



OPINION

The Two-Sided Sword Of Biotechnology

Guest Editorial By Norman G. Conrad
Agronomy Agent, Union Co. Extension Service

Two interesting discoveries related to agricultural research were released in the past several weeks. They deal with butterflies and sheep. Dolly the sheep's clone is suddenly aging faster than Scottish researchers had thought possible. Why? Very simply the biological clock that is ticking in every living cell whether you are a sheep, a human or strawberry plant kept ticking away in the tissue culture cells of Dolly's clone. All the high science has not figured out how to shut off the clock yet. The aging process continued to tick away regardless of the chronological age. Its cells had its own internal biological age — no mystery there. My son Adam studied Hamlet in his English class this year, so to paraphrase the Bard — "There are more wonders in the universe than are dreamed of in your philosophies Horatio."

Strike two on biotechnology was delivered by the monarch butterfly in the past several weeks. The "gene jockeys" who work for the major corn breeding companies had successfully been able to get the corn plant to produce a toxin which occurs normally in a bacterium in nature, *Bacillus thuringiensis*. This bacterium is no surprise, it has been commercially available for biological control of various caterpillars such as cabbage moth and gypsy moth for several decades to both farmers and home gardeners. The bacteria are eaten by the caterpillars as they munch on the leaves of plants, and enter the digestive tract of the larvae. There it produces one of six different "strains" of a crystal toxin which multiplies in the guts of the insect and it is *goodnight sweet prince* — i.e., monarch caterpillar. (Sorry I just cannot seem get off the Shakespeare.)

The geneticists have been able to incorporate the production of the toxin right into the cells of the corn seed itself through gene splicing. Along comes some pesky critter like a female European corn borer moth. Mom lays her eggs on the corn plant, the caterpillars hatch out of their eggs and crawl off to get their first yummy corn plant meal and it is curtains. The corn plant leaves and stem contain the hidden toxin.

The reality is that under our corn growing conditions here in the northeast we have a very small window of risk from this pest. Corn borer actually grows out and develops using a very similar mechanism to the time clock mechanism like Dolly the sheep's cells. The hatch of the eggs is time regulated by temperature and humidity. Then there is the biology — the moth is attracted to only specific fields which we can predict. Here in the northeastern U.S. we get two generations of corn borer per year. When the growth stages of our corn population is overlain with the development of the corn borer only the very early planted crop at the end of April or the very late planted corn in the beginning of June are at risk from this pest. So less than 10 percent of our state's corn crop is at risk from this pest. Few farmers spend the extra money for higher priced seed if their crop is not at risk. That is why sales of Bt corn are also fairly low in this state. Corn borer is not a major problem most years in our state.

Along with the question of controlling the corn borer comes the question what about the corn pollen from Bt that blows from the tassels to pollinate the corn silks? Does it contain the toxin? The answer is yes. That was clearly demonstrated by John Losey at Cornell in the recent Monarch butterfly study. Remember the EPA requires all pesticides, whether biological or man made, to answer the question of what happens to non-target organisms if they are exposed to the toxic product. Curious that the EPA did not think to have the corn companies look at this issue before they approved Bt technology for nationwide release. (You can insert your own jokes at this point regarding policymakers inside the Beltway.)

The Cornell lab study posed a single question. Is there a non-target effect? John Losey fed monarch caterpillars milkweed leaves covered with corn pollen from Bt corn. Remember back to your elementary school science class that milkweed is the only food that monarchs can eat! He applied several different rates (concentrations) to the leaves and observed either dead caterpillars or it extended the time it took them to mature. As the concentration of pollen on the milkweed leaf dropped off so did his observed effects. That is a simple lab study, but let's see how it relates to what happens out in the corn fields. John did not make any attempt to relate the concentration he fed in the lab to what might be found on milkweed leaves in or near a cornfield. He simply did a lab study relating dosage (concentration of Bt pollen) to caterpillar mortality. That is called a

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Now Is
The Time
By John Schwartz

Lancaster County
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To Understand Yellow Jackets

Yellow jackets with a sweet tooth become annoying pests this time of year. Colonies reach peak size in late summer and foraging activities intensify as workers seek food for developing queens and other members of the colony, according to Chester Hughes, Lancaster County Extension Livestock Agent.

Yellow jackets have a persistent habit of scavenging for food at picnics and outdoor restaurants. Yellow jackets foraging away from the nest are seldom aggressive and usually will not sting unless provoked. Avoid the temptation to swat them. Avoid nests too. Colonies die in late autumn and the abandoned nests are not reused and soon disintegrate. Yellow jackets often build nests underground in old rodent burrows, behind veneer on the side of a building, in the attic or in a rock wall. Nests may be destroyed with a wasp aerosol or dust insecticide applied at night in the nest opening. Locate the nest during the day. Then return after dark when the yellow jackets are less active to apply the insecticide. Never disturb a nest by setting fire, using a water hose or shining a flashlight because yellow jackets are extremely aggressive when their nest is disturbed.

To Select Replacement Ewes

Chester Hughes, Lancaster County Extension Livestock Agent, reminds farmers that ewe lambs born in March and April are excellent candidates to be used as replacement ewes in spring lambing flocks. With proper feeding and breeding management, spring born ewe lambs should have lambs by the time they are 12 to 14 months old. Ewes that have their first lambs as yearlings have a higher lifetime production than ewes lambing as two year olds. Select the fastest growing twin and triplet ewe lambs for replacements. Not only is there an advantage in improved prolificacy, but twin and triplet lambs have a more moderate growth rate, which prevents excess fat deposition in the udder. Lifetime milk production may be reduced in ewe lambs grown at an accelerated rate before puberty. Ewe lambs should weigh approximately 60 percent of their mature body weight at the time of breeding. That equates to a weight of approximately 100 pounds at breeding for most commercial crossbred ewe lambs. Expose the

ewe lambs to rams for 50 days. To ensure proper development, ewe lambs should receive one pound of grain daily up through lambing. To prevent excessively large lambs at birth, grain should not be increased during late gestation.

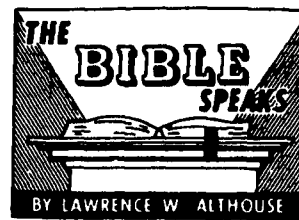
To Understand Potassium Deficiency

The past several weeks many people have reported seeing corn and other plants with bottom leaves which are yellowing along the margins, in some cases this has turned brown. Yellowing begins at the leaf tip on lower leaves and extends back toward the stalk. Bottom leaves usually show the most severe symptoms and as you move up the plant, each leaf shows less.

These symptoms are typical of potassium deficiency. According to Robert Anderson, Lancaster

County Extension Agronomy Agent, these symptoms may occur even when soil levels of potassium are in the adequate or higher level on the soil test report. Potassium deficiency symptoms develop because plants cannot extract potassium from dry surface soil. This is compounded in soils that have low subsurface potassium levels. Adding additional potassium is not likely to change the situation. Having a soil test for the next growing season may be helpful in determining if the soil is deficient or if the deficiency is due to weather. If the deficiency is due to dry soil conditions, the plant will usually recover as soon as a normal rainfall pattern returns with little or no loss in yields.

Feather Prof.'s Footnote:
"Quality only happens when we care enough to do our very best."



WHERE IS YOUR
PROMISED LAND?
July 4, 1999

Background Scripture:
Genesis 11:27 through 12:9
Devotional Reading:
Hebrews 11:8-12

When you consider the story of Abraham, do not overlook that he was 75 years of age when he heard God calling him to leave behind his family and friends to journey to a far land of which he knew absolutely nothing!

I am just six years short of his age at that time and I can assure you that, if I came to my family and friends and told them that God had called me to leave Dallas to journey and settle down in a far-away land on the edge of nowhere, they would certainly lose no time in having me committed! People at my age don't do that sort of thing! In fact, very few people of any age do things like that and we would have a hard time understanding anyone who did what he did.

Abraham is regarded today as the epitome of faith. He not only believed that God had spoken to him, he also believed that he could trust God to do what he promised: "And I will make of you a great nation, and I will bless you, and make your name great so that you will be a blessing" (Gen. 11:2,3).

A SENIOR MOMENT?

Can you imagine what neighbors in Haman thought? This man must be having "a senior moment!" Why leave the populous and cosmopolitan city of Haman for a desert crossroads on the way to nowhere? In his book, *Out of My Life and Thought*, Albert Schweitzer says that he was the subject of the same kind of reaction when he announced that he was giving up his distinguished career — actually, several distinguished careers — to open a mission station and hospital in French Equatorial Africa.

We protect ourselves from this kind of seeming insanity with the rationalization that Abraham was, after all, a hero of the faith, a man specially endowed with superhuman faith and commitment. The Bible, however, does not say anything about Abraham being different from the rest of us. Up to age 75 there is nothing recorded about him or his faith. He became different only when he dared to act according to his divine call.

So, before we put too much qualitative difference between Abraham and ourselves, we need to recognize that this passage speaks to us today, not just about God's call to Abraham, but also his call to each of us. At 69 years of age, I may not be called to move from Dallas, Texas, but I know I am being called to something and you are too. At age 75 Abraham was informed by God that there was more potential to his life than he would have dreamed and at whatever age God finds us, he is saying no less to us. To Abraham, it was a far country, but it is for us, too, no less than a call to a promised land.

HABIT OF INFERIORITY

So, where is your *Promised Land*? To what is God calling you? Think about it.

Psychologist William James said that many of us adopt "the habit of inferiority to our full self." As a result, "the human individual thus lives usually far within his limits; he possesses powers of various sorts which he habitually fails to use." One of the tragedies of life is that so many of us live, not on the cutting edge of our divine endowment, but "far within" our limits. You may be sure that God is calling each of us to push the outer limits of our capacities and opportunities. James also says that this person "energizes below his maximum, and he behaves below his optimum." So, how do you measure up?

God's call to Abraham was uncomplicated. God made two promises and a challenge: he and his descendants would receive a land that God would show him and God would make of him a great nation. Abraham would be blessed — as you and I also are blessed — for a purpose: "so that you will be a blessing . . . and by you all the families of the earth will bless themselves."

Is God calling you? No doubt about it! To what is he calling you? That is for you to determine. But, if you find it hard to understand just where your Promised Land lies, God can make it sufficiently simple. He has richly blessed you: so how can you be a blessing to others?

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