Cooperative Extension

The University of Arizona ! College of Agriculture and Life Sciences ! Tucson, Arizona 85721

2200 W. 28th Street; Suite 102; Yuma AZ 85364; Phone 928 726 3904; Fax 928 726 8472

Yuma County Farm Notes

Table of Contents - September 2003

Agriculture and the Global Economy – In Arizona?

Barry Bequette, County Director, Yuma

Globalization is the trend toward looking at economic and financial issues from a worldwide rather than a single country viewpoint. The United States has been extremely fortunate that it has always been a major food exporter. We not only produce enough food for ourselves, we produce an abundance that allows us to export to nations that do not produce enough food for their populations. In the year 2000, one farmer produced enough food and fiber for 129 people (110 in the United States and 28 in other countries). Most people are surprised to learn that there are only a few major food exporters in the world. Sixty-five percent of the students enrolled in a plant science college class at a major university thought that the former USSR was a major food exporter (while the former USSR was just the opposite, a major food importer).

How does the global economy affect the typical Arizona citizen? While there are many effects of globalization, the one effect that everyone understands is the economy. An advertisement may read "Citrus fruit for sale at $1.00 a dozen." Sounds good! And on the surface, it is good! But look a little deeper, and it is easy to realize that out of the $1.00 paid for a dozen citrus, there are many people that depend on a share of this money.

Who gets a piece of the $1.00 you paid? All of the following get a share: the grocery (plus associated employees), the trucking company, the broker, the cooling and processing company, the farmer, the chemical company that provided protection chemicals, the fertilizer company, the equipment dealer that provided machinery, the gasoline supplier, the harvesting company that provided the labor for harvest, the box company that provided the nice boxes to hold the citrus, the county tax assessor who collected land taxes, and the federal government who taxed most of the above. We have now sliced the dollar into 14 pieces, and in various systems there may be more who share in the same dollar. In a perfect world, they would all share equally, and each would get a little over 7 cents for the product. However, we know that taxes may account for about 1/3 of each dollar, meaning 13 parties need to share about 66 cents. If the remaining parties were to share the money left equally, they would each receive about 5 cents from the dollar.

Now lets focus on the farmer, who just received 5 cents for the dozen citrus sold in the supermarket. If the farmer produces about 27,000 citrus per acre (2240 dozen), the total gross for an acre of citrus is then $112, or about 31 cents per day. In order for the producer to make more than 31 cents per day as income, additional acres of citrus are necessary.

In the evening paper, you read that Chile and Argentina have flooded the market with very inexpensive citrus, so tomorrow there will be a citrus sale, and citrus fruit will be sold for $.50 cents a dozen instead of $1.00 per dozen. At this price, the producer's cost of producing citrus now exceeds the profit made, so he and many others must retire their citrus groves or try to get though the year with a net loss and hope for better times in the future. The trucking company no longer has citrus to ship, so they lay off workers. Without citrus to cool and process, the cooling company no longer is profitable, so they lay off workers. Not being able to survive a year without profit, they eventually close the cooling plant. With fewer trucks transporting citrus, the gasoline provider loses a portion of his income, so decides to not purchase the new tanker truck he had planned to purchase, and the local dealer who was to sell the truck cancels his order. This impacts the truck manufacturing plant in another county, as several producers also cancelled orders for harvesting trucks. With fewer trucks being produced, the need for labor declines and a decision is made to postpone the hiring of three new workers that had been planned on.

The scenario described above could go on and on. From the field worker who will not purchase a new pair of gloves, to the paper mill in Kentucky that provides paper for citrus boxes. From the local to the distant, citrus and vegetables, eggs and beef, wheat and corn, brokers to futures trading on Wall Street, all are interconnected to the global economy, and all are affected by hundreds of factors, including: importation laws, pesticide regulations, labor cost and supply, taxes, the supply and demand for fuel, positive or negative media, government price supports, public perception of genetically modified foods, and yes, even the weather.

Thinking. Awareness. Globalization. “Best Buy”. Unemployment. Importation. Laws. Regulations. All of these words are things you should be aware of whether considering the cost of tea in China, or the cost of citrus fruit or vegetables in the United States. The complexity of our food production system on a world basis is far reaching. The next time you consider purchasing a food product, reflect on the far reaching impact of your purchase.

Biological Control in Arizona Citrus

David L. Kerns, Associate Specialist, Entomology

Eight years ago Arizona citrus growers primarily had to deal with one major pest, citrus thrips, *Scirtothrips citri*, and the occasional opportunist such as mites and mealybugs. Little attention was given towards preserving natural enemies; for the most part it wasn't of paramount importance nor was it really possible. The insecticides we had available then did not lend themselves to beneficial insect preservation. However, this has changed in recent years with the development of new insecticides, and with the influx of new pests; biological control has taken a forefront in Arizona's citrus pest management system.

The woolly whitefly, *Aleurothrixus floccosus*, appeared in Yuma in 1998. Within two years of its arrival it was evident that biological control would play an important role in the management of this pest. A parasitoid, *Eretmocerous comperei* or *E. dozieri* (exact species not certain), appeared in large numbers during the late summer of 2001. This parasitoid was responsible for reducing some extremely high populations of woolly whitefly to almost non-existent levels in some groves. These small wasps appear as small yellow "gnats" with three distinctive red dots (ocelli) on the tops of their heads. They can be easily seen with the naked eye crawling among whitefly colonies. Parasitized whitefly nymphs appear darkened and somewhat swollen compared to non-parasitized ones. Evidence of parasitoid activity is also evident by examining the eclosed pupae of the whiteflies. Those exited by woolly whiteflies will have a vertical split on the anterior dorsum of the empty exuvae (a 10X or better hand lenses will be necessary to view). An eclosed pupae exited by a parasitoid will have a round hole on the anterior dorsum of the exuvae. When parasitoids or parasitoid activity is present, insecticide applications for whiteflies are usually not necessary. Additionally, care should be taken to avoid using insecticides that will disrupt biological control. Those insecticides include: narrow-range petroleum oils, Esteem, Applaud, and Provado. In addition to parasitoids, there are a number of predators that have been observed preying on woolly whitefly. These include various lacewings, but most notably predaceous mites. These mites include *Tydeus* sp. and the Yuma spider mite, *Eotetranychus yumensis*. The Yuma spider mite is unusual in that it also pest of citrus, feeding primarily on the underside of leaves, and on the fruit when populations are high. Because of the "Dr. Jekyll and Mr. Hyde" nature of the Yuma spider mite, their populations should not be controlled until they begin to infest the fruit. Damage to the leaves of mature trees is inconsequential.

When the citrus leafminer, *Phyllocnstis citrella*, appeared in Florida in 1993, it spread through that state, Louisiana, and Texas in less than one year causing a great deal of damage. When this pest appeared in Yuma in the spring or 1999, we were very concerned. Although the citrus leafminer can be easily found during the fall and winter in Yuma, it has not spread to central Arizona, nor has it reached economically damaging levels. The primary reason the citrus leafminer has not reached "severe" pest status in Arizona is the presence of biological control agents. Parasitoids that prey on the endemic pest, the citrus peelminer, *Marmara gulgosa*, a close relative of the leafminer, crossed over and attacked the citrus leafminer. In addition to these parasitoids, the previous mentioned mites have been observed preying on citrus leafminers as well. In a study during the fall and winter of 2002, 66% of citrus leafminer larvae were killed via predation and parasitism.

Not only has biological control been important for control of newly introduced insect pests, but it has proven important for traditional pests as well, i.e. the citrus peelminer (mentioned above). Other good examples are the citrus mealybug, *Planococcus citri* and the cottony-cushion scale, *Icerya purchasi*. Although an occasional pest, the citrus mealybug can be an extremely damaging and difficult to control. Because it infests the fruit and is often deep within the tree canopy, insecticide applications are often not very effective due to poor coverage. Applications of non-selective insecticides for mealybugs will sometimes aggravate the problem due to the destruction of natural enemies. There are a number of predators and parasitoids that will prey on mealybugs. Among these is a particularly effective parasitoid, *Anagraphus* sp. This small wasp is very common during late summer and is the primary biological control agent responsible for the apparent "disappearance" of citrus mealybugs in the spring in groves where heavy infestations occurred the previous summer. Since chemical control of citrus mealy is not particularly effective, it is important that *Anagraphus* sp not be disrupted with the use of non-selective insecticides such as Lorsban or Supracide. The only insecticide that appears to have good activity on citrus mealybug without harming the parasitoids is Applaud. For best control, Applaud should be used before the

mealybugs move to the fruit in large numbers. Additionally, Applaud should be sprayed at or just after egg hatch for maximum efficacy.

Another difficult to control pest is the cottony-cushion scale. This pest occurs throughout Arizona, but infrequently reaches damaging levels. In almost all instances of the occurrence of cottony-cushion scale, the vedalia beetle, *Rodolia cardinalis*, appears and effectively controls this pest. Thus, the key to managing cottony-cushion scale is to encourage the occurrence of the vedalia beetle by using selective insecticides. If insecticides are required for cottony-cushion scale, the product of choice is Applaud since Lorsban, Supricide, and Esteem have all been shown to adversely affect vedalia beetle.

A lot of the insect problems we encounter in the summer can have their origins traced to what we did for thrips control in the spring. When whiteflies, scales, or mealybugs are present in the spring, insecticides choice for thrips control has important long-term implications. If products such as Carzol, Dimethoate, Danitol, or Baythroid are heavily used, the natural enemy complex can be devastated leaving the secondary pests with little or no natural control. Unfortunately we do not have a large number of selective insecticides to use for thrips control. Presently, Success is the only product available that fits this niche although there are several experimental insecticides that have promise. Predaceous mites, (*Tydeus* and Yuma spider mite) can effective suppress citrus thrips populations. In 2003, in experimental plots where these mites were not killed by insecticides, only one application of Success was required for season-long thrips management, whereas where the mites were eliminated, two to three insecticide applications were required.

As the citrus pest complex continues to change in Arizona, it is evident that biological control has and will become to be more heavily relied upon. We should be cognizant of the implications non-selective insecticide use has, not only on the target pest, but also on the potential impact on natural enemies and subsequent relationship to outbreaks of secondary pest such as whiteflies and mealybugs.

Historical Broccoli and Cauliflower Acreage and Yield in Yuma

Mohammed Zerkoune, Extension Agent, Yuma County

Yuma cauliflower and broccoli crops have increased substantially in recent years. Currently more than 93% of state cauliflower and 70% of broccoli is grown in Yuma. Maricopa and Pinal counties grow the rest of state cauliflower and broccoli.

Cauliflower increased from 1400 acres in 1980 to 6200 acres in 1992, then decreased to 4200 acres in 2001. Broccoli was grown on less than 200 acres until 1985, this acreage increase linearly from less than 1000 acres in 1990 to reach 7900 acres in 2001.

Cauliflower yield increased from 100 Cwt in 1985 to 309 Cwt in 1999. Broccoli yield increased from less than 100 Cwt in 1985 to 202 Cwt in 2001.

Both cauliflower and broccoli yield increase was believed to be due to better integrated pest management, irrigation technology and soil and plant nutrient management. The increase is also attributable to newly created cauliflower and broccoli varieties.

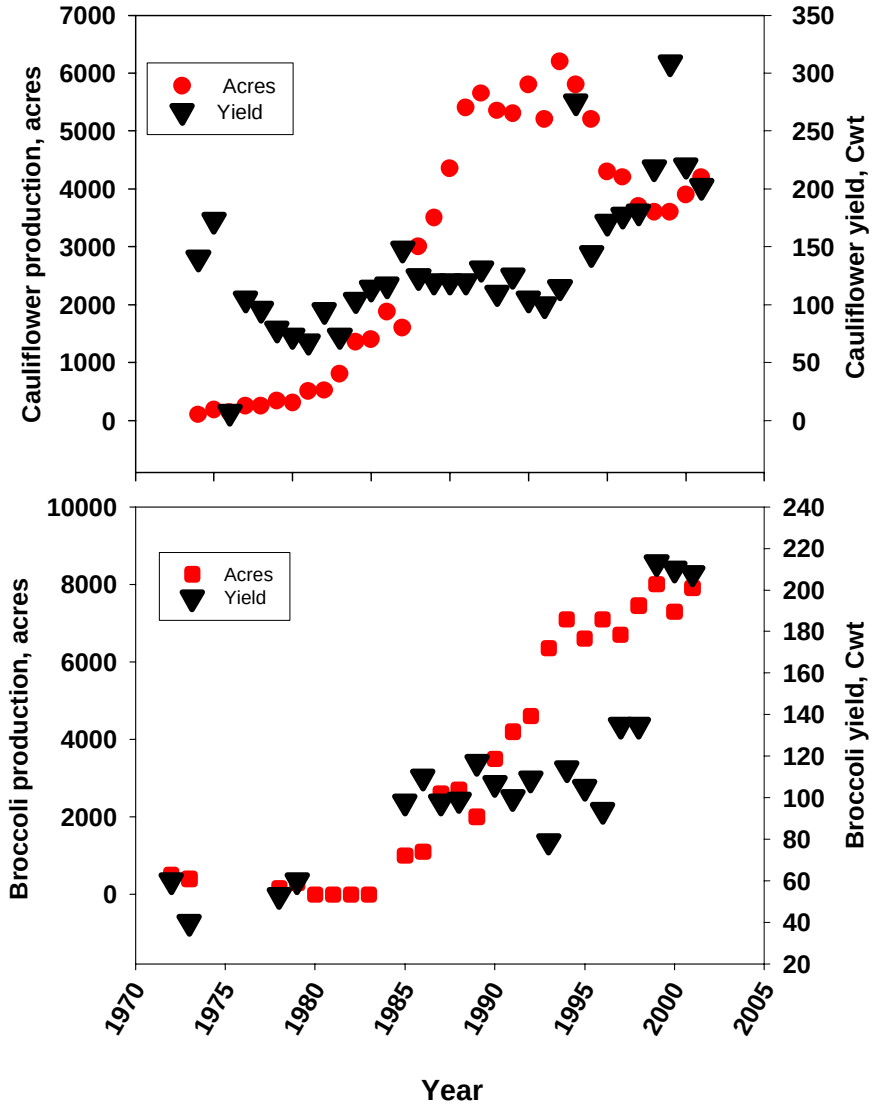


Figure 1 Broccoli and cauliflower acres and yield (cwt) production in Yuma County from 1965 to 2001. Sources Agriculture Statistics, 1965-2001.

Some Practical Steps to Manage and Combat Wood Rot in Lemons

Glenn C. Wright, Extension Specialist, Yuma Agricultural Center

When considering how to manage and prevent wood rot disease in lemons, a grower should consider both the short- and long-term steps. The first of the short-term steps is to prune out diseased wood. This step is critical, and should occur as soon as the damage is noticed, particularly following wind storms, hurricanes or freeze damage. Since the wood rot fungi thrive and grow when temperatures are high, damaged branches may be easily noticed during the late summer and fall.

Prune the branch back to a point where there is no longer evidence of the disease on the cut surface of the limb. Saw blades should be sharp so as to produce a smooth cut. Jagged cuts will provide sites for re-infestation of clean wood. Diseased wood should be removed from the grove as soon as possible.

Trees should also be topped, hedged or hand-pruned to remove "whips". Whips are those long, vigorous, upright branches that extend above the canopy and often have fruit growing at their tips. These should be removed before the weight of the fruit causes the branches to break. Pruning should also remove branches that extend into the middles, and branches that have been damaged due to heavy fruit load. Annual pruning operations should be scheduled for late winter, before temperatures get high and the wood rot fungi become active. Again, saw blades should be sharp.

Long-term management steps should include a commitment to avoid damage to groves from implements such as tractors, forklifts, and sprayers. Properly hedged groves will not have branches that extend into the middles that would catch on implements. Drivers of farm tractors should be educated to avoid damaging the trees.

Also, it is important to avoid damage to the tree from picking ladders. Ladders should be placed gently against the trees to avoid damage. Also, ladders should not be left against the trees overnight, as they can add additional weight to fruit laden branches, particularly if it is windy. When tree damage does occur due to these causes, grove managers should be notified so that the broken limbs can be removed.

Finally, new plantings should be planned to avoid limb breakage. Spacing of less than 22 ft between tree rows should be avoided, since close row-to-row spacing will invariably lead to damage when implements are driven down the row. If higher tree densities are desired, consider planting in the hedge-row design, double hedgerow design, or in the diamond design in which trees can be removed when crowding will lead to limb damage.

Extensive wood rot is not a foregone conclusion in any Arizona lemon grove. With diligent management, the onset of the disease can be delayed and productivity maintained.

Upland Cotton Variety Testing

Mohammed Zerkoune, Extension Agent, Yuma County

Abstract

A variety trial was conducted in Wellton AZ, as part of the statewide upland variety testing program. It was designed to evaluate yield and yield quality parameters of several varieties provided by seed industry. The trial was made of conventional and transgenic varieties tested under growers' cultural practices. Preliminary results are subject to change when ginning and laboratory analysis is completed. The lint yield reported in this Farm Notes is based on the assumption that the turnout will be 35%. The lint results reported show three group of varieties, those that yielded 1800 lb or higher, those between 1600 and 1800 lb and the remaining group with yield below 1600 lb per acre.

Introduction

While cotton acreage tends to stabilize in Yuma County between 22000 to 25000 acres, in recent years, yield is changing. Cotton growers are no longer rewarded for the total yield they harvest from their fields. They are also compensated for the high quality lint they produce or penalized for poor quality. One of the determinant factors among the environmental variables and agronomic practices affecting yield and lint quality includes the choice of variety adapted to the cotton growing area. The objective of this experiment was to evaluate the performance of several varieties developed by cotton seed industry.

Methods

An experimental field was selected on silt loam soil in Wellton, AZ, to conduct upland cotton variety trial. Twelve varieties provided by six companies were planted on grower's field on March 20, 2003 in a six-row plot, 40" bed spacing replicated three times. Cotton was planted on wet field. All agronomic practices were similar to all varieties based on grower's management practices. Cotton field received a total of 7 irrigations during the growing season on 5-15, 5-31, 6-14, 6-23, 7-5, 7-14, and 7-24-03. Urea was side dressed at 165 lb per acre on 5-14-03. Additional application was made on 6-03-03; water run at 10 gal per acre (lb/A). On 5-26-03 Mepiclor pill was banded at ½ pint per acre, and Mepex was applied on 6-12-03 at 1 pint per acre. Insect control was made with Knack applied 10 oz per acre on 7-11-03, followed by Warrior applied at 5 oz per acre and Orthene applied at 1 lb per acre on 7-19-03. Cotton was defoliated with Ginstar applied at 8 oz per acre and 6 oz per acre on 8-27-03.

Two rows of cotton were harvested and weighed using boll buggy equipped with electronic scale to determine seed and lint weight. The remaining rows were left for the field day on 9-9-03. Fifteen pound sub-samples were collected from each plot for the ginning and fiber quality analysis. In this Farm Note, we report total seed and lint yield for each variety and lint yield calculated on the assumption that the turnout is 35% that is subject to change.

Results

Preliminary results are reported in Table 1. Lint yield is subject to change after the ginning and laboratory analysis are made. The lint yield is calculated based on the assumption that the turn out is expected to be 35%. The results are therefore only preliminary until the actual turnout is determined from the gin. In addition, the fiber, strength, length and micronaire are needed from the laboratory to include in the final ranking.

Table 1. Seed and lint, lint preliminary upland cotton variety trial results--Wellton AZ site, 2003. Yield lint is calculated assuming 35% turnout

Total Lint & seed	Lint lb/A	Variety	Seed companies	Significant at 5%*
5673	1986	ST5599br	Stoneville	a
5318	1862	DP449br	Delta Pine	ab
5216	1826	BR303	Button Willow Research	abc
5174	1811	ST4892	Stoneville	abc
5144	1801	DP555br	Delta Pine	abcd
4928	1725	SACOTSCX	SACOTSCX	bcd
4820	1687	AP7126	Stoneville	bcd
4754	1664	DP444br	Delta Pine	bcd
4670	1635	FM989br	Fiber Max	cd
4646	1626	ACG3601	Arizona cotton growers	cd
4538	1589	ST5303r	Stoneville	d
4532	1587	FM960br	Fiber Max	d
*Means followed the same letters are not significantly different at 5% probability level				

All varieties tested appeared to have reasonable yield, the lowest variety had 1587 lb per acre and the highest was 1986 lb per acre. Based on these preliminary results, varieties are grouped into 3 categories, the first group of varieties includes those with yield 1800 lb or higher, those with yield between 1600 and 1800 lb per acre and those below 1600 lb per acre.

West Nile Virus and Farm Folks

Chris Sumner, Research Specialist, Yuma Mesa Agricultural Center

No, this bug doesn't prefer farmers to city folks, but there are some issues you might consider.

This virus is a close relative of some heavy-hitters responsible for thousands of deaths over the years: Yellow Fever, Dengue and Japanese Encephalitis, just to mention a few.

All of these diseases are spread by the bite of infected mosquitoes, only now the mosquitoes infected with West Nile virus are right here in Yuma County.

The standard scenario for virus transmission is for the mosquito to acquire an infective dose of virus in a blood meal taken from a bird. The threshold for a mosquito to be infected from a blood meal is 100,000 virus particles per ml of blood. Many bird species do not produce a sufficiently high a level of circulating virus. Some do however, and some of the best virus producers are abundant in the desert southwest, and include finches and grackles.

Once taken up in a blood meal, the virus must infect the mosquito, become disseminated throughout its tissues, and be secreted in saliva during a subsequent blood meal. This happens to a greater or lesser degree according to the mosquito species, ambient temperature and the initial virus dose.

US Army researchers at USAMRIID have looked at what kinds of mosquitoes are efficient vectors of West Nile virus, and found some very disturbing facts. The most efficient vector evaluated so far appears to be one of the most abundant species along the Colorado and Gila rivers; *Culex tarsalis.*

Infection and dissemination rates for mosquitoes that ingested $10^{7.0 \pm 0.5}$ PFU/ml of West Nile virus

	# Tested	Infection rate (%)	Dissem rate (%)
Cx. tarsalis	71	96	86
Oc. triseriatus	28	32	25
Cx. pipiens	95	81	23
Ae. vexans	75	44	17
Cx. nigripalpus	127	84	12
Ps. ferox	24	33	0

Department of Vector Assessment, Virology Division, USAMRIID

Fortunately, *Culex tarsalis* is most often found in riparian areas along the rivers, but it is also abundant along drainages where there is emergent vegetation, and in areas where tailwater collects for an extended time. If you observe cattails growing in areas of standing water, expect *Culex* mosquitoes to be breeding there. *Culex* mosquitoes, including the more "suburban" species called *Culex quinquifasciatus* will breed enthusiastically in horse or pet water troughs, culverts or any dirty standing water. If you have standing water with cattails growing in it on your property, now may be the time to deal with it before you, a family member or employee is exposed to this virus. Be sure to use mosquito repellent containing DEET when in mosquito infested areas.

Feel free to call either the Yuma County Pest Abatement District at 726-1030 or Yuma County Health Department at 317-4584 for advice and treatment options.

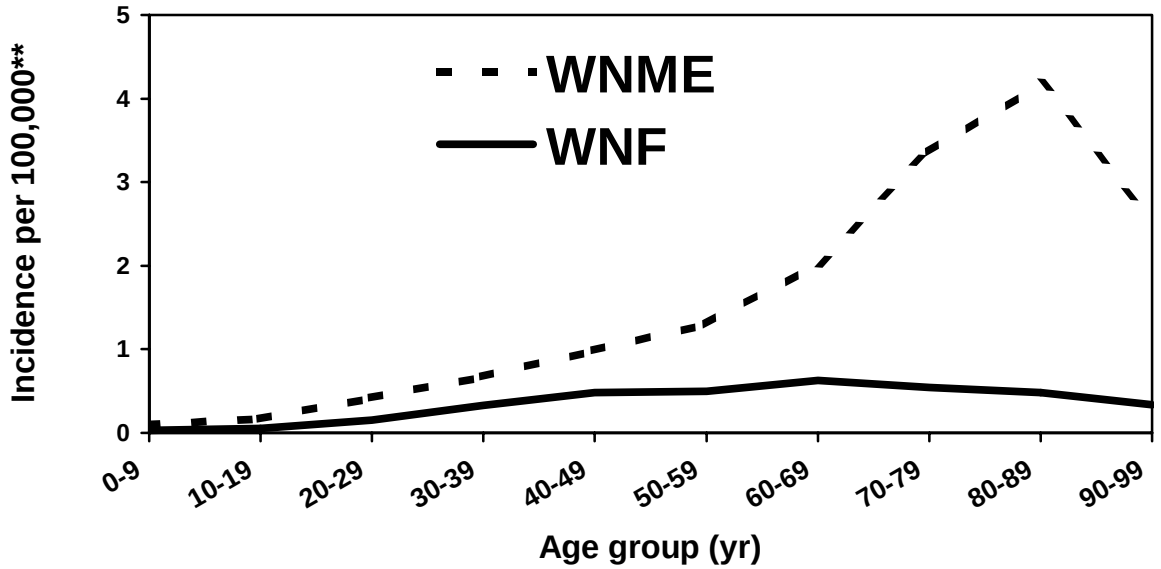
If you have livestock, dump the water at least every week or stock the troughs with mosquito fish also available from YCPAD at no cost.

Remember, you as a landowner are responsible for mosquitoes breeding on your property. Please take the time to check for mosquito breeding sites, and feel free to ask for assistance from the above agencies.

The West Nile infection in horses is deadly. About 1/3 of infected horses will die or have to be euthenised. This can be avoided with a vaccination available from local large animal veterinarians.

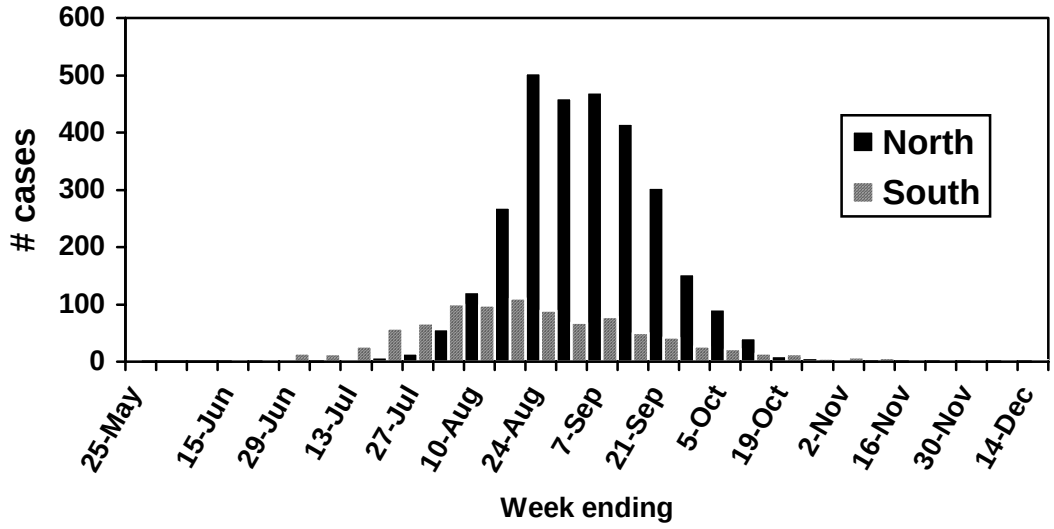
West Nile infection in humans is reported as either West Nile fever, which is the more common mild set of symptoms, which includes fever, headache, body ache, occasionally rash on the body trunk and swollen lymph glands, or as the more severe West Nile Meningo-Encephalitis (WNME). The latter occurs in less than 1% of infected people but includes severe head and neck pain, meningitis, encephalitis, tremors, flaccid paralysis, coma and death. Older people are at increased risk from the more severe form of the disease as shown below:

Human WNV Disease Incidence, by Age Group and Clinical Category, United States, 2002*



In all of last year, CDC reports that there were 4,156 human cases, and 284 deaths. So far this year there have been over 1764 human cases and 32 deaths reported as of September 2nd. This puts us ahead of this time last year. The chart below shows that last year, the bulk of the West Nile cases were reported during the month of September.

West Nile Cases Reported by Week (2002)*



*Grant L. Campbell, M.D., Ph.D., Division of Vector-Borne Infectious Diseases, National Center for Infectious Diseases, Fort Collins, Colorado.

In summary, here are some things you should do:

Eliminate mosquito breeding sites wherever possible

Avoid human exposure to mosquitoes

Get horses vaccinated

Use repellent containing DEET, wear long sleeves/pants

Report mosquito activity to control agencies

For more information call YCPAD at 726-1030. On-line information on West Nile surveillance in Arizona is available at:
http://www.hs.state.az.us/phs/oids/vector/wnv_update.htm

Additional on-line West Nile information is available at:
http://www.cdc.gov/ncidod/dvbid/westnile/
http://westnilemaps.usgs.gov/