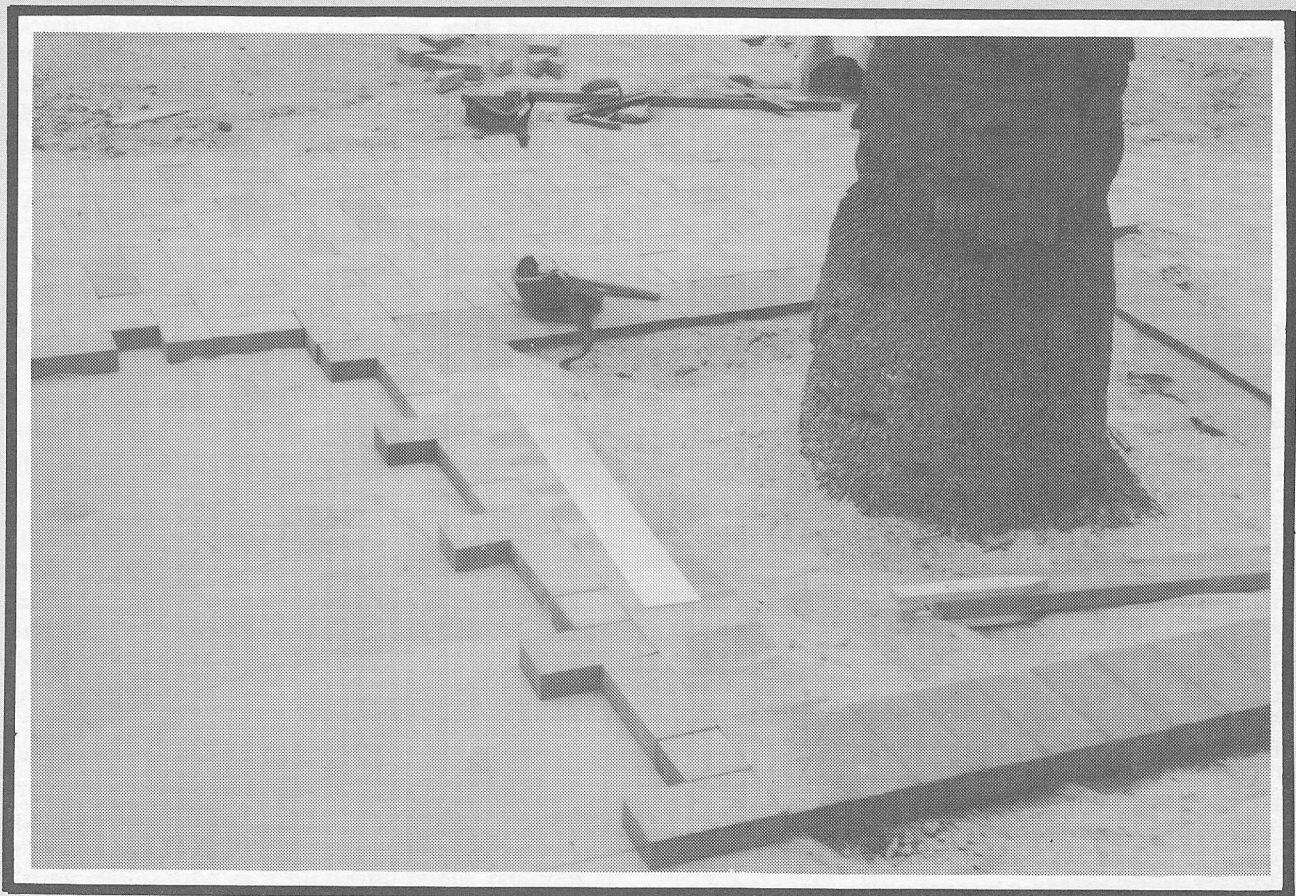


The

Agricultural Education

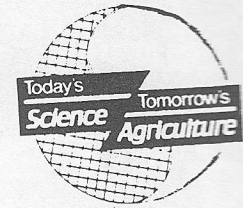
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THEME: Urban Mechanization

THE AGRICULTURAL EDUCATION MAGAZINE



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On and On It Goes!

The verbiage, oral and written, goes on and on in a never ending torrent. Further, this never ending stream of verbiage seems like an ocean with a rising tide. It seems to get deeper and deeper while moving faster and faster. Amazingly this gushing tide of dialogue seems to have little if any effect upon ingrained activities involving human endeavor. Are these the characteristics of the so called "Information Age"? Have humans become immune, insensitive or perhaps even non-receptive to this tidal wave of information that is constantly rolling in and inundating everything they read and hear? Like those who heard the little boy cry wolf, they pay little attention and continue to do what they have always done.

Just as the Rock of Gibraltar appears immune to the incessant pounding tides, so human endeavors seem insensitive to the verbiage that suggest change. An old cliché suggests that talk is cheap and action is difficult; perhaps this explains why there is so much information and so little change. Someone once observed that it takes a minimum of 25 years to bring about change in education. Man (collectively) is not quick to change and never has been so inclined. Fortunately, there are a few (very few) among us with vision and enough intestinal fortitude to advocate and adopt change. Unfortunately, the masses seem to have to be hit between the eyes or threatened with the loss of their livelihood before they are willing to begrudgingly accept change.

Leaders with vision and the willingness to share the vision must also possess a great deal of patience in helping others overcome their resistance and/or lack of foresight. Just as the ocean's incessant pounding ever so slowly alters the great rock, the leader demonstrating patience and persistence can overcome the resistance of those they lead. Undoubtedly, many valuable ideas have been lost or significantly delayed because those with the vision were unwilling to share or lacked the patience to demonstrate the idea to others.

Agricultural education is a prime example of the phenomenon just described. In the past three years, the volume of information describing and advocating program changes has risen to tidal wave proportions. A Strategic Plan for Agricultural Education was prepared and disseminated. The effort was recently recognized by the National Agricultural Marketing Association as a successful public relations effort. Yet in spite of all, how much change has occurred in agricultural education programs? Has the profession collectively and in total embraced the philosophy necessary to adopt and deliver a program worthy of the expanded mission espoused? Must the ship sink before awareness and concern is high enough to precipitate action?

Those who oppose the expanded mission for agricultural education are convinced that the "goose" who laid the golden egg has in fact been slaughtered; those who hold the vision of an expanded mission for agricultural education are



BY PHILLIP R. ZURBRICK, EDITOR

(Dr. Zurbrick is Professor, Department of Agricultural Education, The University of Arizona.)

equally convinced that the window of opportunity is fast disappearing with little to show in terms of results.

A closer assessment of the situation would perhaps reveal that neither point of view is totally correct. The *in agriculture* programs have not been lost and are in fact growing and changing to meet new occupational demands in agriculture. Granted this growth and modification has not been as revolutionary nor as comprehensive as those who drafted the Strategic Plan would have liked. It is still a healthy, viable program serving an important clientele. The *about agriculture* programs are also growing and gaining recognition in many states. Some states have progressed to the point of developing separate, non-vocational courses in agriculture designed to address the needs of students for agricultural literacy.

Philosophically, teachers have progressed to the point of recognizing that agricultural education is more than vocational agriculture. Some states have even moved to change the name of their state teachers association to reflect the expanded mission. Just as the ocean modifies and changes the seashore one grain of sand at a time, so have there been slow evolutionary changes in agricultural education.

Like the ocean there have been and will continue to be "ebbs and tides" in the process of unveiling the expanded agricultural education program. Those lacking the vision persist in creating diversions which slow the flow. There are, for an example, those who cannot or will not expand their concept of supervised experience to include both supervised occupational experience and supervised agricultural experience. Such parochial and/or imprecise thinking results in confusion and failure to provide the most appropriate educational activity for agricultural students. This coupled with leaders who don't know or don't care creates a serious division to program achievement.

The leadership in agricultural education must continue the process of moving forward towards the expanded mission laid out in the Strategic Plan. The tide of information must continue to flow in a never-ending torrent. Patience and persistence will eventually overcome ignorance and apathy. Those who are developing and delivering enhanced programs need to be recognized and rewarded for their efforts. There is much to be gained and enough work for all.

AGRICULTURAL MECHANICS: A Vanishing Curriculum

Agricultural Science! Biotechnology! High Tech! Agricultural Education is moving into the 21st century! I heard a couple of good ole boys talking the other day. They said, "Of course, agricultural mechanics is still around. It is kind of a 'tink-tink, keep 'em busy,' kind of curriculum. We'll burn some rod and turn some wrenches - you know - old technology but lots of fun. We won't worry much about the fact that our program may have changed and we have few students in production agriculture but lots of employment on the golf course or in the landscaping industry."

Unfortunately, this view of agricultural mechanics is shared by more of our colleagues than you would believe. Agricultural mechanics is not viewed by all as a viable and important program area for the next decade. It is recognized that agricultural mechanics played a major role in bringing agriculture to the level of efficiency enjoyed today, but few are visionary enough to see the future role or the need to bring appropriate competencies in agricultural mechanics to the students of tomorrow.

More Than Image

Why the problem? It appears that agricultural mechanics suffers image problems for both internal and external reasons. First, we have failed to tell students and those who support programs that agricultural mechanics is more than "tink-tink" or "rod burning," but is a scientific based curriculum which provides the ideal setting to apply selected principles of physics, chemistry, and mathematics.

Second, we have failed to adjust the curriculum to meet the needs of a changing clientele. The term urban agricultural mechanics troubles many, but the term is intended to focus the scientific principles of agricultural mechanics toward applications in the urban setting. This is most appropriate for instructional programs which are designed to meet the needs of urban students. In many cases, agricultural mechanics in an urban setting dies because of failure to recognize the appropriate competencies needed by students in such a highly mechanized environment.

Scientific Base and Application

What is the appropriate response? First, we must tell students and those who make decisions regarding the agricultural mechanics component of the program that agricultural mechanics instruction truly is science based and "high tech." Examples of the scientific principles applied in agricultural mechanics instruction are:

MECHANICS

- ★ Measurement
- ★ Force
- ★ Analysis of Structures

ELECTRICITY AND MAGNETISM

- ★ Electricity
- ★ Direct Current



By GLEN MILLER, THEME EDITOR

(Dr. Miller is Assistant Professor, Department of Agricultural Education, The University of Arizona.)

- ★ Dynamics
- ★ Work, Energy and Power
- ★ Complex Motions
- ★ Fluid Mechanics

THERMAL PHYSICS

- ★ The Structure of Matter
- ★ Heat
- ★ Thermodynamics

WAVES

- ★ Vibrations
- ★ Sound
- ★ Light
- ★ Optics

- ★ Magnetism
- ★ Alternating Current
- ★ Electronics

MODERN PHYSICS

- ★ Solid State Physics

CHEMISTRY

- ★ Chemical reactions and interactions

MATHEMATICS

- ★ All areas and levels

To some who teach agricultural mechanics, these principles may seem foreign; but the fact is that agricultural mechanics cannot be taught without applying these principles along with many others. Think of the increased importance to the curriculum if a teacher simply identified the principles of electricity which will be applied before beginning a wiring skill exercise. When students analyze the operation of a hydraulic cylinder, why not refer to Pascal's law? Certainly agricultural mechanics is science based and has "high-tech" applications. For students, parents, administrators, supervisors, other teachers, etc. to recognize this, we must establish the scientific base as well as the applications of science.

Second, we must see beyond traditional production applications of agricultural mechanics and identify how agricultural mechanics instruction fits in landscaping, turf, horticulture, "bio-tech," and other emerging curriculum areas of agricultural education. It is no more difficult to apply the principles of hydraulics to a turf mower than to a farm tractor. In fact, it may be easier to develop applications for equipment of a smaller scale.

(Continued on page 23)

AGRICULTURAL MECHANIZATION

Miscellaneous Ramblings and Lesser Thoughts

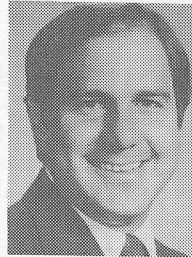
Cliches seem to be an "in thing." There seem to be sayings for just about everything and every situation. There are thoughts for the day, thoughts of the week, and all kinds of special sayings for every occasion. We often times start classes and meetings with some clever, thought provoking gem which is meant to inspire us to bigger and better things. Well, it is time to investigate some of these cliches, and maybe even to come up with a few new ones related to agricultural education, agricultural mechanics and even some that don't seem to apply to much of anything in particular.

It is a natural state of affairs for every welding student who worked so hard to produce that perfect first weld which actually resembles a dried worm on a sidewalk to hear that critical evaluation, "slow down, and shorten the arc." This particular statement has been the mainstay of teaching welding as long as most of us can remember. Many times we would tell students to do this even when they were not welding just because it has such a nice ring to it. I thought that MIG welding would actually do away with this time honored tradition, and I believe that is why so many of us have taken so long to change; but that is hardly the case. For some of us it was quite a relief to find that we really did not have to change our ways after all. Those first MIG welds look just as bad as those first stick electrode welds.

"The squeaky wheel gets the most grease." Yeah, right. This is not a valid statement. The squeaky wheel is first to get replaced. Besides, when something goes wrong, where do we look? Right at that old squeaky wheel. A lot of times people just replace the wheel anyway, rather than bothering to get the grease. New saying: "Don't be a squeaky wheel, unless you have got your own grease."

"What's happening has already happened" was coined by Brock Yates who writes for CAR AND DRIVER. This saying seems so very appropriate in today's environment of change. Often times, especially in teaching, we think we are on the cutting edge of change, when in fact change has already happened.

"When all else fails, read the directions." This cliché will always be in style as it is appropriate to so many situations. Many people thought the computer would do away with the need for reading directions. In reality, computers have provided a whole new dimension to reading directions and seeking help. It is ironic that some of those help menus have the worst set of directions. How can you read the directions if there are no directions on how to read the directions? So, you call someone to get those directions, and there you are trying to get directions for something you cannot explain. I think some teachers call this problem solving.



BY JOE G. HARPER, SPECIAL EDITOR
(Dr. Harper is Associate Professor, Department of Agricultural Education, Clemson University.)

"You can't hit what you can't see." I am not sure where this saying came from, maybe hunting, baseball, or city driving, but it is no longer valid. The Gulf War proved beyond a doubt that not only can you hit something that you cannot see, but it is possible that after it has been hit, there might not be enough stuff left to tell if you hit it; but so what, you never saw it in the first place. Sometimes I feel like I have been hit and I do not have the slightest idea how I have been hit, or when I might be hit again. Therefore, a better strategy is to keep moving, and use a variety of strategies, and besides you might get lucky and hit something.

Recently I have heard a lot of people use the saying, "If it is not broke, then don't fix it." Well, that does not necessarily mean we should not be working on it. Many times you have got to work on something to see if it might be broke. It is better to find out ahead of time if it is going to break than to wait and see if it does break. Our biggest fear is that something is broke, but we can not tell where it is broken or fixed.

"If a rabbit won't eat it, I won't play on it." Supposedly, Ritchie Allen, a former baseball player said this about artificial turf when it was first introduced. A great saying which can be applied to agriculture education. We should apply the rabbit test to more things, like instructional strategies. If the students will not learn this stuff, then why are we teaching it? How palatable are our curriculums?

My colleague, Lloyd Blanton, has a favorite saying from aviation, "Any landing which you can walk away from is considered a good landing." Many times in education we are very excited if at least we can walk away. Our problem may be that we do not walk away enough. Maybe it is time to get out of a few "landed" planes, especially those that are not capable of flying again.

In auto racing there is a saying, "Luck is a product of preparation." Those who seem to have the best luck are those who spend the most time and effort on being prepared.

(Continued on page 23)

Agricultural Mechanics

Change. A word used so often by so many in our profession lately. Change has had to take place in agricultural education for its survival and more importantly for its improvement. Just a few years ago many of our students were production oriented. Now it seems many programs have had to change to accommodate students with vastly different backgrounds and very few, if any, have anything to do with production agriculture.

Yet agricultural education is very traditional in its ideas and concepts. Examples of this are supervised agricultural experience programs and record keeping. Secondary agricultural instructors have long felt this is the backbone of vocational agriculture and they have managed to adapt this most traditional concept to new and more non-traditional portions of their programs. This indicates that if we, as instructors, recognize something to be important, we find ways to incorporate it in our instruction.

This is why I find it hard to believe so many instructors are not incorporating agricultural mechanization units into their non-traditional classes. Horticulture, landscaping, and greenhouse management are courses where small engine maintenance, electricity, surveying, and concrete units fit very well. Instruction in small engines would be useful for repair and maintenance of lawn mowers, tillers, and hedge trimmers, and electricity for wiring needs in greenhouse operations. Surveying and concrete units are beneficial in landscape design.

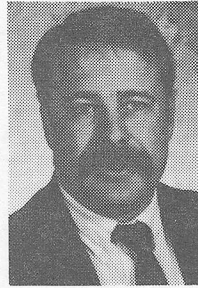
Instruction in agricultural mechanics is still an important part of the total agriculture education program. However, there are some concerns that should be addressed on the topic of agricultural mechanics and its importance to many agricultural education leaders.

First, when agricultural education and agricultural business leaders met to form the Missouri strategic plan for agricultural education, very little discussion was devoted to the topic of agricultural mechanics.

Second, in years past, the Missouri Department of Elementary and Secondary Education would not fund an agriculture program unless shop laboratory facilities were provided by the local school district. This has changed and now funding is available for programs with or without shop facilities. Third, to become certified to teach agriculture in Missouri, only seven semester hours in agricultural mechanics are required. We will all agree it is hard to teach subjects for which we are not well prepared and seven semester hours is not a lot of preparation in the field of mechanics.

The above situations may indicate that agricultural mechanization is a low priority item among teacher educators and agriculture education supervisors. This may indicate why teachers are not teaching agricultural mechanic competencies and skills in traditional, non-traditional and urban areas of agriculture.

Here in Carthage we have evaluated the importance of agricultural mechanics and have incorporated it into tradi-



BY JOHN DILLARD

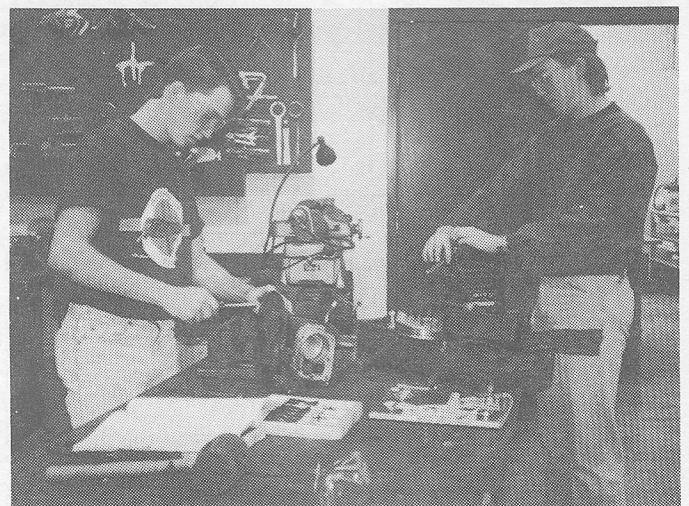
(Mr. Dillard is Agricultural Mechanics Instructor, Carthage Area Vocational School, Carthage, Missouri.)

tional as well as non-traditional areas of our program. Students currently enrolling in agriculture classes are not from production backgrounds but are very interested in pursuing a career in agriculture. When students enroll as freshmen, they have a choice of one of three Ag Science I classes: Ag Science I - Horticulture; Ag Science I - Animal Science; Ag Science I - Mechanics. Even though these courses emphasize a special field of Agriculture, Agriculture Mechanics units are taught in each class.

As sophomores, students have the option to take either Plant Science or Ag Science II which emphasizes special units in Ag Mechanics.

Juniors and seniors can choose from several courses: Agribusiness, Ag Communications, Ornamental Horticulture, Nursery and Landscaping, Floriculture, Ag Construction, Ag Power, and Ag Structures. Only Ag Business and Communications do not incorporate any type of mechanical instruction.

Many of our urban students are enrolling in the Horticulture/Plant portion of our program. Instruction in these classes are including more and more mechanical concepts such as short units in engine tune up, lubrication, maintenance, basic electricity, tool sharpening (mower blades, hoes, etc.), surveying, and concrete work. For ex-



Regardless of agricultural education interests, students are encouraged to take Agricultural Power.

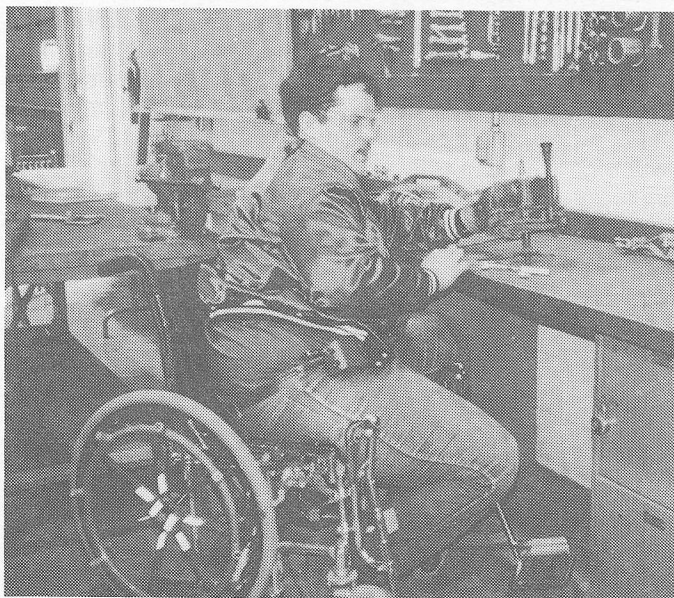
ample, nursery and landscaping students are taught how to estimate concrete materials for landscaping gardens and yards.

Agriculture Power is a class dealing with engine theory and Basic Electricity. Regardless of their agricultural education interests, students are encouraged to take this course. Many Horticulture students have enrolled in this class. A real need exists in that many horticultural operations are using small gas engines and electricity. Employers tell us they need people who have educational backgrounds in these two areas.

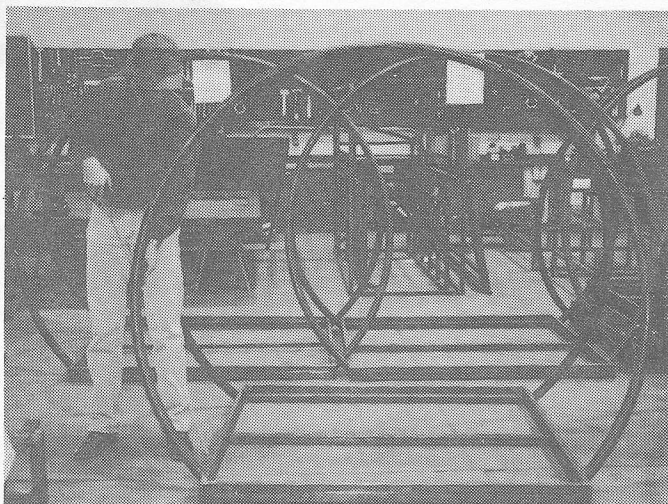
Urban as well as rural students enrolling in Ag Construction classes are required to design and construct their own project. Students are encouraged to construct at least one project for themselves or their family. If money is a problem, they may choose a project from a community request list compiled in the instructor's office. All projects must have the approval of the instructor. A project plan is developed by the student before any construction begins. The plan must include a bill of materials, a three view drawing of the project, and a construction procedure.

After the project is completed the students are required to exhibit them at the county fair. Examples of projects that have been constructed in this class include picnic tables, yard swings, BBQ grills, gates, truck beds, utility trailers, livestock and horse trailers, and gooseneck trailers. Emphasis in this class includes shop safety, drawing and plan development, and project construction applying basic skills and competencies learned in lower level ag mechanics classes.

Many of our students live in urban areas and do not have the opportunity for traditional supervised agricultural experience programs at home due to space requirements. Yet school administrators feel high enrollment is important and students should not be turned away because animal projects



Handicapped students are finding useful skills and employment through competencies acquired in Agricultural Power.



Students are encouraged to construct at least one project for themselves or their family. A yard swing is one project that is chosen by many students because of its simplicity and low cost. Students achieve pride and satisfaction when family members can enjoy or use their project.

are not feasible at home. Therefore, the agricultural education shop is used extensively as an SAE laboratory for students to construct projects, repair equipment, or overhaul small engines.

The shop is kept open after school two to three nights per week during school months. Students are required to keep records on money earned and time spent in the laboratory. Urban students who do not have space at home and are not interested in shop work may plant and maintain a large school owned garden area. These students use tillers, sprayers, and other small gas engine equipment and have to do periodic routine maintenance, tune-ups and repairs. As you can see a good background in mechanics is helpful.

The final word is that changes have occurred in our programs but many of the concepts and ideas still apply; this is so true in areas of Agricultural Mechanics. The classes and areas where we are and should be teaching agricultural mechanics principles have changed, but little if any has changed the principles. Skills in tuning-up an engine, whether it is a tractor or hedge trimmer, are virtually the same.

About the Cover

Urban hardscape in the form of brick pavers are an expanding application. (Photo courtesy of Dr. Glen M. Miller, University of Arizona.)

COMPUTER TECHNOLOGY RESOURCES

Computer Viruses — They Are No Joke!

(Part I)

Picture yourself, for a moment, seated quietly at your computer. You are laboring over a very important piece of work and things are developing quite well. Now picture this comfortable, serene, productive setting being interrupted by one of the following scenarios: 1) The text you have been working on has its letters drop to the bottom of the screen in a pile; 2) Your computer monitor and keyboard suddenly "lock-up" for no apparent reason; 3) Your computer begins to "talk" or play a tune; 4) Your hard disk drive decides to delete all of its files and/or reformat itself. Chances are, you have just become a victim of a computer virus.

These scenarios may seem far-fetched, but they are actually quite realistic. Given the ordering above, your computer many have contracted: Blackjack 1704, Stone-B, nVIR, or Lehigh. These maladies, and others like them, are increasing both in occurrence as well as in straining type. If you have not experienced a computer virus by now, chances are you will in the future. The good news is that there are some every effective precautions that you can take in order to insure that your computer doesn't suffer any ill-effects due to contracting a disease.

The Nature of Viruses

Computer viruses, while not being biologically bacterial or viral in nature, are quite analogous in an electronic context. A very important difference, however, is the fact that biological bacteria and viruses occur as natural components of creation, while computer viruses are computer programs written by people who have a perverted sense of what is fun, humorous, and/or creative.

To help you better understand the nature of computer viruses, let's compare their characteristics to that of a swine disease that many agricultural educators may be familiar with — transmissible gastroenteritis (TGE).

TGE is a type of corona virus which causes excessive diarrhea and hence desiccation in swine. If left untreated, death will ensue. Computer viruses can also be classified into "family" orders. They will usually demonstrate some type of symptomatic behavior in your computer's performance, and more times than not they will damage or destroy computer files and/or directories.

Before manifesting itself in an acute fashion, TGE can lay dormant for an extended period of time by residing in the lungs of the infected animal. By the same token, computer viruses can sit dormant for an extended period of time by attaching themselves to an available file on the magnetic media (i.e. strip, tape, or disk storage) of the infected computer. Then at some pre-programmed time (unbeknownst to the user of the infected computer) the virus will activate



By GRANT M. TIPTON, III AND W. WADE MILLER,
SPECIAL EDITOR

(Mr. Tipton is Research Associate and Dr. Miller is Associate Professor,
Department of Agricultural Education and Studies, Iowa State University.)

and perform its intended irritating and/or destructive function.

TGE can be transmitted from animal to animal in a variety of ways, such as: fecal matter, airborne aerosols, and contact with carriers. In like fashion, viruses can be transmitted from computer to computer. Computer viruses attach themselves to certain types of files. They tend to favor attaching themselves to COMMAND, EXECUTABLE, and SYSTEM files, as well as to various types of "overlay" files. When these infected files reside on any form of magnetic storage (hard disks, floppy disks, micro-disks, magnetic tape, etc.) and are read by any given computer, the virus will then transfer a copy of itself into that computer's "high" memory.

Thus, any new floppy disks introduced into that computer will automatically be infected with the same strain of virus, and when that disk is inserted into any computer, the memory of that computer becomes infected as well. Computer viruses transfer and duplicate themselves very quickly and efficiently. Furthermore, additional exposure to computer viruses can be achieved through the use of modems, networks, or any other form of telecommunications. Thus, computers can acquire viruses from both computer-to-computer contact, as well as data-storage to computer contact.

Finally, a modified live vaccine such as TGE-VAC can be administered to livestock as a preventative measure to their contracting TGE in the first place. If a pig does acquire the disease, it can often be saved by administering electrolytes and other fluids after symptoms of the disease manifest themselves. By the same token, there are a variety

(Continued on page 23)

Urban Mechanization and Then Some!

Urban mechanization — the words just do not seem to go together. Whenever you hear mechanization, the last things that come to mind are streets, stoplights, skylines, and other such stereotypic perceptions of an urban environment. Unfortunately, our perceptions of both the urban setting and mechanization are often times too narrow and lack a broad perspective. Now, if we consider urban agricultural mechanization, the perception, at first, is not a perception. There is no such animal. Tractors, balers, sprayers, and even lawn mowers do not appear in an initial perception of urban agricultural mechanization. What do you do now? Where do we go from here? Maybe there is such an animal, if we adjust the way we are thinking. Here are some strategies for implementing programs related to urban mechanization.

1. First, any program curriculum must be based upon the applied sciences, which means **technology**. The urban environment is full of mechanical stuff. There are applications of hydraulics, pneumatics, power, refrigeration, electrical circuits, sensors, drainage, irrigation, air quality, wind control, wood structures, metal structures, and concrete everywhere.
2. Programs must be interesting to students. Students are interested in technology, the environment, and the applied sciences. How things work is fascinating to a lot of students. However, how a tractor works may be of interest to us, but may not interest high school students in an urban setting. Quite frankly, a program called "urban agricultural mechanics" probably does not have very much appeal to anyone. At the present time, terms like environment and technology appear to be of interest to most students. Be sure that you call the instruction in environmentally-related technology systems something other than urban agricultural mechanics.



Power equipment is used extensively in the urban setting and urban programs must prepare students for proper power equipment management. (Photo by Dr. Glen Miller, University of Arizona)



BY TAMMY R. BLACK AND JOE G. HARPER

(Ms. Black is Graduate Assistant and Dr. Harper is Associate Professor, Department of Agricultural Education, Clemson University.)

3. Instructional programs must be based upon experiential learning. Students must be able to experience the learning process through applied, hands-on learning experiences. Such experiences can be taught in the laboratory or through supervised experience programs.
4. The level of instruction varies from student to students, and program to program. Not every student who studies agricultural mechanization is going to master all of the knowledge, skills, and behaviors associated with the technology. Our perception of agricultural technology is too narrow. Most students need to be aware of a diverse array of technology principles and skills, such as the fundamentals of electricity.

The technology of the future will be based upon computers and other electronic devices. Not to provide an awareness of this basic energy source is to miss a key aspect of environmental technology instruction. However, few students will really need all the knowledge, skills, and behaviors required to build complex electronic equipment. Effective urban educational programs must be based upon the level of instruction that will meet individual needs.

The question remains — what should we teach in "urban mechanization?"

The application of the physical sciences has been and will continue to be an important component of instruction in agricultural and other technology based curriculums. The following units of instruction in agricultural technology are applicable to urban settings:

- Landscape Technology
 - Drainage planning
 - Irrigation equipment
 - Earthmoving and landscaping equipment
 - Equipment preventive maintenance
 - Proper operation and safety
 - Fundamental troubleshooting and repairs
 - Equipment selection and management

Electrical Technology	
Low voltage electrical systems	
Wiring and circuits	
Electrical safety	
Switches and controls	
Electrical power and motors	
Environmental Technology	
Soil and water relationships	
Basics of soil conservation - drainage, runoff	
Waste management technology	
Air quality and ventilation	
Temperature control - heating and air conditioning	
Structures, Construction and Manufacturing	
Construction materials	
Design and fabrication techniques	
Construction and manufacturing technology	
Environmental and social impacts	
Energy Systems and Management	
Energy sources	
Energy transfer and utilization	
Conservation strategies	
Mechanical power systems	
Electrical power systems	
Fluid Power Systems - pneumatics, hydraulics	
Alternative power systems	

Natural environments	
Environmental control	
Waste management	
Computers and Electronics	6
Computer software	
Computer language systems	
Circuits	
Hardware and peripherals	
Fundamentals of electronics	
Electronic sensors and controls	
Electrical motors and power transfer	
Energy Systems and Management	8
Energy sources	
Energy transfer and utilization	
Conservation strategies	
Mechanical power systems	
Electrical power systems	
Fluid power systems - pneumatics, hydraulics	
Alternative power systems	
Leadership and Personal Development	2
Cooperation and teamwork	
The value of work	
Personal development	

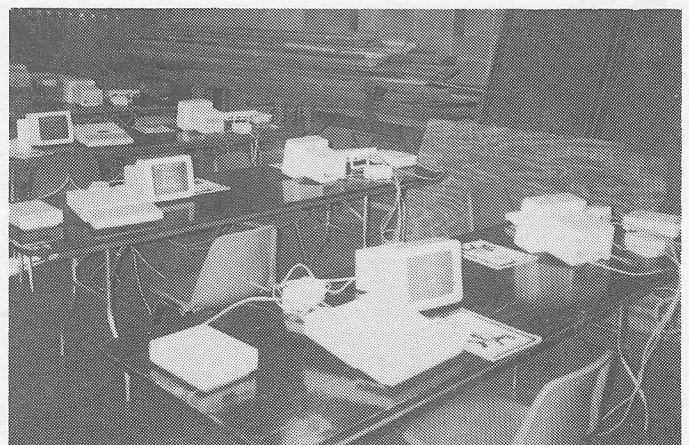
The following curriculum outline is proposed for a full year of instruction at the secondary level. Such a program could be shortened to a semester course, or broadened to a multiple period or 2-year instructional program.

Environmental Systems Technology
Secondary Education Curriculum

Topics	Weeks
Orientation, Supervised Experience	1
Environmental Technology Systems Management	2
Information acquisition	
Biological systems	
Environmental systems	
Principles of management	
Expert systems applications	
Environmental Sciences and Mathematics	3
Units of measurement	
Problem solving strategies	
Scientific inquiry	
Ecology	
Mechanical sciences and principles	
Technology Construction and Manufacturing	6
Materials of construction	
Design of construction	
Construction techniques	
Environmental and social impacts	
Environmental Technology	8
Soil and water relationships	
Conservation management	

These units of instruction suggest a very different way of thinking about agricultural mechanization education in the urban setting. Technology is changing at an ever increasing rate. In order to provide effective, current, instructional programs we must change existing curricula.

In conclusion, there is a large curricula associated with urban mechanization. Students are interested in knowing new technologies, how things work, and how these things are going to impact their environment. We need to incorporate instruction about these technologies into existing programs, and to develop new programs to educate urban students about the interrelationships of technology and the environment. Which sounds a lot like urban mechanization and then some.



Computer technology has had a significant impact on the competencies needed by students in agricultural mechanics both in the production area and in the urban mechanics area. (Photo by Dr. Glen M. Miller, University of Arizona)

Agriscience: Good For Students or Just A Charade

A friend and colleague of mine (Buriak, 1989, p. 18) has defined agriscience as, "... instruction in agriculture emphasizing the principles, concepts, and laws of science and their mathematical relationships, supporting, describing, and explaining agriculture." While not a dictionary definition of agriscience, it is generally sufficient to be used when talking about the subject. The \$64,000 question is, "Are we teaching agriscience, or just doing the same old thing and calling it a new name?" Remember the adage — if it looks like a duck, sounds like a duck, and walks like a duck, it is a duck!

The profession owes a tremendous debt of thanks and gratitude to the National Research Council (1988) for their bold and challenging report entitled, "Understanding Agriculture: New Directions for Education." This report caused the profession to look at the critical lack of science instruction in agricultural education and set into motion the need for additional emphasis in the area of science. Thus, the term agriscience has emerged in all its grandeur. However, are we really teaching agriscience to our students?

Many programs that I have seen have simply changed their name and are going about business as usual while at the same time hyping the teaching of agriscience. While we may fool the administration and public for a while, we are in for a rude awakening when our graduates are not successful in their career choices due to a poor agriscience curriculum coupled with inadequate instruction. At the other extreme and possibly as bad is the person who says they have a biotechnology curriculum. While that person needs to be congratulated for introducing biotechnology and showing students its potential, that person also needs to be chastised for allowing the public relations exposure and hype of something new and novel to rule the curriculum at the expense of students.

Students in such a program are getting short changed in an area where there are few opportunities for individuals with their backgrounds. Stop and think for a moment who is being hired to work in the biotechnology area. Persons with PhD's in a very narrow and highly specialized field are the ones in demand, not high school agricultural education graduates. If you add to this the fact that in many instances twenty to forty percent of agricultural education students are educationally disadvantaged, who are we trying to fool? I have no axe to grind with biotechnology nor with aquaculture, but I have seen too many programs called such that have been extremely shallow with little breadth and width.

I have also seen a tremendous proliferation and emphasis upon the biological sciences in the new agriscience curriculum. The other day I received a text book from a major



BY JOE A. GLIEM

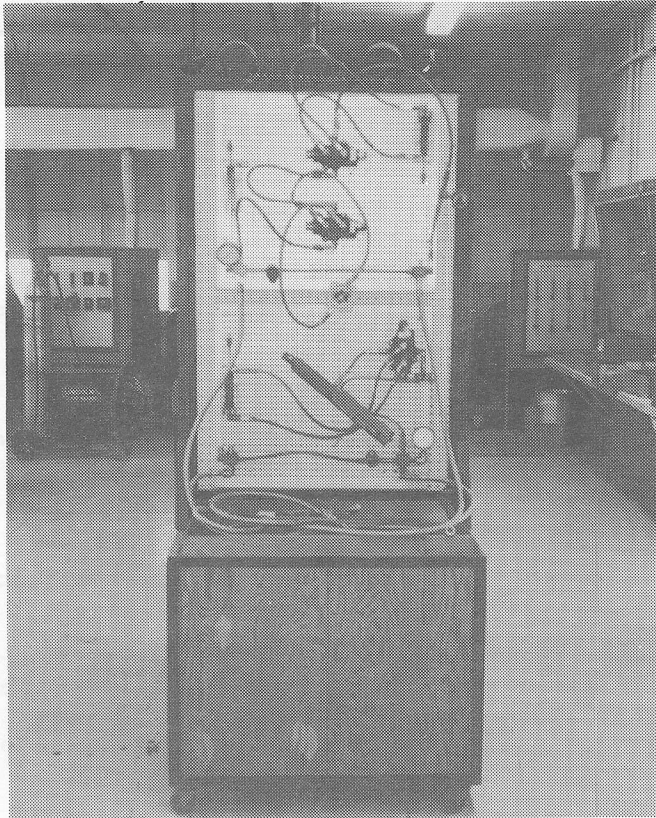
(Dr. Gliem is Assistant Professor, Department of Agricultural Education, The Ohio State University.)

national publisher entitled "Agriscience . . ." I was so excited at the prospect of having an up-to-date text available for use in this area that I could hardly wait to open it. However, upon opening the book, I found the contents to be basically information about the biological sciences.

While there is nothing wrong with the contents of the book, should it have been called "Agriscience . . ." or is this just a ploy by the book publisher and author to gain additional revenues? Have we forgotten the other half of the Natural Sciences, that is physics. I would argue that it is as important as the biological sciences and possibly the science we come in most direct contact with every day. Have we just assumed that it was going to be a part of the agriscience curriculum? If we have, it is a big mistake.

The application of the laws of physics has become less and less over the years. Partly, because it was assumed that the teaching of agricultural mechanics would insure including physics in the curriculum, which is not true. Skill development in agricultural mechanics does not mean that students will learn to apply nor understand the laws of physics so they can transfer them to new situations. For example, the following was written in a recent issue of Wood Magazine (October, 1990, p. 73) by an experienced woodworker having a tremendous amount of skill as he compared mechanical versus electrical speed change methods for a wood lathe: "We prefer the mechanical method of reducing speed through gears or belts. When you slow a motor by cutting voltage, horsepower drops as well. On the other hand, when you mechanically reduce speed, horsepower at the spindle increases."

This individual did not understand the concepts of horsepower and torque. Horsepower is never increased by any mechanical speed change. When you mechanically reduce speed, torque at the spindle increases, not horsepower. Another reason is that the preservice education program for our future teachers in many instances does not require any coursework in physics.



The scientific principles of fluid mechanics should be established as a part of instruction in hydraulics. Illustrated is a laboratory built station mounting a commercially available hydraulic theory training module. (Photo by Dr. Glen Miller, University of Arizona)

At our institution, students majoring in Agricultural Education have not been required to take a physics course for at least the past sixteen years. If you ask those same students if they have had any physics in high school, you will find about ninety percent have not. My question is, "If students do not take physics in their preservice coursework nor in high school, where are they expected to learn the basic laws of physics?" I hope, but I do not think our institution is alone in its lack of a physics course requirement. I know that a single physics course in and by itself does not guarantee a student will understand and can teach the concepts involved, but it is at least a start.

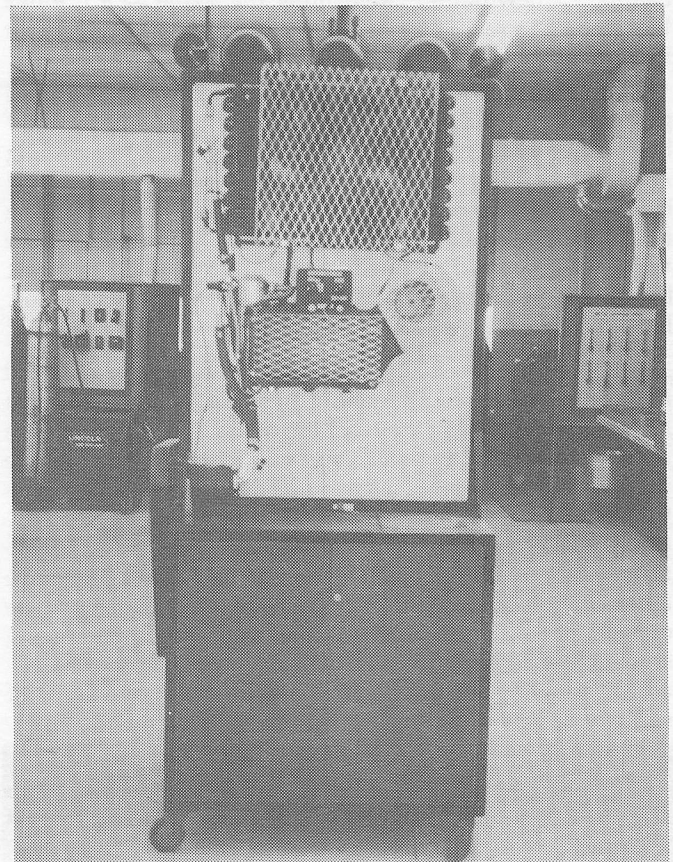
In the definition of agriscience at the beginning of this article, there was mention of the terminology "mathematical relationships." What level of mathematics do you require of your upper division agriscience students? Do you require at a minimum algebra and maybe geometry? If not, why? Science is based upon mathematics. Without some competency in mathematics, students will not be able to understand the concepts involved nor be able to transfer learning to new and different situations.

For example, most students have some idea of speed when expressed in miles per hour, but do they really understand the concept that speed is distance per unit of time? Those who have listened to the launch of the space shuttle have heard mission control express speed as six hundred feet per second. One says, "So what? That really doesn't mean anything to me. I wish they would tell me how fast that is in miles per hour." Understanding the concept would let

one convert that to approximately four-hundred ten miles per hour.

Why have we been led to believe that we cannot have prerequisites for agricultural education courses? I know that we say our agriscience instruction is applied, but before you can apply something don't you have to understand it first? While I don't question that we could teach the basic science and mathematics concepts needed, the question is do we have the time in an already overcrowded curriculum?

An even more fundamental question is should we be teaching that subject matter or should that be left to the professionals in those areas? Would we like having them teach our subject matter because they said they could do it better? Don't forget that the agricultural education program is only a part of the entire school system. Let's work with those professionals, so together we can produce a better curriculum that will meet the needs of our students.



Refrigeration components can be removed from a vehicle and assembled into an effective theory trainer to apply the scientific principles of thermodynamics. (Photo by Dr. Glen Miller, University of Arizona)

Please allow me to summarize my thoughts as follows:

1. The movement towards a science based curriculum is badly needed and one of the best things to have happened to agricultural education in many, many years. However, let's be sure that the move is well planned, is a sincere change of emphasis in the curriculum, is for the benefit of students, and encompasses all of the Natural Sciences. Let's not just do something for the hype and media blitz that might be generated.

(Continued on page 23)

Urban Mechanization — It's Reality

Urban mechanization — what is it? How should we in the profession define this phenomena? According to Webster's New World Dictionary, for U.S. census use, a place is considered "urban" if 2,500 people live in a given area. A more general definition of urban is that which comprises a city or town — the characteristic of the city as distinguished from the country. The word "mechanize" is defined as to do or operate by machinery, not by hand - to bring about the use of machinery in (an industry, etc.). "Mechanics" is defined as the theoretical and practical knowledge of the design, construction, operation, and care of machinery.

A working definition of "urban mechanization" for agricultural education therefore reflects the fact that urban settings are becoming more mechanized and that the students who are reared in urban settings are becoming more skilled in the theoretical and practical knowledge of the design, construction, operation, and care of related machinery.

The urbanization of agriculture programs across the nation has undoubtedly affected the content of the agricultural mechanics classes taught. Many urban students come into our classes lacking skills in agricultural mechanics. Many haven't watched their dad, an uncle or even a big brother cut threads on a bolt. Fewer still have either watched or help service an automobile.

The types of approved projects that we expect these students to construct as they apply the skills they have learned in the classroom are different. Few of these urban students have a need for a feed bunk or a calf shelter; projects that were frequently constructed by students reared on a farm. Appropriate projects may include the construction of pet shelters, lawn furniture, bar-b-que grills, or log splitters. In short, the needs of our urban students can be much different from the students reared on a farm. Teachers who have failed to recognize these differences and adjust their curriculum accordingly may be ignoring the needs of these students.

Teachers who are cognizant of the needs of urban students have adjusted their curriculum in a number of ways in addition to those noted above. The equipment selected for a machinery class, for example, should be different. Rather than teach about the maintenance and use of equipment suited for production agriculture, horticulture and forestry equipment should be selected. Self-propelled lawn mowers and roto-tillers, gas and electric powered weed eaters and chain saws, and small chemical spraying equipment are commonplace in urban settings. It's easy to see why the knowledge of the maintenance of these tools interests an urban student. The knowledge of the maintenance of these tools also interests the farm reared student. A good teacher than explains how students can transfer these skills to maintenance of equipment largely used in production agriculture.

Some of the equipment that has mechanized urban areas is quite sophisticated. For example, many of the urban



BY LEON G. SCHUMACHER

(Dr. Schumacher is Assistant Professor, Agricultural Education and Agricultural Engineering, University of Missouri-Columbia.)

equipment examples identified possess electrical and in some cases electronically controlled circuits. Some of the tools commonly associated with urban settings possess hydraulic and PTO capabilities. In these situations, the competencies that a teacher would traditionally associate with some of the equipment used in production agriculture are equally important to an urban student.

Examples of other current curricula that is equally important in an urban setting include basic skill development in plumbing, electricity, small gasoline engines, and general repair and maintenance. Urban students need an understanding of these concepts. The basic skills learned within each of these areas are used as frequently in urban settings as they are in rural settings. The subsequent knowledge base developed helps one determine when to attempt or to leave an urban project for a professional.

The introduction of urban students into the high school agriculture program in some schools has results in the development of other laboratory settings in addition to the agricultural mechanics laboratory. The use of horticulture, aquaculture, and land laboratories (especially horticulture) have become more common in high school agriculture programs.

An important fact to remember when teaching in these laboratory settings is that the agricultural mechanics skills needed to maintain these facilities are not that much different from those needed by students reared on a farm. For example, in horticulture, agricultural mechanics skills are applied when wiring electrical timers for electrically controlled water valves and thermostats for heating and cooling, and during the selection and use of chemical application equipment.

In summary, the urban student has different interests and needs. The teacher who recognizes their interests and needs and plans their lessons accordingly will see many of these students in their classroom. Many of the skills and competencies presently taught are equally important to the urban student, however, teaching aids and examples used in class that reflect the needs of the urban student must be used before they will see the merit in learning these competencies or enrolling in your classes.

The Urban Environment: Rich in Agricultural Mechanics and Science

Urban mechanics: What is it? When we think of the urban environment, we traditionally think of agriculture in terms of horticulture. But pick up any magazine thought to be horticulturally based and you're in for quite a surprise. LAWN AND LANDSCAPE MAINTENANCE, GROUNDS MAINTENANCE, TREE CARE INDUSTRY, TURF, and publications for the Golf Course Industry are readily available. And all we have to do is look at the pictures and the advertisements to realize that much of what is done in these industries would fit many of our definitions of agricultural mechanics. If we take a closer look at the table of contents, we see such topics as:

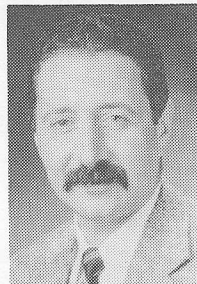
- Handling, mixing and application of chemicals.
- Pesticide residues.
- Equipment maintenance, selection and management.
- Conservation and recycling.
- Water management.
- Irrigation design and installation.

There is a vast industry and a large number of potential students that agricultural education, more specifically agricultural mechanics, has ignored. It is time we embraced this industry and new clientele by teaching students agriculture guided by applications common to the urban environment. How?

Well, we must identify applications within the urban environment that are agriculturally related. Next, identify the content and concepts (often science-based) that govern, control and/or explain the application. Finally, design instructional activities and teach the content and the concepts. In our design of instruction we should remember to emphasize the science and mathematics content and concepts. We should also remember that science is more than content . . . it is also a process. Instruction to enhance science and mathematics must emphasize observing, thinking, analyzing, experimenting, and validating. This represents the "method of knowing" called science. Only through the marriage of content, concept and process will our students truly understand the way things work. This process of science is research (guided inquiry and experimentation).

For the purpose of example, let's select microirrigation design as an urban application (materials and equipment to teach this application are readily available and relatively inexpensive). All irrigation requires a knowledge of soil - water - plant relationships (interactions), fluid flow characteristics, hydraulics concepts (pressure/volume), and basic irrigation plumbing and materials. If we want to automatically control the scheduling of the irrigation, we get into sensors and electronic control systems (these items are not usually inexpensive, but industry may assist by donating discontinued models).

Within the application of microirrigation design and in-



BY PHIL BURIAK

(Dr. Buriak is Associate Professor, Department of Agricultural Engineering, University of Illinois, Urbana.)

stallation, I'll expand the soil - water - plant - relationships area.

Optimum plant growth requires that moisture levels in the root zone be kept near capacity. Water moves from the soil solution to the cells of the plant. The plant moves the water and nutrients upward through the xylem to the leaves, where it is released into the atmosphere through a process called transpiration.

Water is also lost to the atmosphere through evaporation from the soil itself. Well-designed microirrigation systems must replenish the water lost by evaporation and transpiration; therefore, the rates of evaporation and transpiration must be quantified. The purpose of this series of experiments is to determine what environmental factors effect the evaporation and transpiration losses and to quantify these losses for inputs into the design of microirrigation systems. Example experiments include:

- Measurement of daily soil evaporation losses.
- Effect of temperature on soil evaporation losses.
- Effect of humidity on soil evaporation losses.
- Effect of soil type on soil evaporation losses.
- Effect of soil organic matter on soil evaporation losses.
- Measurement of transpiration rates.
- Effect of air movement on transpiration rates.
- Effect of temperature on transpiration rates.
- Effect of light intensity on transpiration rates.
- Effect of leaf area on transpiration rates.
- Effect of plant type on transpiration rates.
- Effect of humidity on transpiration rates.

A microirrigation system is a transportation system delivering water to a plant in or near the root zone. The soil is the bridge between the irrigation system and the plant. The soil's physical properties determine its ability to store water and nutrients; therefore, an understanding of soil - water relationships is fundamental to the irrigation designer.

The purpose of this series of experiments is to identify the physical properties of soils and to determine how these properties impact soil - water relationships as applied to the design of microirrigation systems. Again the science content and the scientific process are emphasized.

Measurement of soil textures.

Effect of soil texture on water movement.

Effect of soil texture on water holding capacity.

Measurement of bulk density.

Measurement of porosity.

Measurement of infiltration rates.

Effect of texture, density and porosity on infiltration rates.

Measurement of water holding capacity/field capacity.

Effect of soil properties on wetting patterns of drip emitters.

Effect of soil properties on water application rates and wetting patterns.

Experimental determination of wetting pattern.

Number, type, and spacing of emitters as a function of soil properties.

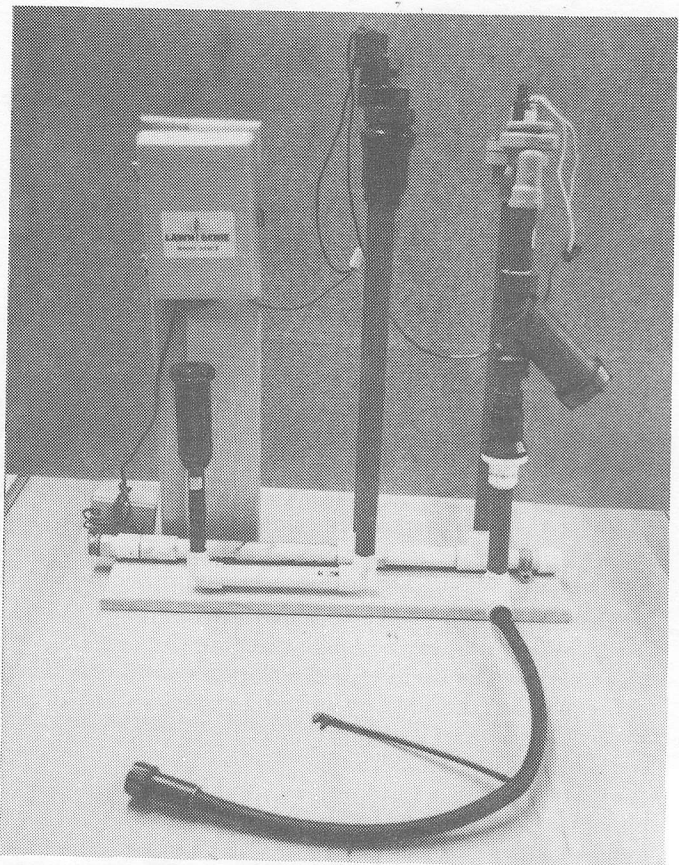
The example experiments listed may not fit the traditional perception of agricultural mechanics. I'm certain that if I had developed the other areas I have listed under the applica-



While not the latest equipment for microirrigation equipment, many discontinued pieces of equipment are happily donated by manufacturers for use in the urban agricultural mechanics curriculum. (Photo by Dr. Davis Cox, University of Arizona)

tion microirrigation, i.e., fluid flow and hydraulics, plumbing, sensors and controls, they would be more in line with most instructors' perceptions. I chose not to develop these traditional areas to emphasize a point. When attempting to teach an application-based curriculum, urban or otherwise, I feel it is best to weaken the separation between science, agriculture, mechanics, and any other area. Allow the application to drive the instruction rather than some arbitrary division of content. It makes sense to me.

The urban environment is rich with many and varied agricultural applications that can guide our instruction of agriculture and science. We simply have to expand our context and our sources of information. When planning your next unit of instruction, look to the urban environment. You won't be disappointed.



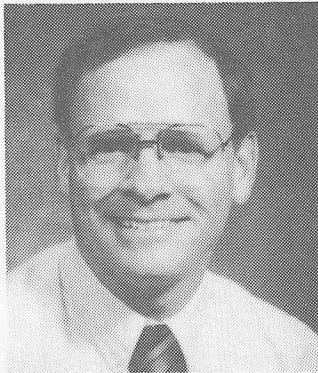
Models of drip/sprinkle irrigation systems are easily constructed with donated components. (Photo by Dr. David Cox, University of Arizona)

TEACHING TIPS

Winning Ideas!

The following articles were selected as winners in the NVATA Exchange of Ideas Contest. Perhaps the ideas will prove useful and will encourage others to share their ideas in the annual Exchange of Ideas Contest.

Crops Use Display and Contest



Bill Jimmerson
Agriculture Teacher
Conrad High School
Conrad, Montana

I have always felt that teaching crop production has two main problems. First, as a teacher, it has always been difficult to keep the study of crop production exciting and interesting, especially to the non-production oriented student. Second, there are many livestock contests which keep students interested in that area, but there have not been many contests related to crop production that offer similar "hands-on" activities.

I have found a way to make teaching and learning crop production more exciting. I developed a crop use display and expanded the idea by offering contests. The display shows the students which products are produced from the crops we discuss. I limit my display to crops grown in Montana. For example, a loaf of bread is displayed with a sample of hard red wheat and a short story giving facts regarding the production of the wheat. Other products are crackers (white wheat), spaghetti (durum wheat), safflower oil (safflower), linseed oil (flax) and beer (barley). The display allows me to include crop products as part of my crop production unit plan. Student interest has improved, as well as students' comprehension of crop production principles. To prepare the display, collect samples of crop seed from your state or area (Kerr jars work well), purchase the product or products made from the crop, and build a display board to match the crop and product.

I also developed a crop use contest which related directly to the display. The contest consists of crop products matched to the crop used to produce them. A multiple-choice format is used, showing four seed samples in each Riker mount (labeled A to D). The students select the crop that produced the product shown. To set up the contest, three steps are necessary: 1) collect crop products from your state or area, 2) prepare a collection of four seed samples in a



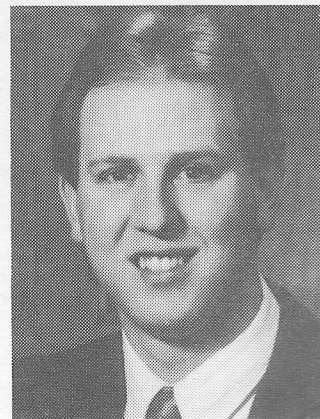
BY EDWARD W. OSBORNE,
SPECIAL EDITOR

(Dr. Osborne is Associate Professor and Chair, Department of Agricultural Education, University of Illinois, Urbana-Champaign.)

Riker or similar mount, and 3) write a question regarding the product such as, "What crop produced this product?"

The display makes an attractive addition to the agriculture classroom and allows students to study the information at all times. The contest is easy to administer and has been integrated into all of the livestock contests in our area. Our state agronomy contest has been completely revamped using this concept instead of the emphasis on traditional plant and seed identification. The display was selected to represent Montana crop products at the Disneyland State Fair. Other agricultural groups have borrowed it to display at their meetings because of its educational value.

Classroom Silos



Jerry Wendt
Agriculture Teacher
Kiel High School
Kiel, Wisconsin

Five years ago I was frustrated trying to explain how silage fermented and how to ensure proper preservation. After some thought, I came up with a method to demonstrate silage fermentation in the classroom by using containers to make miniature silos. The short unit is now one of the most exciting units for the students, and they have fun doing it. It is simple enough that students can do it, or the teacher can put it together in a very short period.

The first step is to secure several clear glass jars with strong lids which you can screw on to make them air-tight

(Continued on page 19)

Teachers Making a Difference: Miller and McNutt - A Case Study

Robesonia is a serene community nestled in a limestone valley in Southeastern Pennsylvania. The rural/urban interface has quietly evolved over the past 20 years. Slowly farms have been replaced by urban development and light manufacturing. In a similar way, the type of students entering the Conrad Weiser agricultural program have changed. At one time, most students in the program were from farms and were interested in learning all they could about production agriculture. Over the years the situation began to change. Don McNutt and Steve Miller, who have been teaching for 16 and 18 years, respectively, began to see fewer and fewer students entering their program.

It was about this same time that the academic ability of students entering the program began to decline. The traditional production agriculture students with high GPAs were opting for a college track program. The double periods in agriculture, which were mandated by state regulations, did not seem to fit the students' academic aspirations. Additionally, in 1988 Pennsylvania increased the number of science, mathematics, and computer literacy courses needed to graduate, thereby further compounding scheduling problems. The lack of flexibility in scheduling agriculture classes, increased academic requirements, and demographic changes in the community were slowly eroding the program.

The teachers were not happy with the direction of the program and knew something had to be done. At this time, McNutt was serving as the adult/young farmer instructor, and noted that along with the decline in the farm population, a corresponding decline in the adult program was occurring.

More importantly, the superintendent knew that something had to be done. In March of 1988, he initiated discussions with the teachers regarding the low numbers of students in the program. Then, in October of 1988, McNutt and Miller obtained a copy of UNDERSTANDING AGRICULTURE (National Academy of Science Report, 1988) and shared a copy with the administration. The teachers discussed several revitalization options with the young/adult farmer and day school advisory councils and administration.

The Change

The teachers embraced the spirit of the National Academy report and initiated dramatic changes in the curriculum. They decided to teach in and about agriculture "as it is too important to teach to only a few students." The objectives of their program were to:

1. expose all eighth grade Conrad Wiser students to the vast world of agriculture through a 9-week introductory agricultural science and technology course.
2. provide challenging science courses (biotechnology) as an elective to meet the science graduation requirement.
3. develop a linkage between high school and postsec-



By THOMAS H. BRUENING AND TRACY HOOVER

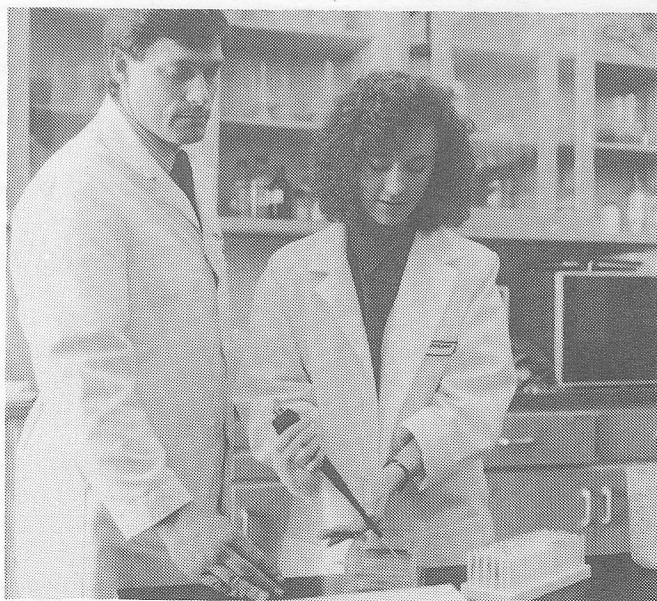
(Dr. Bruening is Assistant Professor and Dr. Hoover is Assistant Professor, Department of Agricultural and Extension Education, The Pennsylvania State University.)

dary institutions through articulation programs and advanced placement courses.

4. create a positive career outlook for all students within agriculture, thus, reducing the "brain drain" away from the agriculture program.

The Curriculum

The instructors always had a sincere interest in teaching the science of agriculture at a more challenging level. However, they knew that many of their traditional agriculture students could not handle the advanced material. They also decided that they would develop a course that would expose all students in the district to the vast diversity of agriculture. Therefore, they designed an eighth grade course



Don McNutt is supervising Michelle Troutman as she works on an electrophoresis experiment. (Photo by Thomas H. Bruening)

that would teach students the value agriculture has to students in Berks County, Pennsylvania, and the value of agriculture to the state, the nation, and globally. High student interest has been developed and maintained through a small animal adoption center, which is used to teach nutrition, management, and reproduction.

The curriculum does not sound significantly different from courses offered elsewhere. The program consists of a cadre of courses found in many agricultural programs: agricultural science, agricultural mechanics, horticulture, supervised agricultural experience, independent study, biotechnology, and cooperative education. However, the substantive nature of the subject matter is much different. For example, students in Agricultural Science 11 & 12 are learning food science principles and concepts. The text for the course is *Food Science* (1986) by Norman N. Potter. This is the same text that students at The Pennsylvania State University use in *Food Science 200*, a sophomore level course.

Students at Conrad Weiser are learning how the formulas that they learn in chemistry classes apply to the science of agriculture. Along with the advanced curriculum, the teachers are integrating specialized teaching techniques to further enhance learning. For example, a special project using experiential learning techniques requires students to select a food science topic of their choice for further study. Miller guides the student to select an appropriate topic and then the students complete an in-depth analysis of that topic. For example, students are required to read scientific and trade journals such as *APPLIED AND ENVIRONMENTAL MICROBIOLOGY* or *PREPARED FOODS*.

Sometimes students will call the author of a journal article to learn more about a topic or to get additional explanations regarding key details needed to complete an experiment. Students have been surprised at the willingness of researchers at distant universities such as Texas A & M and Washington State to share their knowledge and expertise. This in-depth research report also provides students with post-secondary opportunities and contacts.

For example, Michelle Troutman, a junior recently completed her research report on *Esters and Their Role in Food Processing*. Based on her interest in this area, she has discussed the topic with Dr. Stephanie Doores, a Penn State Food Scientist, about entering the food science degree program at the University. Michelle credits her high school agriculture teachers for providing the opportunity to discover her career interest early. This opportunity has opened doors for her to apply for scholarships in agriculture that she and her peers in other academic classes did not know existed.

To complement the demand for academic excellence in the classroom, Miller and McNutt have utilized experiential learning activities to apply science theories and practices. The teachers have found that experiential learning opportunities abound in the agri-science community. Formalized learning experience programs are also established for the students. For example, a trip is planned to Beltsville Agricultural Experiment Station this year to give students the experience of working with a scientist. Cooperation from the scientific community has been phenomenal. "The scientists are eager because they see the number of students interested in agriculture diminishing over time. Our overall plan was to improve the quality and quantity of instruction in agriculture — it seems to be working," Miller shared.



Michelle Troutman is holding the ester model and material she developed in the agricultural food science laboratory as part of her experiential learning activity. (Photo by Thomas H. Bruening)

McNutt is working hard to integrate biotechnology into the classroom and laboratory. Last year, he attended the Biotechnology Conference in St. Louis, which was sponsored by Monsanto. His office library is stacked with the most recent biotechnology texts and videotapes. The curriculum offers more than just textual information. Frequently, detailed experiments are conducted in the laboratory using tissue cultures and electrophoresis as a basis for experiments. These high level experiments require the teachers to maintain a current knowledge base regarding subject matter needed to teach the advanced courses and labs.

The school administration played a major role in the development of this program. Over the last two years more than \$50,000 has been invested in the program. A laminar-flow hood, a cool-light microscope, and all of the equipment needed to complete experiments with electrophoresis (DNA mapping) are in place to help the instructors teach the new curriculum. While this represents a significant financial investment for the district, the expenditures were necessary to teach advanced courses such as biotechnology and food science.

The teachers had to devote time and energy learning new curriculum. Professional development activities included specific subject matter courses/conferences and independent study courses which allowed for program improvement and restructuring. New curriculum materials were also needed to support the curriculum changes and to direct students through high-level scientific experiments. Miller and McNutt had to familiarize themselves with a new language. Additionally, they needed to be able to communicate this language to their students. For example, step two of an experiment directs the student to ". . . measure out 1.0 ml sodium dodecyl sulfate (SDS) with a pipet and add it to the *E. coli* suspension . . . You may notice that the suspension become more viscous as the bacteria are lysed."

The curriculum is not all glitz and high-tech experiments. McNutt and Miller have also added a summer school component to the agricultural curriculum. Last summer, over 40 students came to school voluntarily to participate in two, week-long seminars. One seminar dealt with agriculture's

effect on the environment. Students toured the county with professionals from the Soil Conservation Service to learn the environmental impact of agriculture and urban practices on the land.

Other summer school students spent time learning how to weld. Even though welding is taught during the year, some students are not able to schedule the course. The welding seminar allowed time for individualized attention and work on special projects not permitted during the regular school year because of time constraints.

Epilogue

Change does not come easily or without costs. The adult/young farmer program at Conrad Weiser was dropped with the endorsement of the young/adult farmer and day school advisory boards. McNutt was the teacher in charge of the program and now he has full-time responsibilities teaching day school students.

The teachers report that some individuals who were not familiar with what is being taught have been critical of the program because it is perceived to be non-agricultural. However, Miller and McNutt contend that they are teaching more agriculture now than they were five years ago. They enjoy the challenge of integrating and blending more academic-oriented agricultural subject matter with practical/applied science technology. They feel that they are addressing the educational needs of all individuals employed in agriculture, as well as students simply interested in agriculture.

According to Miller, "We must try to reach the 18% of the people employed in agricultural occupations versus just the 2% who are involved in production. The 'non-farm' students in the program do not resist production examples. They are very interested in production schedules, so that they can relate this information to diseases, pesticides, and food processing as they investigate research topics, apply scientific principles, and/or pursue career opportunities. However, these students are more interested in the 'concepts' of agriculture and not as interested in the 'how to' that we formally taught."

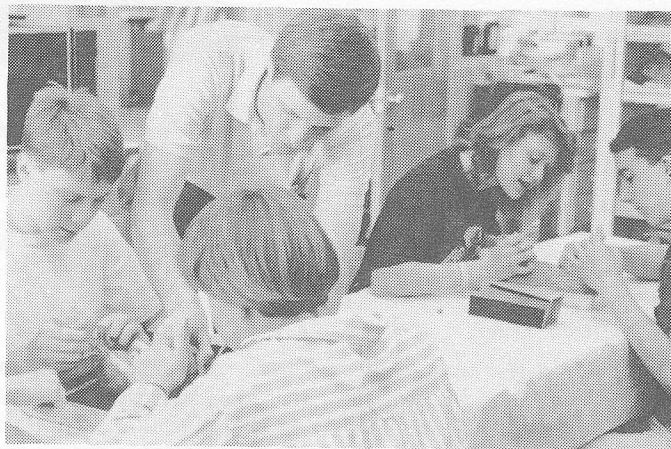
Teaching Tips — Winning Ideas!

(Continued from page 16)

(i.e., peanut butter jars, mayonnaise jars, etc.). Students usually can bring these to class. Second, get 10-12 bread wrappers (clear plastic) from a local bakery. Third, collect forages to preserve (i.e., corn silage, haylage, pealage, etc.). I found that getting fresh cut, and already preserved samples is best. This provides an opportunity to show steps toward preservation and how preserved crops can spoil if incorrectly stored or if the storage facility is damaged. Optional materials are silage preservatives, water, salt, or forage additives on the market. Students can also bring these items to class.

From here there are several ways to proceed with the variety and amount of silos; pack the forage as tight as possible into the jars to get best results. I suggest some of the following examples:

One silo — good silage, stored in a non-sealed container. Results — poor silage after 2-3 weeks. Students will see mold and spoilage occurring on a daily basis.



Steve Miller is showing the students how to complete an anatomy lab using a pig fetus. (Photo by Thomas H. Bruening)

The Conrad Weiser academic students are also involved with FFA activities. Students like Michelle Troutman, who has excelled in state FFA speaking contests, would not have considered entering a production-based agriculture program. However, the leadership component of the FFA, coupled with the agri-science emphasis, attracted her into the program.

This year 196 students are enrolled in the Conrad Weiser program and are learning a variety of concepts "in" and "about" agriculture.

References

- APPLIED AND ENVIRONMENTAL MICROBIOLOGY, American Society for Microbiology, 1325 Massachusetts Ave., N.W., Washington, DC 20005.
- National Committee on Agricultural Education in Secondary Schools (1986). UNDERSTANDING AGRICULTURE: NEW DIRECTIONS FOR EDUCATION, Washington, DC: National Academy Press Board on Agriculture: National Research Council.
- PREPARED FOODS: THE MAGAZINE FOR PACKAGED FOODS, Gorman Publication, 8570 West Bryn Ave., Chicago, IL.
- Pottern, N.D. (1986). FOOD SCIENCE. 4th ed. AVI Publishing Comp., Inc., Westport, CT.

- One silo — new cut forage packed tightly and sealed (i.e., Harvestore silo). Result — good silage.
- One silo — new cut forage, moisture added. Result — spoiled silage.
- One silo — new cut forage, left out overnight then put in a jar. Result — doesn't make silage even after tight packing due to lack of moisture.
- One silo — pack forage tight (3/4 full) in one plastic bag, then put layer after layer of clear plastic to seal up. Replicates a bag silo.

Other variations can be added, such as adding other ingredients or puncturing a container to show how silage spoils. Students look forward to seeing the progress. Changes include color, odor, and quality. After 2-3 months or even weeks open each and discuss what caused either good or poor silage. This can be applied to actual harvest and storage problems that occur on farms.

Some additional variations are using short/long cut forage at different stages of maturity or temperature when stored. Also, forage samples can be taken from a silo where they

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HISTORICAL REVIEW

October, 1941 & 1966

October 1941

"The last war was decided by food shortage, apart from the aid supplied by America" was the quotation used by D.B. Johnstone-Wallace (Cornell University) to begin an article on agriculture and World War II. He noted that military experts recognized that military victory typically went to the nation with the highest morale.

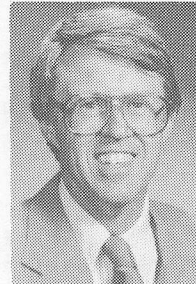
Johnstone-Wallace reported that the United States had 15.8 acres of land per person while England had 0.8 acres and clearly needed help from American agriculture. Germany and Italy had 1.8 acres and 1.9 acres, respectively. He concluded the article with "Agriculture is destined to play an extremely important part in the conflict now raging and may well determine the future of democratic government in this country and throughout the world. In such a grave emergency no one should be content merely to remain an idle spectator."

In an article entitled, "Teaching Boys to Beautify Farm Homes" M.C. Gaar (Teacher Education, West Virginia University) emphasized the importance of teaching about home beautification. He suggested teaching about a community survey to determine needs. He also suggested teaching about jobs such as mapping the home grounds; making and maintaining the lawn; providing planting of tree shrubs, flowers, and vines, and hedges, growing plant materials, making out-buildings attractive; and making a rock garden.

R.W. Canada (Supervising Teacher in Agriculture, Crete, Nebraska) wrote about the use of supervised practice in productive enterprises for young-farmers classes. The young-farmer program was started by having high school students identify potential enrollees. The potential students were visited during the summer with a total of 27 enrolling in the fall.

The instructional program centered about poultry production. The problems growing out of the poultry enterprise formed the nucleus of classroom instruction and resulted in motivated students asking a lot of questions and seeking information. Shop instruction for this group of young farmers centered around poultry equipment and appliances such as feeders, automatic washers, and light reflectors.

Other articles in this issue included "The National Evaluation Project" by F.W. Lathrop, "FFA Leadership Training in the Curriculum" by L.R. Humphreys, "What a Mother Thinks of the FFA" by Mrs. James Lurtey, "An Exchange in the Paradise of the Pacific" by D.E. Womer, "Measuring Efficiency in Conducting Farm-Practice Program" by R.O. Robinson, and "Getting at Leadership Training from All Angles" by Marshall L. Gefke.



BY JOHN HILLISON, SPECIAL EDITOR

(Dr. Hillison is Professor and Program Area Leader, Agricultural Education, Virginia Polytechnic Institute and State University.)

October 1966

With a theme topic on adult education, editor Cayce Scarborough wrote an editorial with the title "What Adult Education for Whom?" The editorial raised such questions as "Now that we are entering a new era of "Agriculture Is More Than Farming," will we do any better by adult education? Will adult education receive higher priority on the teacher's time than in past years?"

Scarborough went on to note three givens with reference to adult education. One given was the extent to which post-secondary institutions were rapidly developing and including adult education as part of their program. A second given was the extent to which larger high schools will see the importance of adult education. The third given (possibly the most important) was the ability of the teacher to become a modern adult education leader.

Harry E. Frank (instructor, agricultural education, Oklahoma State University) writes about the "New Look in Vocational Agriculture What Could Be Offered the Adult Student." He quoted Jack R. Gibb from the book *HANDBOOK OF ADULT EDUCATION IN THE UNITED STATES* with such points as "Learning for adults must be experimental and problem centered with meaningful experiences that the learner is free to examine. The goals must be set and the search organized and initiated by the learner who must then have feedback about progress toward goal accomplishment." Frank went on to point out what local departments can offer (1) Programs based on local needs, (2) Opportunity for participation in planning and conducting educational activities, (3) Close acquaintance with participants, and (4) Attention to individual problems.

Gerald Fuller (Assistant Professor, Agricultural Education, University of Illinois) reported on a suggested post-high school agricultural supply curriculum. He encouraged use of such basic courses as biology, botany, physics, and chemistry as applied to agriculture. Fuller further suggested a series of core courses for all students that included such content as basic agricultural communications, livestock production science, agricultural business operations, and plant

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INTERNATIONAL AGRICULTURE

Student Awareness of International Agriculture

Within recent years, agricultural educators have become increasingly aware of the necessity to view the profession from a global perspective. Teachers are beginning to perceive themselves and their students as a part of the world community. International dependence on agricultural products and technical expertise, satellites, television, jet travel, employment opportunities abroad, the Work Experience Abroad program, and the importance of international export markets have all served to create a better understanding of the globe beyond the boundaries of states and the nation.

The global dimension of agricultural education has evolved from only teaching prospective teachers those pedagogical skills needed to plan, teach, and evaluate high school agriculture programs to include a thrust in international education (Welton, 1987). A review of the history of the development of teacher education in agriculture reveals no formal reference to international education until the early 1970s. At that time, future responsibilities of the agriculture teacher were examined. In the document *AGRICULTURAL EDUCATION FOR THE SEVENTIES AND BEYOND* (1971), dealing with international education was identified as an emerging responsibility.

In the decade since agricultural education moved onto the global stage, a number of noteworthy events have occurred (Welton, 1987). In 1979, a nation-wide assessment of teacher education activities in international agriculture was conducted by Thuemmel and Welton (1983). This study was conducted on behalf of the American Association of Agricultural Educators and served as the basis for Chapter 15 in *TEACHER EDUCATION IN AGRICULTURE*. The AAE modified its purposes to include the promotion of international agricultural education as a basic function of international agricultural development. The Association of International Agricultural and Extension Education was established in 1984 to provide a professional association and network of agricultural educators and extension personnel concerned with the advancement of agricultural education programs in developing countries.

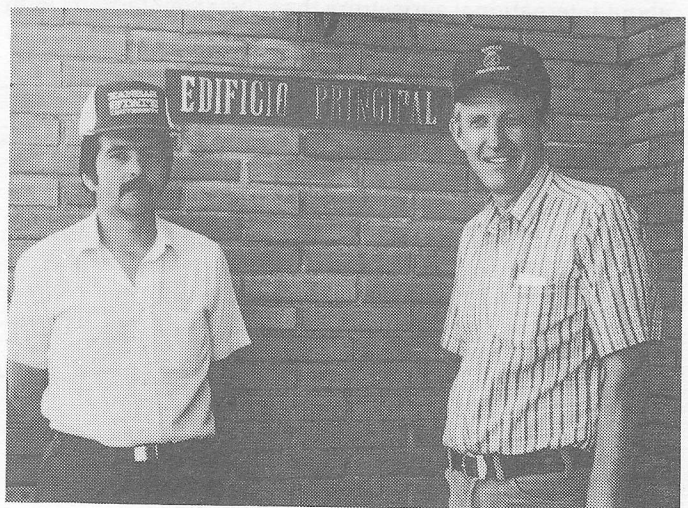
During the latter part of the past decade, a number of activities emerged to help make international agriculture instruction become a reality in the secondary classroom. Most notable among these efforts was the project of the Council for Vocational and Technical Education in Agriculture to infuse international agriculture into the curriculum. This project involved the visitation of state teams to Japan and the development of instructional materials and in-service education.



BY RICHARD F. WELTON AND STEVEN R. HARBSTREIT

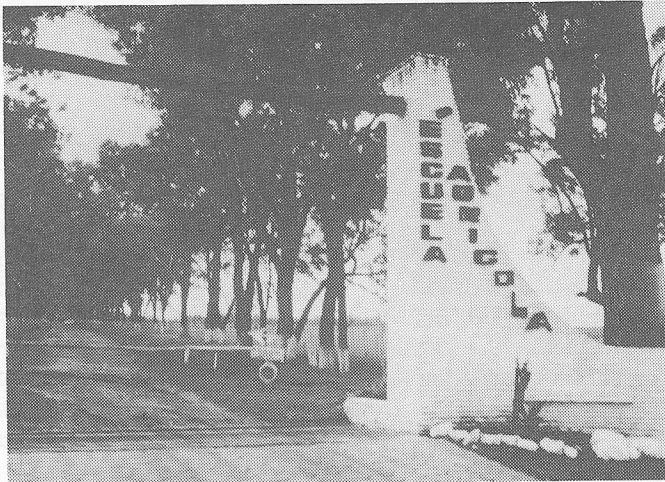
(Dr. Welton is Professor and Dr. Harbstreit is Assistant Professor, College of Education, Kansas State University.)

Other projects (Moss, 1988) included the expansion of international programs by the National FFA Organization, a joint project between Michigan State University and North Carolina Agricultural and Technical State University to internationalize programs, the development of international topics by the Instructional Materials Service at Texas A & M University, and the development of an international course at Anderson Valley High School at Boonville, California. These activities and other events have served to bring a new meaning and emphasis to international education.



The principal of the Agricultural Mechanization Center at Pirapo, Paraguay (on left) administers a three-year program for high school students. The final six months of the training consists of practical mechanics experience with farmers in the region.

As the profession has advanced ideas and projects to internationalize the secondary curriculum, an assumption has been made that students in these programs lacked knowledge about the world and international agriculture. In Kansas, a study of high school agriculture students was carried out during 1989-90 to determine if this proposition was accurate. The purpose of the study was to assess student awareness of international agricultural concepts and to see if any kind of relationships existed between these concepts and selected students' characteristics (gender, year in school, academic performance, FFA membership, semester enrolled in agriculture, and semesters of supervised experience).



Traditional gateways are a feature of agricultural high schools in Paraguay.

A questionnaire consisting of 50 items was completed by 1,008 high school agriculture students in 35 schools. The accompanying table shows the average scores received by students participating in the study in the four international agriculture concept categories and an overall score. This information indicates that secondary agriculture students in Kansas do indeed lack knowledge about the world and international agriculture. Other findings from the study indicate that: a) students with higher grades possess more knowledge about international agriculture than their counterparts with lower self-reported grades; b) student awareness about inter-

national agriculture increases with advancement to the next high school class; and c) the longer a student is a part of an agriculture program and involved with supervised experience, awareness about international agriculture increases.

Table 1
Average Scores for Categories of International Agriculture Awareness Questionnaire

Categories	Average Score	Percent Correct
Agricultural products ^a	6.1	32
Agricultural policy ^b	4.5	38
Geography ^c	4.6	38
People and cultures ^d	2.5	36
Total ^e	17.8	37

^acontained 19 items

^bcontained 12 items

^ccontained 12 items

^dcontained 7 items

^econtained 50 items

Agriculture teachers who are interested in preparing their students for the multiplicity of opportunities in agriculture need to include international agriculture in their teaching. Teachers should be alert to ideas from across the country on how they can infuse international agriculture concepts into their program. Students with a better appreciation and understanding of the global dimensions of agriculture will be able to take advantage of career opportunities and be better citizens of the world community.

References

- AGRICULTURAL EDUCATION FOR THE SEVENTIES AND BEYOND. (1971). Washington, DC: American Vocational Association.
- Moss, J. (December, 1988). A REVIEW OF ACTIVITIES IN INTERNATIONALIZING THE CURRICULUM IN AGRICULTURAL EDUCATION. Paper presented at AATEA meeting, St. Louis, Mo.
- Thuemmel, W.L. & Welton, R. (1983). Teacher education in international agriculture: A national assessment. *AATEA JOURNAL*, 24 (3), 40-52.
- Welton, R. (1987). Undergraduate and graduate programs: The need for an expanded international dimension. *THE AGRICULTURAL EDUCATION MAGAZINE*, 59 (9), 6-8.

Teaching Tips — Winning Ideas!

(Continued from page 19)

were stored on the farm, and from school when stored in various containers. They can be sent to a lab, and results can be compared with each storage facility. In 1990, the results that we had from the silos nearly matched textbook values for haylage!

This unit can lead directly into units on feeding requirements for cattle, feeding values, and/or balancing rations. The quality of feed and storage is critical to a successful operation, and this unit does an outstanding job of showing firsthand effects of good storage, proper crop moisture, and many other variations.

Historical Review

(Continued from page 20)

health. He also suggested an animal science and a plant science specialization.

Names in the news included: Harold Anderson returned to Colorado, to fill the position of Paul Foster, after com-

pleting his Ph.D. at Ohio State, Alan Kahler joined the Agricultural Education Department at the University of Nebraska, John Coster was appointed Director of the Center for Occupational Education at North Carolina State University, and James Horner was promoted from Associate Professor to Professor at the University of Nebraska.

Agricultural Mechanics:

A Vanishing Curriculum

(Continued from page 4)

This issue of the Agricultural Education Magazine is intended to help focus on applications of agricultural

mechanics to the urban setting. It is critical we remember that agricultural mechanics reaches across the entire agricultural education curriculum to all of the present and emerging areas. It is also important to emphasize the scientific base of agricultural mechanics and leave behind the "tink-tink, keep 'em busy," image of agricultural mechanics.

Agricultural Mechanization Miscellaneous Ramblings and Lesser Thoughts

(Continued from page 5)

This is true for teachers as well. Those who succeed are those who are the best prepared.

There is a saying I recently heard which was referred to as the Mountain Climbers Creed, "Don't let go of something old, unless you have a firm grip on something new." This

seems to have particular significance at the present time as we are looking for new ideas and practices.

Probably my favorite saying of all, "It's not over, until it's over." This statement has characterized as a "Yogism" from the former catcher of the New York Yankees, Yogi Berra. He is also credited with "It's *deja vu*, all over again." Which sounds a lot like strategic planning. Each of us in Agricultural Education should take note of the first Yogism, and I would add the following, "But, when it is over, it is really over." Therefore, I guess this column is really over, because it is over.

Computer Viruses — They Are No Joke!

(Continued from page 8)

of computer virus protection programs available for most makes of computers. Anti-viral products can be used both as a preventative measure, as well as a post-infection prescription.

Next month we will discuss some of the "family types" that exist in the world of computer viruses, as well as discuss some of their unique irritating and/or destructive effects. We will also examine some specific virus protection programs that are on the market. If you are a "single operator"

computer user who never uses anyone else's disks or files, and who never connects to another computer via a network or modem, then you are probably fairly safe from contracting a computer virus. If you violate any one of these conditions, then you had better take computer viruses very seriously. Their terminology is made from puns, but their effects are no laughing matter.

References

- Gillespie, J. (1981) MODERN LIVESTOCK AND POULTRY PRODUCTION. Albany, NY: Delmar Publishers. pp. 290-291.
- McAfee, J. and Haynes, C. (1989) COMPUTER VIRUSES, WORMS, DATA DIDDERS, KILLER PROGRAMS, AND OTHER THREATS TO YOUR SYSTEM. New York, NY: St. Martin's Press.

Agriscience Good For Students or Just a Charade

(Continued from page 12)

2. Let's help those teachers needing and desiring help in implementing an agriscience curriculum through new curriculum materials and inservice education programs.

3. Let's make our agriscience curriculum mathematics based. Doing anything less will weaken the curriculum and not be in the best interests of our students. Implementing

these ideas will surely lead to an agriscience curriculum that is a benefit to the school, the community, and most of all the students. This is what agriscience is and should be about rather than a charade for media purposes.

References

- Buriak, P. (1989, March). Incorporating agriscience into agricultural mechanics. THE AGRICULTURAL EDUCATION MAGAZINE, pp. 18 & 22.
- National Research Council. (1988). UNDERSTANDING AGRICULTURE: NEW DIRECTIONS FOR EDUCATION. Washington, D.C.: National Academy of Sciences, National Academy Press.
- Staff. (1990, October). Lathes. WOOD MAGAZINE, pp. 70-73.

Stories in Pictures



Urban Agricultural Mechanics includes applying the scientific principles of agricultural mechanics to equipment used in the urban agricultural setting. (Photo by Dr. Glen Miller, University of Arizona)



Small gasoline engines are extensively used in urban agriculture. (Photo by Dr. Glen Miller, University of Arizona)