings that are feather-like in appearance. Adults of both onion thrips and western flower thrips are pale yellow to light brown in color. Thrips larvae have the same body shape as adults but are lighter in color and are wingless. The first instar larvae are whitish and the second instar larvae are yellowish. Both the prepupa and pupa are similar to the second instar larva in shape and color, but have small wing pads.

The host range of both onion thrips and western flower thrips are very extensive, including cereals and broadleaf crops. Both species are injurious to onions. Onion thrips thrive in hot, dry conditions and are usually more damaging in areas where these climatic conditions prevail for most of the production season. High populations of thrips can reduce both yield and reduce the storage life of onions. Leaf scaring is a serious problem on green onions, but thrips feeding during the early bulb development is most injurious to dehydrator onions and sweet onions. Western flower thrips are generally more difficult to control with insecticides than onion thrips, but onion thrips can be more damaging when they transmit Iris Yellow Spot Virus (IYSV).

Thrips injury is caused by their unique rasping-sucking mouthparts. They rasp the surface of the leaves and sucking up the liberated plant fluid. This injury removes nutrients needed for bulb development, causes scaring and reduces photosynthesis. Leaf scaring in a heavily thrips infested onion crop causes the entire field to take on a silvery appearance. They cause damage during storage by feeding under the leaf folds and in the protected inner leaves near the bulb. Both adults and nymphs of both species cause damage but only onion thrips transmits IYSV.

Several natural enemies attack thrips, including predaceous mites, minute pirate bugs, and lacewings. However, the natural enemies may not be important in fields where insecticides have been used. If possible, avoid planting onions near grain fields. When onions are planted near grain, expect immigration of thrips into the onion field from the grain field.

For fresh market onions, thrips must be controlled before early bulb development to keep populations levels below economically injurious levels during bulb development. When the onion crop is nearing harvest, higher thrips populations can be tolerated. To scout for thrips in onions, randomly sample entire onion plants and evaluate thrips numbers and damage. Pull leaves apart and, using a hand lens, all the thrips

on the inner leaves near the bulb can be counted as well as those under the leaf folds. Sample at least five plants from four separate areas of the field. Treat with an insecticide when there are 30 thrips per plant mid-season. The treatment level can be adjusted up or down depending on the crop development, lower for very young plants and higher for larger mature plants.

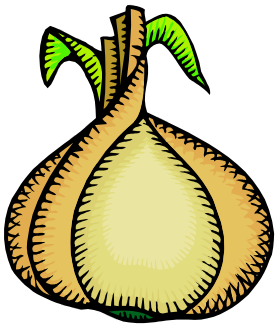
For processing onions, examine the entire top growth of 10 onion plant from four areas of the field, counting the number of thrips. Sample at least weekly and more often when counts exceed 20 thrips per plant. Cumulative thrips-days (CTD) can be calculate from the average number of thrips per plant on two successive sample dates, dividing the average by the number of days between samples to get the number of thrips per plant per day or thrips-days, and adding up the thrips-days during crop growth. When 500 to 600 CTD or more accumulate, significant yield loss can occur.

In 2006 an insecticide efficacy trial for thrips control and IYSV disease suppression in White Creole dehydrator onions was conducted at Brawley, CA in a randomized complete block experiment with 15 treatments and 4 replicates. Insecticide treatments were applied with a handheld spray boom on 14 Feb, 6, 14, 30 March and 19 April at the rates listed in Table 1. All insecticide treatment had significantly (P=0.05) fewer thrips for seasonal means compared to the untreated control (P = 0.05), Table 2. Lannate LV at 36 ounces per acre plus Mustang 1.5 EW at 3.8 ounces per acre had the lowest seasonal means for thrips per plant (6.92), which was significantly lower than all other treatments except Vydate 2L at 64 ounces per acre (7.94) and Mustang 1.5 EW at 3.8 ounces per acre plus Prev-Am at 0.4% v/v (9.72). There were no significant differences among the treatments for IYSV due to the low incidence of the disease in 2006.

Table 1. Seasonal Means for Thrips per Five Plant and Numbers of Onions With Iris Yellow Spot Virus Symptoms and Numbers of Lesions on Iris Yellow Spot Virus Symptomatic Plants per Twenty Five Row-Feet Following Various Insecticide Treatments at Brawley, CA During the Spring of 2006.

Treatment	Ounces/Acre	Thrips[y]	IYSV Infected Plants[z]	Lesions per IYSV Infected Plant[z]
Untreated Control	--------	39.44 a	5.13	47.13
Vydate 2 L	64.0 fl	7.94 fg	3.25	49.88
Lannate LV + Mustang 1.5EW	36.0 fl + 3.8 fl	6.92 g	3.63	56.88
Success + Aza-Direct	6.0 fl + 48.0 fl	11.50 cde	3.13	54.75
Carzol 92 SP	16.0 dry	10.92 def	7.00	73.75
Assail 30 SG	4.0 dry	10.83 def	4.25	37.63
Assail 30 SG	5.4 dry	10.53 ef	6.00	43.88
Success + Prev-Am	6.0 fl + 0.4% v/v	14.22 bc	6.88	60.50
Mustang + Prev-Am	6.0 fl + 0.4% v/v	9.72 efg	4.50	61.25
Tesoro 4EC	8.0 fl	12.31 b-e	3.50	45.13
Tesoro 4EC	11.2 fl	12.17 b-e	4.88	56.75
NNI-0101 20 SC	19.0 fl	11.75 cde	5.88	109.63
FujiMite 5 EC	32.0 fl	12.83 b-e	4.13	55.88
NAI- 2302 15%EC	14.0 fl	13.92 bcd	2.63	30.13
NAI- 2302 15%EC	21.0 fl	15.22 b	5.63	70.00

[y] Means followed by the same letter in columns were not significantly different by LSD ($P = 0.05$).
[z] There were no differences among the means, ANOVA ($P = 0.05$).



Fungicide Applications for Monosporascus vine decline: 2005 and 2006 Trial Results

Thomas Turini, Michael Stanghellini[1], Don Ferrin[1] Iraj Misaghi[1] and Ronald Cardoza
[1] UC Riverside Department of Plant Pathology

Monosporascus cannonballus, a soil-borne fungus that causes vine decline of melons, is very common in the low desert production areas. Several weeks before harvest, this pathogen can cause a rapid collapse of the melon vine, possibly over the entire field. The thick-walled spores of *M. cannonballus* survive in the soil for many years in the absence of a host. In high risk areas, chloropicrin is used to reduce the number of viable spores in the soil and decrease the likelihood that this disease will cause crop loss. In addition, root destruction shortly after harvest, either by uprooting the plants or applying metam sodium through the drip irrigation system, reduces the rate that the spore levels in the soil increase to again decrease the likelihood that crop loss will occur. Topsin M (thiophanate methyl) and Cannonball (fludioxonil) are materials that are registered for soil applications on melons, which were tested for the potential of these materials to further reduce the chances of suffering losses due to this disease.

To assess the activity of these materials, trials were conducted at the University of California Desert Research and Extension Center in spring and fall 2005 and spring 2006. In spring 2005 and 2006, treatments included an untreated control, Topsin-M at 10 oz/acre and Cannonball at 4 oz/acre with each of the chemical agents applied at 28, 56 and 84 days after planting. On 18 Mar 2005, cantaloupe cv. 'Caravelle' and on 16 Mar 2006, cv. 'Sol Real' seed were sown in a Meloland clay loam in an area that had a history of the occurrence of this disease. Throughout the season, water was applied with a drip irrigation system buried 5 in below the surface.

In Fall 2005, the effect of Cannonball at 4 oz/acre applied (i) 7 days after planting (ii) 7 and 28 days after planting and (iii) 7, 28 and 46 days after planting was compared to an untreated control. In the fall trial, cv. 'Impac' cantaloupe seed was sown on 25 August.

Prior to each application in all trials, the field was irrigated for 3 hours. For each application, the chemical was mixed into 2.5 gal water and injected into the drip system over 50 to 70 minutes with a 1.7 amp electric metering pump (G.H. Stenner & Co., Inc.; Model no. 45M5). The experimental design was a randomized complete block with four replications. Each plot consisted of one bed 80 inch wide and 240 feet long.

On 23 Jun 2005, 14 Nov 2005 and 26 Jun 2006, the melon vines were cut back and the roots were undercut mechanically at a depth of 6 to 7 inches, uprooted by hand, and roots of 20 plants per plot were collected. Roots were washed and assessed for root rot severity: rating scale of 0 to 4 (0 = no lesions, 4 = 75 to 100% of the root system per plant with lesions).

In both of the spring trials, Cannonball reduced root lesion severity, but roots treated with Topsin M were similar to the untreated control (Table 1). Under the conditions of the fall 2005 study, the severity of root rot was lower in areas treated with Cannonball as compared to the untreated control, but all treatments receiving Cannonball applications were similar regardless of the number of applications (Table 2). Cannonball consistently reduced the severity of the root lesions, but due to the condition of these trials, the influence on yield could not be assessed.

Table 1. The effect of Cannonball (4 oz/acre) or Topsin-M (10 oz/acre) applied at 4, 8 and 12 weeks after planting on root rot severity in Spring-planted cantaloupes in 2005 and 2006 at Desert Research and Extension Center, Holtville, CA.

Treatment	severity (1-4)	
Cannonball	1.40 b	1.50 b[z]
Topsin-M	2.40 a	2.42 a
Untreated control	2.90 a	2.75 a

Table 2. The effect of Cannonball (4 oz/acre) application timing on root rot severity in Fall-plated cantaloupes cv. Impac in 2005 at Desert Research and Extension Center, Holtville, CA.

Treatment	severity (1-4)
one application of Cannonball – 7 days after first irrigation	2.512 b[z]
two applications of Cannonball – 7 and 28 days after first irrigation	2.149 b
three applications of Cannonball – 7, 28 and 46 days after first irrigation	2.241 b
Untreated control	3.185 a

Is There A Fix For Aflatoxins Down The Line?

Rick Bottoms

There's a fungus among us as the saying goes, well growing corn in the Imperial Valley is almost certain to allow the expression of the fungus *Aspergillus flavus* (which is responsible for the majority of aflatoxin contamination) to attack crops. When it does, it often produces aflatoxins as a by-product and a potent toxin that when found in corn greatly reduces the value and marketability of the grain. The major types of aflatoxins are B1, B2, G1, G2, and M1, with aflatoxin B1 being the most toxic, and usually predominant. Aflatoxin B1 is a very potent carcinogen to humans and animals. Because of their toxicity, aflatoxins are recognized as serious food safety hazards by most countries of the world and more than 50 countries have established or proposed regulations for controlling them in food and feed. In the U.S., corn, cottonseed, peanuts, and other crops are routinely tested and those containing more than 20 parts per billion of aflatoxins cannot be used in human food or fed and a level exceeding 0.5 ppb in market milk, the level below is considered no hazard for the consuming public. The aflatoxins are capable of causing aflatoxicosis in consumers of milk. This is why government regulations specify that milk must be free of aflatoxin. It is estimated that crop lost due to aflatoxin contamination costs U.S. producers more than $100 million per year on average. In the Imperial Valley the incidence for aflatoxin is near 95% according to the California Department of Food and Agriculture.

Some quick facts:

- Aflatoxin symptoms include mold found on ears of corn in the field or on kernels in storage.
- Aflatoxin and other mycotoxins are heat-stable toxins produced by fungi.
- Aflatoxins and other mycotoxins have not been shown to be a problem in the field, but after harvest they may form in corn during storage.
- These toxins can be a serious problem in grain stored under unfavorable conditions.
- Black light screening is not a conclusive test for aflatoxin.

Positive tests indicating aflatoxin must be confirmed by chemical analysis.

Aflatoxin, a toxic metabolic by-product of certain fungi, is a threat to the safe use of corn products as food for humans and livestock. National news accounts generally quote that the Midwest to Southeast areas of the United States may experience serious problems with aflatoxin in corn. Very little attention is directed to the far West. Dangerous levels of aflatoxin seldom occur in Imperial Valley corn fields when harvest conditions prevail before early June. When corn is harvested later, nearly always the aflatoxin is found to be present. If possible, growers should minimize crop stress from droughty conditions and insect damage, nitrogen deficiency, harvest early and reduce storage moisture levels to <14%. When necessary, corn is tested for aflatoxin prior to use. Growers having aflatoxin levels greater then 20 ppb can usually have their corn detoxified by having it treated by a process that uses anhydrous ammonia and steam. The severity of contamination will determine the amount of treatment.

Three conditions that favor continued mold growth are necessary for aflatoxin formation. They are: high corn kernel moisture (16 to 30 percent); warm temperatures (77 to 90 degrees F); and high humidity (80 to 100 percent) look out for July through September in Imperial Valley.

Corn exhibiting mold formation doesn't necessarily contain aflatoxin. Growth of the fungus is poor at temperatures below 50 degrees F but slow growth will occur and low amounts of aflatoxin may be produced under favorable moisture conditions. Moisture levels below 12 to 13 percent will prevent mold formation.

So what levels for aflatoxin in grain corn are there? An Aflatoxin quick test by Neogen taking nearly 45 minutes can tell you if you have the fungus. The black light method is more antiquated.

The Food and Drug Administration (FDA) Center for Veterinary Medicine (CVM) and the Center for Food Safety and Applied Nutrition (CFSAN) have established the following aflatoxin "action" levels. The CVM and CFSAN prohibit aflatoxin contaminated corn being shipped in interstate commerce when:

1. Corn containing in excess of 20 parts per billion (ppb) aflatoxins is intended for consumption by humans, immature animals (including immature poultry) and dairy animals, or grain sent to an unknown destination.
2. Corn containing in excess of 100 ppb aflatoxins for consumption by breeding cattle, breeding swine, or mature poultry.

3. Corn containing in excess of 200 ppb aflatoxins for feed to finish swine (e.g., 100 lbs or greater).
4. Corn in excess of 300 ppb aflatoxins as feed destined for finishing (i.e., feedlot cattle).
5. The California state regulations require both dairy and beef cattle must have 20 ppb or less.

So is there a fix for aflatoxins down the line? Can a more viable grain industry flourish here to serve our cattle and BioEnergy industry? The Corn Host Plant Resistance Research Unit (CHPRRU) of the USDA-Agriculture Research Service thinks there may be. One of the primary objectives of the research unit is to develop corn with genetic resistance to disease and insect pests. Currently, research efforts on resistance to accumulation of aflatoxin in corn grain are underway. Each year, evaluations of hundreds of corn germplasm lines in field trials are evaluated for resistance to the fungus and insect pests. Plants are inoculated with *Aspergillus flavus* or infested with insect larvae. The damage that results is quantified. Germplasm lines that exhibit the least damage are used in our breeding program. The goal is to develop corn germplasm lines that can then be used to develop corn hybrids that will be commercially available to farmers. Growing hybrids with genetic resistance to aflatoxin accumulation will enable farmers to not only reduce losses and increase profitability including provide grain for safer supply of human food and livestock feed.

The approach is to determine the role of drought and heat stress in predisposing corn to *A. flavus* infection and subsequent aflatoxin accumulation in the field and investigating the effects of drought under a controlled environment. Determining associations between aflatoxin contamination of corn and environmental stresses from historical weather details is also useful. Researchers are genetically trying to identify proteins, genes, and molecular markers associated with resistance to *A. flavus* infection and aflatoxin accumulation. Enhancing corn germplasm with resistance to *A. flavus*/aflatoxin using conventional plant breeding methods is hoped will soon lead to resistant corn varieties being available for growers in the Imperial Valley. A real shot in the arm for livestock producers and growers wanting to capitalize on the BioEnergy drive. One of our efforts at the University of California Desert Research and Extension Center (UC-DREC) include looking at production, water use, seasonality and harvest issues associated with corn, sorghum, triticale and canola.

Croissant R. L. 1992. *Managing stored grain*, fact sheet 0.117. Colorado State University Cooperative Extension.

Doupnik B. 1983. *Aflatoxins in Corn - background and proper use of black light*. Nebguide G83-644. Extension Service University of Nebraska. Lincoln NE.

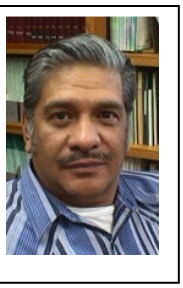
Hermann, Tim. 2002. Mycotoxins in Feed Grains and Ingredients. Kansas State University Agricultural Experiment Station and Cooperative Extension, MF-206.

Larson, E. 2000. Minimizing Aflatoxin in Corn. Extension Service of Mississippi State University. Info Sheet 1563

Stack J. and Carlson M. 2003. Aspergillus flavus and Aflatoxins in Corn. NebFacts NF 03-571. University of Nebraska Extension Service, Lincoln, NE.

Brown midrib sudangrass

Juan N. Guerrero



The brown midrib mutant gene was discovered in sorghums in 1931. This mutant gene is associated with decreased levels and types of lignins in the plant. Lignins give the plant structure, but for ruminants are indigestible. In ruminant nutrition, generally, as forage lignin increases, forage digestibility decreases. Presumably, plants with less lignins would be prone to lodging, although being very digestible to ruminants. Casler et al. (2003) in ***Crop Science*** compared normal 'Piper' sudangrass and BMR 'Piper' sudangrass digestibilities. At the first harvest the digestibilities of Neutral Detergent Fiber (NDF) for normal 'Piper' sudangrass and BMR 'Piper' sudangrass were 44.9% and 49.2%, respectively. At the second harvest the digestibilities of NDF for normal 'Piper' sudangrass and BMR 'Piper' sudangrass were 47.9% and 54.7%, respectively. Higher NDF digestibility means that cows will eat more of the BMR sudangrass and therefore produce more milk. BMR sudangrass seed will shortly be available.

In late April 2006, we (Dan Putnam from UC-Davis, Francisco Maciel of UCDREC, and I) planted at UCDREC a trial of 'Piper" and BMR sudangrass. We planted the two sudangrass varieties at 30, 60, 90, 120, and 150 lb of seed per acre in 13 x 10" plots with 4 repetitions. At planting we used 100 lb N/a on each plot, afterwards at each cutting we placed 0, 50, and 100 lb N/a on different plots as fertilizer levels. Therefore, the trial consisted of 2 sudangrass varieties, 'Piper" vs. BMR, 5 seeding rates, and 3 fertility levels. The 4 repetitions served as blocks. We took three cuttings; on 6/16, 8/7, and on 10/3. We harvested the sudangrass at approximately the 20% flower stage at 6 to 8 inches height. We measured yields, % leaf, stem diameter (about 10 cm above the cutting level), % crude protein (CP), % neutral detergent fiber (NFD), and % acid detergent fiber (ADF).

The chemical analyses for quality; CP, nitrates, NDF, and ADF have not yet been done. For the three cuttings and over the 5 seeding rates and 3 fertility levels, Piper yielded higher ($P < 0.05$) than the BMR sudangrass; 9.3 vs 8.5 t/a. Over the two varieties, 3 cuttings, and 5 seeding rates, the yields for the three fertility levels (0, 50, and 100 lb N/a) were 8.3, 9.6, and 8.9 t/a, respectively. For three cuttings and over the 5 seeding rates; at the three fertility levels (0, 50, and 100 lbN/a), Piper yielded 8.7, 10.2 and 9.2 t/a, and BMR sudangrass yielded 7.9, 9.0 and 8.7 t/a, respectively. Over the three cuttings, and 3 fertility levels; at the 5 seeding rates (30, 60, 90, 120, and 150 lb seed/a), Piper yielded 9.1, 9.3, 9.4, 9.4, 9.4, and 9.3 t/a, while the BMR sudangrass yielded 7.9, 8.0, 8.7, 9.3, 8.8, and 8.5 t/a of hay. The 120 lb of seed per acre evidently was the optimal seeding rate. We planted at lb per

acre of seed, but we made a mistake. The BMR sudangrass seed is much larger than the Piper seed. There are 42,666 seeds per lb of Piper and 28,666 seeds per lb of BMR sudangrass. To have the same number of seeds per acre of Piper at 120 lb/a, BMR sudangrass would have to be planted at 180 lb/a. Over the three cuttings, and 3 fertility levels; at the 5 seeding rates (30, 60, 90, 120, and 150 lb seed/a), Piper had 49.1, 45.7, 44.1, 51.9, and 44% of leaf dry matter (DM) in the hay, while the BMR sudangrass had 49.2, 43.2, 46.3, 48.2, and 49.2%, respectively, of leaf DM in the hay. In any hay, the greater the proportion of leaf, the higher quality the hay will be. For three cuttings, and at three fertility levels; at the 5 seeding rates (30, 60, 90, 120, and 150 lb seed/a), Piper had 3.6, 3.5, 3.4, 4.0, and 3.5 mm stem diameter, while BMR sudangrass had 4.9, 3.7, 4.1, 4.2, and 3.9 mm stem diameter, respectively.

What do all these numbers mean? As with other BMR crops, BMR sudangrass produced less ($P < 0.05$; 0.8 tons in three cuttings) hay than Piper; 8.5 vs 9.3 t/a. The fertilization rates were interesting. Sudangrass needs a fertilizer boost after each cutting, but not too much. In this study, both Piper and the BMR sudangrass had their best yields at 50 lb N/a after each cutting. With Piper, the optimal seeding rate was 120 lb per acre but with the BMR sudangrass the density results were inconclusive. As with the hay yields, Piper had the highest % leaf at 120 lb/a of seed but the results were inconclusive for the BMR sudangrass. Usually any hay that has a high leaf percentage is very high quality hay. Many of the foreign customers that buy sudangrass hay place great value on stem diameter. Again for Piper, the 120 lb/a of seed planting density produced the stems with the thinnest stems, while for the BMR sudangrass the diameter measurements were inconclusive.

BMR sudangrass produces a very high quality hay (lower fiber values and high digestibility rates); but will foreign customers pay more for sudangrass hay that yields less, has thicker stems, and requires much more seed at planting? Hay prices will have to be discussed with hay buyers before the decision to plant BMR sudangrass is made. We will again be repeating this trial during the summer of 2007, but taking into account seed numbers per pound.

Announcement

Mary Harmon Appointed as the new Imperial County UCCE 4-H Youth Development / Nutrition, Family and Consumer Science Advisor

I am pleased to announce that Mary Harmon has accepted the position of 4-H Youth Development / Nutrition, Family and Consumer Science Advisor for University of California Cooperative Extension in Imperial County. Mary will begin her new appointment as a 4-H / NFCS Advisor on March 1, 2007.

Mary Harmon has returned to the position of 4-H Youth Development after 17 years with the additional duty as the Nutrition, Family and Consumer Science Advisor. She formerly held a position as a 4-H Youth Development in Imperial County from 1978 to 1990.

Mary Harmon earned her B.A. degree in Recreational Administration and a M.A. degree in Education Administration at San Diego State University. She earned a second M.S. degree in Educational Counseling at the University of Redlands. For the past 10 years, she has been an academic counselor to community college students at Imperial Valley College. Mary has served on the Board of Directors of the 45th District Agricultural Association and she was the Imperial County Mid-Winter Fair Board President in 2002-2003.

Mary has developed a great rapport in the community through her service in Imperial County. In addition to prior experience as a UCCE 4-H Youth Development Advisor, she has many years experience as a 4-H community leader and project leader. Please join me in welcoming Mary Harmon to Imperial County UC Cooperative Extension!

CIMIS REPORT

Khaled Bali and Steve Burch*

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of March 1 to May 31 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Irrigation Management Unit (339-9082).

Please feel free to call us if you need additional weather information, or check the latest weather data on the worldwide web (visit http://tmdl.ucdavis.edu and click on the CIMIS link).

Table 1. Estimates of daily Evapotranspiration (ET_o) in inches per day

Station	March		April		May	
	1-15	16-31	1-15	15-30	1-15	16-31
Calipatria	0.18	0.22	0.26	0.29	0.32	0.36
El Centro (Seeley)	0.16	0.20	0.24	0.28	0.31	0.34
Holtville (Meloland)	0.17	0.21	0.25	0.28	0.32	0.35

* Irrigation Management Unit- Imperial Irrigation District

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__ Seed Company
__ Sudan Grass
__ Sugar Beets
__ Today's Families
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__ Wheat

VOLUNTARY SELF IDENTIFICATION STATEMENT

__ Male __ Female __ Handicapped (specify) _____
__ Caucasian __ African American __ Hispanic __ American Indian __ Asian __ Other

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Eric T. Natwick
County Director

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