Loneliness—the plague of our times

see page 5
A Message from the Vice Chancellor

students for careers as vo-ag teachers, as well as for other fields such as agricultural extension work. Dr. Osmund Gilbertson, department chairman, indicates that there has been a shortage of qualified vo-ag teachers for the past 25 years or more.

Courses in vocational agriculture, designed to prepare young men and women for careers in agriculture or agriculture-related fields, were established under the National Vocational Education Act of 1917.

Since then, the number of programs offered have increased significantly. Last year, 138 of Nebraska's high schools offered vo-ag programs, an increase of 24 over the last 10 years. Four more have been authorized to begin this year, but as of this writing, teachers have not been found for the new programs.

Vocational agriculture programs, too, were once thought rural in nature, but in recent years programs (and FFA chapters) have been established in Nebraska's larger cities.

FFA is a national organization of, by and for students enrolled in vo-ag programs. It was established in 1928, and Nebraska was one of the seven states to be chartered that year.

Vocational agriculture, FFA, and 4-H are all vital to meet the needs of our state and our citizens.

M.A. Massengale

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On the cover:

"A person is lonely only if he thinks of himself as lonely." Using this definition of loneliness, researchers set about finding how various groups of people perceived themselves. Rural high school students, college freshmen, divorced persons, AFDC single mothers, never-married persons, homemakers and the elderly were studied. (Cover by Eloise Wilson)
It takes many years of planning and hard work to produce the lovely Christmas tree which will be in your home this holiday season.

BEHIND the BRANCHES

By Donald E. Janssen and Donald H. Steinegger

The Christmas holidays are fast approaching. Most of us probably are thinking—at least a little—about the upcoming season, but it always seems to arrive before we’re ready.

One Christmas tradition you may be thinking about is the selection of the Christmas tree. When the time comes, not just any Christmas tree will do; you will want the best tree you can find. When you find it, decorate it and set it up for the holidays, you might want to give a thought to the years of work and care it took to grow and develop your tree.

Most Christmas trees today are grown on Christmas tree farms or plantations. Very few are cut from wild stands. Forty years ago, only one tree in 10 sold in Nebraska was plantation grown. Today nearly 9 out of 10 are plantation grown. About 10 per cent of all Christmas trees sold in Nebraska are grown in the state.

Each person has his or her own opinion on what makes a good Christmas tree, but there are several points you should look for. The tree should have a single, straight stem. The crown or top of the tree should be dense to moderately dense. Crown density refers to the compactness and amount of foliage on

(Continued on next page)
Trees . . .

The crown should be symmetrical and have a conical shape.

The tree's base should be long enough to mount the tree in a holder and the tree should be fresh, healthy, and clean. “Fresh” needles are pliable and firmly attached. A “clean” tree is free of undesirable foreign materials. Last, but not least, the tree should hold its needles throughout the Christmas season.

Several species of evergreens are used for Christmas trees. Most popular in the midwest is the Scotch pine. This pine has medium-length needles and it adapts well to Christmas tree production.

Long-needled pines such as the Austrian pine and ponderosa pine also are popular. These pines develop well as large trees and are in demand for holiday use in churches and businesses. The eastern white pine with its long, soft needles and fragrant aroma is becoming increasingly popular.

Douglas fir and concolor fir appeal to many Christmas tree customers. Their symmetrical dense crowns and green or silvery foliage color have given them reputations as the Cadillac of Christmas trees.

Spruces are also used for Christmas trees but the disadvantages of slow growth and poor needle retention after cutting have restricted their use.

Christmas trees are products of years of work. On the average, it takes seven years to bring that five-to seven-foot tree to its favored spot in your living room. Evergreen trees are not just planted in the spring and then harvested in the fall. Much more is involved.

A Christmas tree grower is at work every month of the year. In January and February he plans for the coming seven to 10 years, counts the replants he needs and orders the seedlings and other supplies he'll need for the spring planting. He also checks for rodent damage and cleans out brush. In March, he must prepare the planting site for the new trees, repair equipment and apply preemergent herbicides on his established trees.

Planting Time

April and early May is tree planting time. Depending on the weather and number of trees planted, this may take several days to complete.

During May, the grower will be on guard against insects such as the Nantucket Pine Tip Moth. This insect is very destructive to his trees if its population is large. Mowing and cultivating to control grass and weeds will continue throughout the summer. This also is the month to spray the trees with fungicides to control tip blight and needle blight diseases.

June marks the beginning of pruning and shearing. Depending on the number of trees to be sheared, this may require several days to several weeks to complete. Every tree from three to eight years old needs to be sheared. This is a job which should not be rushed because the quality of your Christmas tree depends on how it's sheared.

By the end of July, all shearing is completed in order to allow time for new buds to set for next year's growth. All mowing should be caught up.

During August, September and October the general maintenance of the plantation is continued and the grower is constantly checking for insect and disease problems. This is the time the grower makes his preliminary count of marketable trees. He orders his decorative supplies and other needed supplies for his retail sales.

In November, the grower measures and tags the marketable trees. He repairs and puts up his directional signs. By the end of the month he starts advertising.

In December, of course, he sells his Christmas trees. He may also be involved in making wreaths and greenery from below-standard trees. Only after all his salable trees are sold can the grower relax for the holiday season.

Whether the trees are sold at your corner grocery store, or directly from the growers' fields through a “choose-and-cut” marketing system, the yearly work schedule is the same. Christmas may be a once-a-year holiday to many of us, but to the Christmas tree grower it's a year-round occupation.

Donald E. Janssen is extension horticulture assistant. Donald H. Steinegger is extension horticulturist.
Loneliness is a central and inevitable theme in human existence. Several years ago when Billy Graham was asked what problem plagues more people than any other, he answered in a single word, “loneliness.” Loneliness has been called “the most devastating malady of the age.”

By John C. Woodward and Mary Jane Visser

This article reports one aspect of the findings for seven in-depth studies recently completed on loneliness. The major research explored loneliness throughout the various stages of life and the relationship of loneliness to certain factors. This article will report how loneliness is perceived by rural high school students, college freshmen, divorced persons, Aid to Families of Dependent Children (AFDC) single mothers, never-married persons, homemakers, and elderly persons, and the differences among these seven groups.

Although loneliness is universal, the subject is seldom talked about. People admit to being unhappy, discontent, bored, depressed, anxious, but rarely to being lonely. Behavioral science textbooks seldom list the subject in their indexes, much less devote space to discussing loneliness except by implication, using such terms as alienation, social isolation and anomie.

There is no attempt in this article to classify or categorize the type of loneliness an individual is experiencing. We use the definition of loneliness that a person is lonely only if he thinks of himself as lonely.

The data for the major project on (Continued on next page)
Lonely . . . 

Loneliness consisted of a sample of 1,614 participants.

A brief summary of the findings concerning the perceptions of loneliness for the various sub-groups is as follows:

1. Rural high school students had a significantly higher mean Loneliness Self-Rating Score (LSRS) than homemakers and the elderly, but were similar to college students, divorced persons, AFDC single mothers and never-married persons.

2. College freshmen had a significantly higher mean LSRS score than never-married persons, homemakers and the elderly, but were similar to AFDC single mothers, divorced persons and rural high school students.

3. Divorced persons had a significantly higher mean LSRS score than the housewives and the elderly but were similar to the never-married persons, AFDC single mothers, college students and rural high school students.

4. AFDC single mothers had a significantly higher mean score than homemakers and elderly but were similar to the other four groups.

5. Never-married persons had a significantly higher mean LSRS score than the elderly but had a significantly lower mean score than the college freshmen. They had a similar mean to the divorced persons, rural high school students, AFDC single mothers and homemakers.

6. The homemakers and elderly had significantly lower mean scores than all the groups except the never-married. Homemakers' scores were similar to never-married and elderly.

Elderly Not Loneliest

Perhaps the most striking result of the study was the apparent inconsistency between the differences actually found and those expected. The elderly were not the most lonely. There is still a common idea that most old people lead isolated lives weighed down by loneliness and ill health.

Elderly persons in this study were not as lonely as anticipated. This does not suggest that these elderly persons were not lonely; but that as a group, they saw themselves as less lonely than rural high school students, college freshmen, divorced persons, AFDC single mothers and never-married persons. Their perceptions of loneliness were similar to those expressed by the homemakers studied, because their LSRS scores were not significantly different.

Several factors may have contributed to the similarities between homemakers and elderly persons in loneliness scores (LSRS). The elderly had perhaps made a successful adjustment to their situations and feelings about life.

Perhaps the homemakers were also well adjusted to their role and found great satisfaction in it, whether it was a full time homemaker-mother or homemaker-mother-career combination. This is an extremely busy period in the lives of these women. There is probably little time and few reasons for loneliness.

We can only speculate why college freshmen saw themselves as more lonely than the other groups measured, and yet similar to divorced persons, rural high school students and AFDC single mothers.

During the college years, students are confronted with many uncertain questions about life. Many students are miles from the security of home and secure personal relationships. They are involved in making decisions about their future occupation, marital choice, philosophical concepts, goals and other important issues in their personal lives.

A similar re-evaluation of life and social change occurs for the divorced. A possible explanation for their loneliness is that loneliness occurs with social change. The divorced persons, having been forced into an adjustment in their social situations, could be experiencing feelings of rejection, alienation or loneliness or all.

Table 1. Mean loneliness scores for each group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural High School Students</td>
<td>2.65</td>
</tr>
<tr>
<td>College Students</td>
<td>2.79</td>
</tr>
<tr>
<td>Divorced persons</td>
<td>2.75</td>
</tr>
<tr>
<td>AFDC Single Mothers</td>
<td>2.73</td>
</tr>
<tr>
<td>Never-Married persons</td>
<td>2.46</td>
</tr>
<tr>
<td>Housewives</td>
<td>2.15</td>
</tr>
<tr>
<td>Elderly persons</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Perhaps another possibility is the sense of failure with which divorced persons are faced. They realize they have failed in their marriages and in their roles as husband or wife, especially in a society that still implies that divorce is bad or undesirable. This sense of failure could result in feelings of loneliness.

Perhaps it is the concept of “married is better” that our media-influenced society has emphasized for so long that provides a common ground for the similarities between the divorced and never-married persons. They are both outside the “ideal state of eternal bliss” called marriage. Although this may not necessarily be true, our society feels very strongly that in marriage a person will achieve fulfillment and will not be bothered with feelings of loneliness.

Alone, Poor

The AFDC single mother is not only alone in most cases with responsibilities for at least one child, but she also is poor. Her problems are similar to those of the divorced.

The rural high school student is faced with many decisions about the future. Many of these decisions are, by their very nature, lonely ones. Similar to the college freshmen, they too are concerned about their future occupations, whether to go to college, marital choices, philosophical concepts, goals and other important issues in their personal lives.

Loneliness then, continues to be a prevailing fact of life. The kind of loneliness, and the degree to which it was experienced by the subjects varied, but all rated themselves as lonely to some extent. And certainly, the reasons underlying the experienced loneliness of each individual are unique. The results obtained do suggest, however, that there are social factors which influence loneliness, whether in terms of role prescriptions, group attitude or the individual’s present stage in life’s cycle.
Sprayer Kills Weed Escapes And Recovers Your Herbicide

By D. R. Carlson and O. C. Burnside

In recent years, trends in farming have been towards larger fields, increased use of one-crop farming, less plowing and fall tillage, greater use of preplant or preemergence herbicides, and reduced cultivation of row crops.

Some hard-to-control perennial weeds have increased under these reduced tillage production systems. Their seedlings frequently survive and, once established as perennials, they are difficult to control. Some of these hard-to-control perennials which are increasing include common milkweed, hemp dogbane and johnsongrass. Tenacious annual weeds such as shattercane, sunflower and velvetleaf also are escaping established chemical and mechanical control procedures and are on the increase.

Large farms and limited supplies of farm labor have reduced the amount of hand weeding done. Thus, farmers are looking for a mechanized method to control the weed escapes that are increasing on Nebraska farms.

Control of these weeds involves the use of non-selective herbicides in growing crops because effective selective herbicides are not available. New application techniques designed to selectively treat these weed escapes without contacting the crop are therefore being studied.

This new technique requires a difference in the height of the crop and weeds so the herbicide can be applied only to the weeds. Any herbicide not intercepted by the weeds is collected and reused. Thus, the need to control weed escapes led to the development of a recirculating sprayer.

Many attempts have been made to develop a method of applying herbicides to weeds and not to the crop. Unfortunately most of these consist of manually treating each weed, (for instance the herbicide glove). This is an acceptable practice with small infestations of weeds, but applying herbicides to individual weeds by hand is impractical on today’s large farms with their limited labor.

Dr. C. G. McWhorter at the Southern Weed Science Laboratory in Stoneville, Mississippi, recently developed what is known as a recirculating sprayer (Figure 1). The applicator can spray weeds growing above the crop and at the same time collect and reuse the spray not intercepted by the weeds. This selective spraying procedure can be applied to any weed which is taller than the crop at some stage of growth.

The sprayer works by having nozzles which spray horizontally (Figure 2) rather than vertically, as with conventional sprayers. The sprayer covers four or more rows at a time with three or four spray nozzles directed above each row. These nozzles generally spray a flat stream with a spray angle of about 15 degrees, as opposed to a normal spray pattern of about 80 degrees.

The stream of herbicide, if not intercepted by a plant, is caught in a catch basin located on the side of the row opposite the nozzles. The herbicide solution is then pumped from the catch basin back into the spray tank, hence the name recirculating. The sprayer moves along over the row spraying the taller weeds but missing the shorter crop. Weeds need to be at least 10 inches (25.5 cm) taller than the crop for selective control.

Recent herbicide developments such as glyphosate (Roundup), plus new uses for established herbicides such as amitrole (Amitrole T), have stimulated renewed interest in chemical control of these weed escapes—especially our hard-to-kill perennial weeds. These are non-selective herbicides, which means

Table 1. Percentage stand reduction of common milkweed from glyphosate one year after treatment with the recirculating sprayer.

<table>
<thead>
<tr>
<th>Glyphosate</th>
<th>% stand reduction of Common 1 year after treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-check</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>88</td>
</tr>
<tr>
<td>2</td>
<td>73</td>
</tr>
<tr>
<td>4</td>
<td>77</td>
</tr>
</tbody>
</table>

(Continued on next page)
the herbicide are just as toxic to the crop as they are to the weeds.

This does not mean the recirculating sprayer will not work for selective herbicides, but development of this equipment arose due to the non-selectivity of these herbicides. Some of the more effective times to treat these weeds with herbicides is when the weed is actively growing. One cannot afford to keep expensive land out of production in order to spray weed increasers with non-selective herbicides. Thus, the recirculating sprayer provides a ready means for applying non-selective herbicides in a growing crop.

In Nebraska, we have been working with a recirculating sprayer for the past three years. Experiments have been conducted in soybeans and sorghum fields on controlling common milkweed, as increasing perennial weed that is not controlled by selective herbicides presently available. (See table 1).

The recirculating sprayer also has been used to treat volunteer corn and velvetleaf in soybeans, and shattercane in sorghum and soybeans. Volunteer corn was completely controlled with glyphosate because all corn plants were above the soybean crop at the time of spraying. It was found that when using glyphosate to control common milkweed, control of common milkweed was less than 100 per cent because of the uneven growth (height) of common milkweed. Some of the plants were not growing above the crop at the time of spraying.

However, 70 per cent control is a great improvement when you are dealing with hard-to-kill problem weeds. It does mean a farmer will have to treat two or three years in a row to obtain adequate control. Once common milkweed is under control, small infestations or escapes can be treated by hand.

Treating a field broadcast for three years to get a good control would not be economical. However, when spraying a moderate to heavy weed infestation with the recirculating sprayer, it was found that at least 80 per cent of the herbicide was recovered. As an example, we may want to use glyphosate at 2 lb/acre (2.25 kg/ha) for control of common milkweed. This amounts to a herbicide cost of $40/acre per year. If we recover 80 per cent of the spray we are cutting our herbicide cost to $8/acre.

Another way to look at it would be to take the $40 to treat one acre but with 80 per cent recovery of our herbicide we could treat five acres for that same $40. This would indicate that the recirculating sprayer could be used as an economical control for these hard-to-control perennial weeds and for any other tall weeds in sorghum and soybeans. Other herbicides are being investigated in an attempt to reduce the per acre cost.

Since the first experimental models were produced three to four years ago, several companies have started producing recirculating sprayers commercially. These include Riverside Chemical Company of Memphis, Tennessee; Spray Rite Company of West Helena, Arkansas; Porter Manufacturing Co., Lubbock, Texas; and Wylie Manufacturing Co., Petersburg, Texas.

At present there are no herbicides with a full label to allow their use through a recirculating sprayer, but several companies currently are working on this clearance. With the increase in hard-to-control weeds, rising herbicide costs, higher operating expenses and the short supply of farm labor, the recirculating spray should find a use on modern farms.

Because of limited availability of this type of equipment, small number of acres treated, and the seasonal use of it, ownership probably would largely be limited to commercial applicators.

In the future we may see more of our postemergence treatments applied this way to conserve herbicide. We feel the recirculating sprayer can be an effective and economical tool for the Nebraska farmer in his fight against weeds that escape commonly used weed control methods.

D. R. CARLSON is a graduate student in Agronomy. O. C. BURNSIDE is professor of Agronomy.
4-H Camps Serve Thousands

Above left: A view of the cabins at Lodgepole Valley 4-H Camp near Sidney, Nebraska. Above right: A flag-raising ceremony at the South Central 4-H Camp located on the Harlan County Dam. The camp serves 75 to 100 persons. Below: Canoeing on the Middle Loup River is one activity possible at the Nebraska State 4-H Camp in the Nebraska National Forest near Halsey.

By John D. Orr

More than 10,000 Nebraska 4-H youth attended a 4-H Camp last summer at one of the various Nebraska facilities.

These summer educational experiences had their beginnings in 1958 when Nebraska citizens interested in helping meet the needs of 4-H'ers, formed a non-profit organization called the Nebraska Association for 4-H Development. Over the years, the Association has helped recruit well over one million dollars in funds for scholarships, development of 4-H materials, awards, international programs and the construction of four new 4-H camping centers.

A statewide camping organization was authorized by the association and five district camp committees were organized to determine youth camping needs, help raise necessary funds and to review building plans with the association.

After assessing Nebraska's needs for safe and available camps, the association decided to build new camps that would allow for the development of educational programs for youth. Each 4-H facility as developed is managed by the district camping committee and is represented on the state camping committee. All final decisions rest with the Association for 4-H Development.

The first camping facility to be completed was the Nebraska State 4-H Camp. This camp is in the Nebraska National Forest near Halsey.

(Continued on next page)
Camps . . .

It is winterized and can accommodate 150 persons. It operates from March 1 to November 1.

Though the months of April, May, and September are busy, the heavy camping season falls during June, July and August when there are no open dates. The camp serves older 4-H youth on a statewide basis, younger 4-H members from the Nebraska sandhills and other interested youth and adults who wish to use the facility for educational purposes.

The Eastern Nebraska 4-H Center is adjacent to the historical Gretna Fish Hatchery midway between Omaha and Lincoln. Housing for 200 persons in the winterized facilities is nearly complete. When the current fund raising project secures adequate funds, a central dining and assembly facility will be built. Overlooking the Platte River and surrounded by oak, linden and walnut trees, the Eastern Nebraska 4-H Center will serve youth from Eastern Nebraska and will be available for outdoor education activities.

The Lodgepole Valley 4-H Camp is owned by the city of Sidney, Nebraska, and is located on the southeast edge of the city. The modern winterized dining-assembly building and several unwinterized cabins are designed to serve 75 to 100 persons and are nearly completed. The facilities at Lodgepole Camp were made possible by numerous contributions by individuals and organizations, including the Nebraska Association for 4-H Development.

The South Central 4-H Camp is located on the Harlan County Dam near Republican City and will serve 75 to 100 persons. The main dining and assembly hall is completed and cabins will be constructed when adequate funds are available.

4-H and other interested youth and adults are extensively using each of these facilities. Programs and equipment are continuously being prepared to improve the outdoor educational experiences for Nebraska youth and adults.

For more information, contact your County Extension Agent.

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Enterprise Budgets Easier With AGNET's CROPBUDGET

By Larry L. Bitney

The Russian wheat deal, the energy crisis, rapidly increasing costs, and related events during the past few years have rekindled an interest in farm enterprise budgets.

Questions on the cost of producing food have been asked in unprecedented numbers. Before this time, farm records from the previous year were a good source of production cost information. But the rapidly changing costs during the recent years have made cost data from farm records obsolete before they were published.

Enterprise budgets, which use a combination of valid historical production relationships and current or projected costs and prices, have proved a useful tool for estimating current or projected costs of producing farm commodities.

Calculating enterprise budgets can, however, be tedious and time consuming. And, when farm costs and prices are changing rapidly, enterprise budgets must be revised frequently. In answer to this problem, a computer program called CROPBUDGET has been developed to save the time of professional staff members who prepare enterprise budgets, and to speed the task of frequently updating these budgets. The CROPBUDGET program is available on the AGNET system. (Nebraska's Agricultural Computer Network)

The CROPBUDGET program was developed primarily to help farm management extension staff members prepare an annual publication containing estimated crop production costs for the coming year. But it also is useful to individual farmers and agribusiness personnel who need estimates of crop production costs which reflect production practices and soils in their area.

The computer “leads you by the hand” through the CROPBUDGET program, asking for each item of information. If you do not understand a question, or would like additional explanation, you may type “help,” and the computer will type back detailed information. An input form has been developed to help the user gather and organize the necessary information for a crop budget.

You indicate to the computer that you want to use this program by typing CROPBUDGET. Then, it asks whether the budget is for a nurse crop, a fallow crop or an annual crop. This determines whether none, one, or two years’ land charge is included in the production costs. The computer then asks some preliminary questions including the name of the crop, acreage and yield.

The next series of questions deals with the field machinery operations. The computer asks for the machine number, size, speed, field efficiency, initial cost, total annual use, and power unit number for each separate field operation done with owned machinery.

Additional materials—When certain machines are entered, such as a fertilizer spreader or planter, the computer will ask for “additional materials.” In response to this ques-
tion, you would enter the cost per unit, units per acre, and a verbal description of items such as seed, fertilizer, insecticide, etc.

When the last owned machine operation is entered, type stops and the computer will proceed to the next section, which relates to custom hired operations. It asks for the machine number, the custom rate per acre, and the cost of any additional materials which must be paid for, such as bale twine.

Next, the computer asks for information on power units which were used in the previous section on machinery operations. It asks for the initial cost of each tractor, fuel consumption in gallons per hour, the fuel cost per gallon, and the hours of annual use. Typing an “x” for fuel consumption again signals the computer to use a standard fuel consumption figure for that size of tractor, based on Nebraska Tractor Test Data.

Next the computer asks a series of questions:
1. Interest rate to be charged on operating capital.
2. Share of seeding cost (This allows a pro-rated seeding cost to be included in a pasture or alfalfa budget).
3. Time period (The portion of a year in which operating capital is needed).
4. Labor wage rate per hour.
5. Land value per acre.
7. Value of grazing production per unit.
8. Value of main product per unit.

The computer then asks for any other costs which should be included. Irrigation costs may be included here. For example, you might enter a labor requirement of 30 minutes per acre, a variable cost of $12 per acre and a fixed cost of $40.60 per acre, and describe it as “irrigation.”

Finally the computer asks the grain tax rate for the crop which is being budgeted.

The computer then asks if you want to review your input data. If you say yes, it lists out everything you have typed in. If you have made an error, you can correct it. The computer then proceeds to type the enterprise budget, such as the one that is shown.

The output, or budget, appears in three sections, roughly divided by the dashed lines. The heading section gives the description of the budget, yields and other general information.

Next, a detailed description of the machinery operations and purchased inputs are shown. An explanation of the column headings is as follows:

Job—A description of the field operations and purchased items.

Acres/hour—The accomplishment rate of each machine.

Labor min./acre—The labor required for each job.

Purchased inputs—The amounts per acre and cost are shown for each item.

Variable machine costs—The fuel, oil and repairs for each machinery
With a little know-how you can keep those holiday plants lovely through another year.

By Donald H. Steinegger

The evergreen tree holds an esteemed place in most American homes around Christmastime. But there are many other delightful plants which can adorn your home during the holidays.

Discarding these plants after the holidays may be the most practical approach, but for the hobbyist, the challenge of reflowering these plants can justify nursing them through another year.

Regardless of your long-term purposes, you will want your plants to remain attractive during the holiday season. Here are some tips on how to accomplish this. Following this are pointers on how to rebloom holiday plants.

Holiday plants suffer in the home from insufficient light, high temperatures and low humidity. As if these environmental factors weren’t enough, improper watering is often their downfall.

Poinsettia (Euphorbia pulcherrima), a plant traditionally associated with Christmas, beautifully captures the holiday colors with red or pink bracts contrasting with dark green leaves. Today’s cultivars (varieties) have a range of color and size. They also hold their bracts much longer than the older varieties.

To keep the plant attractive, put it in a well-lighted, draft-free location. The plant will tolerate warm temperatures if it receives enough light.

Watering a poinsettia, like watering any house plant, is very important to its well being. More plants probably are killed by improper watering than by any other practice. Water a poinsettia when the soil ball is dry. Soak it entirely. You will know this is accomplished when water runs out the drainage hole. Rewater when the soil ball is dry.

Fertilize a poinsettia two weeks after purchase. Then fertilize every month to maintain the plant’s vigor and to retain leaves. Use a complete fertilizer (one containing nitrogen, phosphorus and potassium) for poinsettia and all other holiday plants. For indoor locations use a complete fertilizer low in nitrogen such as a 5-20-20, proportion of the three nutrients.

In a high light area, especially outdoors or when forcing growth to increase plant size, use a complete fertilizer high in nitrogen such as 20-20-20. Poinsettia may be used as a specimen plant or the focal point of your interior design. You may wish to consider using poinsettia for your indoor hanging baskets.

To reflower poinsettia, continue to water and fertilize it. Provide as much light as possible. After danger of frost is past plant it outdoors in full sun by sinking the pot in the ground.

Pinch plants, as you would chrysan-
themums, to develop a full attractive plant.

Take the plant indoors before the first frost in fall. Starting in October, give the plant a daily dark period of 15 hours. To accomplish this, daily place the plant in a closet, or cover it with a black cloth at 5 p.m. The plant must receive no light during the dark period. Even the light from a desk lamp will prevent flowering. Repeat this treatment (long nights) until December 1. Each morning at 8 a.m. place the plant in a well-lighted location.

Two succulent house plants which put on holiday color for the Christmas season are the Christmas Cactus (Zygocactus truncatus) and Kalanchoe (Kalanchoe pumila).

Greenery sets off this Kalanchoe plant. (Photos by Mikkelsens)

Keep Christmas cactus in full sun for a stunning Christmas performance. Its high organic soil mix should be kept uniformly moist. During active growth, fertilize every month with a complete soluble fertilizer.

As with poinsettia, you can use this plant as a specimen plant on a table or in a hanging pot.

To reflower this plant, keep it actively growing until fall. Then lower temperatures to 55°F. (12.7°C), and reduce watering. Do not fertilize. Some cultivars are sensitive to day length as the poinsettia is. Place these where they will not be exposed to light during the evening. Resume watering and fertilizing when buds appear.

There are many new cultivars of Kalanchoe with attractive foliage and flowers. Like poinsettia, the Kalanchoe prefers a well-lighted location. Allow the well-drained soil to dry out between waterings. Fertilize every month when the plant is in active growth.

To reflower this attractive house plant, maintain the plant in active growth and remove the flowers when they fade. Pinch back new growth to obtain an attractive full plant. The plant responds as a small specimen plant on an end table or a similar small surface area. Kalanchoe also may be grouped to form an attractive focal point for your holiday display. Kalanchoe will flower approximately four months after initiation of long nights.

Christmas Cherry (Solanum pseudo-capsicum) and ornamental pepper (Capsicum annum "Fiesta") require a well-lighted location to retain the attractive red fruit. You should let the soil of Christmas Cherry become dry before rewatering but the pepper’s soil should be kept uniformly moist. Fertilize the cherry once every month. The ornamental pepper usually requires no fertilizer once it is in fruit.

Both plants may be used as small accent plants, but they are particularly attractive when they are combined in a holiday arrangement.

Discard the ornamental pepper after the holidays. The Christmas Cherry can be reflowered. After the leaves drop, cut the plant back several inches to reshape it and to initiate new growth. Plant it outdoors after the frost-free date and fertilize it monthly to encourage new growth.

(Continued on next page)
Plants . . .

Pinch repeatedly until late June to form a shapely plant. The Christmas Cherry will flower during the summer. The plant should be brought indoors before frost.

Many people find Cyclamen (Cyclamen persicum giganteum) difficult to maintain in the home. However, its striking appearance makes it a worthwhile addition to the holiday decor, even if it must be discarded in several months. Like most holiday plants, cyclamen requires a well-lighted location (indirect light). Cool nights (with temperatures in the 50-degree range) and humid air are its major cultural requirements.

Keep the high organic soil mix uniformly moist. Fertilize once every two or three weeks with half the recommended fertilizer concentration used when the plant is in flower.

To reflower Cyclamen, gradually reduce water as the plant begins to dry and when all the top growth is gone, allow the soil to become dry. Don't fertilize during this period.

Replant the Cyclamen corm (underground stem) in a high organic soil mix. To prevent corm rot, plant with the top of the corm above the soil. Place in well-lighted area and keep the soil moist. The red flowering types make a spectacular arrangement when massed with poinsettia.

Amaryllis (Hippeastrum hybrid) is adaptable to many holiday plant arrangements. Amaryllis culture is not demanding and reflowering is easily accomplished. A well-lighted area with monthly fertilization will keep the plant attractive.

Keep the well-drained soil evenly moist. When blossoms have faded, remove them to prevent seed formation. Leaves will turn yellow in late fall. At that time, reduce frequency of watering and don't fertilize. Don't water when the bulb is dormant.

Allow bulb to remain dormant for at least six to eight weeks. To reflower, resume watering and fertilizing. The bulb will exhibit growth within two weeks and bloom in four to six weeks. Amaryllis makes an ideal floor specimen.

DONALD H. STEINEGGER is extension horticulturist.
Child Abusers: Myths and Realities

By John DeFrain and Elaine Klamm

A crying baby girl is thrown by its mother across the bedroom into the wall. The baby's skull is fractured.

A seven-year-old boy is purposely pushed down the basement stairs by his father after the boy scuffled with his brother. The boy's arm is broken.

A single parent's boyfriend spanks and punches a two-year-old girl until she is unconscious. The girl had spilled a glass of milk.

A babysitter slaps a five-year-old boy across the face for saying a "naughty" word. His jaw is broken.

Those incidents and others like them have undoubtedly all happened countless times in the United States. They probably happened in Nebraska many times. Perhaps in your neighborhood—today.

Child abuse, in many researchers' estimations is an epidemic that sweeps the country. At least 2,000 children are killed in the U.S. each year by adults. It is estimated there are as many as 4.7 million incidents of child abuse each year, leading one authority to sadly name the family as our society's most violent institution.

We set out to find what type of person abuses children. At the onset of the study, we were conditioned to the stereotypic notion that only some type of monster could abuse a child. Child abusers must be "psychotic," for who could do the things we read about in the newspapers and magazines almost daily? Who could cut off a child's tongue? Scald a child? Burn a toddler with cigarettes?

We neglected to remember that stories in the media often are the most dramatic, the most bizarre, the most violent. They represent the far-out end of the child abuse scale.

We define child abuse as violence against children. This is not a legal definition, by any means. The Nebraska State Reporting Law (LB207) reads, in part:

Section 1... Abuse or neglect shall mean knowingly, intentionally, or negligently causing or permitting a minor child or an incompetent or disabled person to be: a) placed in a situation that may endanger his life or physical or mental health b) tortured, cruelly confined, or cruelly punished c) deprived of necessary food, clothing, shelter or care; or d) left unattended in a motor vehicle, if such minor child is six years of age or younger; or e) sexually abused.

Our much simpler definition of child abuse—violence against children—takes into account all forms of violence from the relatively common, and milder verbal violence and spanking which probably all parents use on occasion, to the more extreme forms on the other end of the scale.

This simpler definition may sound ridiculous to the parent not prone to "spare the rod and spoil the child."

Does the first author of this article seriously suggest that he is abusing his child simply because on occasion he yells at his eight-year-old and out of frustration gives her a whack on the bottom? Yes, exactly. Spanking is child abuse, in a very real sense. It is very different in degree from cutting off a tongue. But it is not different in kind. The two behaviors are simply on opposite poles on scale of aggression toward children.

Dr. David G. Gil, who conducted the first nationwide child abuse study, testified before the Senate Subcommittee on Children and Youth in 1973 that the "widespread acceptance in our culture of physical discipline of children is the un-

A study of abusers and non-abusers shows some startling results.

(Continued on next page)
Abuse...
derlying factor of physical child abuse."

We really don't have to hit our children. We only have rationalized our way into believing that violence is necessary. Professionals in the area of child development have verified simple, effective ways for discipline. Dozens of good paperback books, which outline these procedures are available in most bookstores.

In our study of child abuse, we surveyed personality and social factors of 39 rural and urban people who had allegedly physically abused children. These adults were compared with a random selection of 25 rural and urban adults who had no documented evidence of abusive behavior; these adults were matched with the abusers for level of income, marital status, race and number of children.

**Startling Results**

The results were startling:

1. It is commonly believed that child abusers are lonely and isolated. In our study we could find no significant difference between alleged abusers and non-abusers.

2. It is commonly believed that child abusers have poor relationships with their spouses. In our study we could find no significant differences between alleged abusers and non-abusers.

3. It is commonly believed that child abusers have poor relationships with their parents. In our study, the alleged abusers reported parental relationships significantly superior to non-abusers' relationships with their parents.

4. It is commonly believed that abusers have poor relationships with their in-laws. In our study we could find no significant differences between alleged abusers and non-abusers.

5. It is commonly believed that child abusers were abused themselves as children. In our study we could find no significant differences between alleged abusers and non-abusers.

6. It is commonly believed that child abusers are generally more punitive in their child-rearing behaviors. In our study, the alleged abusers reported they were significantly less punitive! This last finding totally threw us. Alleged child abusers spank their children less than a more random selection of parents? Are we having the wool pulled over our eyes?

**Results Similar**

Possibly. The alleged abusers could have responded idealistically or have stretched the truth. But general results of a lengthy study at Michigan State University are strikingly similar to ours. In comparing numerous personality and social relationships factors of child abusers with those of the general population, the researchers have found it hard to differentiate the two groups.

7. Social factors loom highly important in the search for the causes of child abuse. In our study, we found that low incomes and single parenthood are closely related to abuse, because abusers tended to have less education, a less-prestigious job or none at all, and were three times more likely to not have a spouse.

Child abuse, it is becoming increasingly clear, is not solely the product of a deranged mind, although some researchers maintain that 10 per cent of abusers are psychotic. Rather, a host of psychological and social factors are involved. Granted, some affluent people beat up their children, probably a lot more than we will ever know. The affluent have the means to cover up their acts.

But, it is well documented that abuse is more common among the poor. Rearing children is a tough proposition for anybody—no doubt about it. Most parents probably cross the line of sound child-rearing practices on occasion, for in our work with parents we find very few who do not hit their children out of frustration. Given the added stresses of low income and the little aid one gets as a single parent, the possibility of child abuse skyrocket. In the words of Naomi Feigelson Chase:

Who are reported abusers and neglecters? Overwhelmingly they are poor people, black people, Hispanic people, very young mothers. Mothers with illegitimate children. Parents with a lot of children. Alcoholics, junkies, people on public assistance, people with no jobs. People with no friends. People with no resources. People with emotional problems, with medical problems, with poverty physical health, with poor mental health. People with no wherewithal. People with no hope.

What, then, can be done? We must offer help in any way we can to parents we suspect are having trouble rearing their kids. Although child abuse is a criminal act, our ultimate aim—after protecting the children—should be to rehabilitate rather than punish the parent. This may mean counseling and parent education for the person. It may mean day care services for the children to relieve the stress of 24-hour-a-day, seven-day-a-week, week-in-week-out parenthood, which is too great a burden for almost any human.

**Provide Jobs, Money**

Further, we must continue to strongly support low-income parents financially by providing them jobs in the cases where this is realistic, or direct monetary benefits when it is infeasible for them to work outside the home.

These proposals will be hard for many people to swallow, we suspect, because the notion that the poor are the root of their own problems is so common as to be almost a religion. Whether or not people actually have the power to raise themselves by their own bootstraps, however, is irrelevant in the case of child abuse. Children, obviously, are trapped. If financial support to their parents is necessary to provide them with a decent world in which to thrive—and we strongly believe it—is then we have a moral obligation to come up with that support.

To do otherwise is to hide our heads in the sand; to consciously, and calculatedly ignore the shame of our times.□

John DeFrance is assistant professor, and Elaine Klamma is a former graduate student in the Department of Human Development and the Family.
Tan Spot: New Blight Threatens Wheat Growers

By John E. Watkins, Gary N. Odvody, Michael G. Boosalis, and David S. Wysong

The principal disease of wheat in Nebraska and Kansas this spring was a fungal leaf spot commonly called tan spot, eye spot or yellow leaf blotch. This disease occurs worldwide and is prevalent and destructive in many north central states, particularly North Dakota.

The disease, caused by the fungus Pyrenophora trichostoma (Fr.) Fckl., was epidemic this year in Nebraska and caused severe damage to the foliage of wheat. The development of tan spot was apparently encouraged by frequent rains and periods of cool, cloudy, humid weather during April, May and June.

Tan spot first appears on wheat leaves as small, dark, oval lesions with light brown centers (Fig. 1). These soon develop into larger tan to light brown blotches, often surrounded by a distinct yellow border (Fig. 2). When the spots are abundant, the leaf may be yellow. As the spots increase in size and merge, the yellowing of the leaf gradually fades to a tan and the leaf dies from the tip toward the base. The lower leaves are infected first (Fig. 3) with the pathogen spreading to the upper leaves as the season progresses.

The disease cycle (Fig. 4) of tan spot in Nebraska is similar to that reported in other states. The pathogen invades the culm and overwinters in the wheat stubble (Fig. 5) as small, raised, black, sexual fruiting bodies called pseudoperithecia. Sexual spores, called ascospores (Fig. 6), are formed within these fruiting bodies and are discharged during periods of wet, cloudy weather in spring and early summer. Ascospores may be spread by wind to infect wheat in adjacent fields or in fields several miles away.

Thus, wheat residue on the soil surface containing pseudoperithecia with viable ascospores is the primary source of inoculum throughout the season, but particularly during the spring and early summer. Cool, moist weather favors the development and maturation of the fungal structures in the residue. Infection is favored by cool, moist weather that maintains dew on the leaves for six hours or more.

The fungus may produce a second kind of spore called a conidium on (Continued on next page)
Tan Spot . . .

infected leaves. Conidia are non-sexual reproductive structures that may be produced later in the growing season, usually after the plants have headed. Large numbers of conidia were observed on severely infected leaves collected in eastern Nebraska during late May and early June.

The conidia may be an important source of inoculum infecting upper leaves. Infection of the flag leaf is critical in causing substantial reduction in grain yield and quality. Although the pathogen survives very well on wheat residues on the soil surface, it is destroyed when the residue is worked into the soil.

In April 1977, tan spot was prevalent in winter wheat fields in at least 21 counties of southeastern, south central, central and east central Nebraska. Frequent rains and prolonged periods of cool, moist, cloudy weather in April and May favored the development of tan spot.

As the disease progressed many of the infected lower leaves died, and the pathogen spread to infect the upper leaves. In early May many fields of yellow wheat could be attributed to tan spot. Some fields of wheat were taken out of production because of the thin plant stands due to root and crown rot and to a high incidence of tan spot in the field.

In subsequent surveys in May, tan spot was found in commercial wheat fields in four counties in the Panhandle region of western Nebraska and in commercial wheat plots (continuous wheat since 1972) at the High Plains Agricultural Laboratory, Sidney, Nebraska.

Although relatively new to Nebraska, there is good evidence to indicate that the disease was in the state before 1972. Wheat straw collected from a field near Crete in 1972, and 1974 and 1975 wheat straw collected from ecocallow plots on the dryland farm at the North Platte Station contained fruiting structures (pseudoperithecia and ascospores) resembling those of the pathogen.

A number of factors may account for the widespread distribution of tan spot in 1977. The apparent susceptibility of leading wheat varieties to the pathogen led to a gradual increase in inoculum in the years before the 1977 epidemic.

The continuous planting of wheat in many areas of the state, coupled with the cultural practice of leaving wheat residue standing to reduce erosion and increase soil moisture, provide ideal conditions for overwintering of the pathogen. Several lengthy periods of favorable weather during the early growing season were favorable to ascospore production and release. Dew which persists on the plants for more than six hours in some areas of the state provided the necessary moisture for infection. The severe and extensive drought last fall and winter may have increased the susceptibility of wheat to the pathogen. North Dakota researchers have shown the importance of some of these factors in the development of epidemics of tan spot in that state.

Our surveys showed that the intensity of the disease was generally higher in wheat fields which had large amounts of surface wheat residue containing the black, raised, fruiting bodies of the pathogen. Fields without surface wheat residues also had tan spot, but the level of infection generally was lower than in fields with residue. This was not unexpected because the pathogen may be spread by wind to wheat in nearby fields.

At the High Plains Agricultural Laboratory, the importance of dew as a free moisture source for infection was seen in continuous wheat plots which had a high incidence of tan spot in spite of the extended and severe drought. North Dakota researchers found that infection did not occur unless the leaves of wheat inoculated with the pathogen had free moisture for 6 to 24 hours, depending upon the variety.

At the High Plains Agricultural Laboratory field plots, which are at an elevation of 4,100 feet (1,230 m). The night temperature frequently drops below 65°F (18°C). Under these conditions, heavy dew is formed and may persist for six hours or more on wheat leaves. Thus, moisture conditions necessary for infection by P. trichostoma may be met even during a drought.

Tan spot must be considered a potentially serious threat to wheat production in Nebraska. The disease is now well established in the major wheat areas of the state and severe epidemics of the disease could reduce yields markedly. A complex of leaf spots in North Dakota in 1970 and 1971 caused by P. trichostoma and Leptosphaeria avenaria Weber f. sp. triticea T. Johnson reduced grain yield 12.9 per cent in spring wheat and durum.

It is impossible, of course, to predict whether severe epidemics of tan spot will reappear in the future. The hot, dry, windy weather that generally prevails during most seasons in Nebraska—and particularly during the yield-critical post-boot stage of wheat development—may be unfavorable for the continued development of destructive epidemics.

Effective, practical and economical control of tan spot may be difficult. Disking will minimize the amount of disease, provided the wheat stubble is tilled under the soil surface. To be effective, this should be done over large areas. Tillage practices that remove stubble from the soil surface generally increase losses of soil moisture. These practices, therefore, should be done in a manner that promotes residue breakdown but also conserves soil moisture. Spores can be disseminated long distances by wind.

Because this is a relatively new disease in the state, no research has been done to develop varieties resistant to tan spot. The zinc ion-maneb complex fungicides Dithane M-45 and Manzate 200 are labeled for use on wheat against this pathogen. Research already is in progress to test the fungicide Manzate 200 against tan spot. Preliminary results show that wheat treated with one application of Manzate 200 at early heading, or with two applications, one at early heading and a second in six days, had less tan spot on the flag leaf than corresponding nontreated wheat. Yield comparisons will be made between treated and nontreated wheat plots.□

John E. Watkins is extension plant pathologist; Gary N. Oogedy is research associate; Michael G. Boosalis is professor of Plant Pathology; David S. Wysong is extension plant pathologist.
Composting Converts Waste Into Valuable Resources

By Leon Chesnin

Rural and urban communities and farms have at least one problem in common: the accumulation of various organic wastes. Farms produce wastes such as animal manures, and crop residues such as straw, corn cobs, hay stack bottoms and spoiled silage.

In Nebraska’s towns and cities, the organic wastes include sewage sludge, paunch manure from slaughter houses, and garbage originating from household foods and paper.

Some of these organic wastes are associated with the nuisances of flies, odors and dust. Fresh animal manures, paunch manure, sewage sludge and garbage are favorite breeding places for flies. Flies are attracted to odors and moisture. As these wastes dry and become free of odors, they do not attract flies and are no longer breeding places.

Many large communities bury their garbage and sewage sludge wastes in landfills. This is a costly burden to taxpayers that can result in ground water contamination. Accumulations of dry manure in feedlots or animal confinement facilities results in serious dust problems.

But there is a way all of these wastes can be converted into valuable resources—through composting. Composting is the process of biological decomposition of organic wastes or mixtures of organic wastes that have been piled together. The resulting products are similar to soil organic matter in that a great deal of the cellulose and fiber in the waste have been consumed by microorganisms.

The composted waste is much lower in moisture content because of the heat generated during composting. These changes greatly reduce the bulk of the material and usually concentrate the plant nutrients in the waste.

A compost pile requires lots of air for the microorganisms to break down the waste. The heat generated by composting pasteurizes or kills the disease organisms in the wastes. The compost is generally aerated by mixing when the temperature is around 140° to 150° F (60° – 66° C). Composting is an ancient art. It is practiced on a small scale by many organic and backyard farmers, but specialized equipment has been developed to handle large volumes of wastes.

Figures 1-3 show the modified Brown Bear integral auger tractor which has been loaned to the UNL Agronomy Department by the Roscoe Brown Corp. of Lenox, Iowa, for use by the author in composting feedlot manure, paunch manure, sewage sludge and crop residues. The paunch manure was obtained from the American Stores Packing Co., Lincoln; the secondary treatment sewage sludge (90 per cent moisture content) was obtained from the City of Fremont. Composted beef cattle manure samples were obtained from a commercial custom composting company, Mid America Compost of Gothenburg.

**Beef Cattle Manure**— Fresh beef cattle manure contains about 85 per cent moisture. The moisture content of feedlot manure depends on climate and length of exposure. In Nebraska’s climate feedlot manure averages about 50 per cent moisture. When composted, beef cattle manure changes from large sized masses which are difficult to spread uniformly, to small particles which can be applied as easily as commercial fertilizer.

Marked changes also occur in the chemical composition of composted beef cattle manure obtained at the Mead Field Laboratory and from Mid American Compost (Table 1). During composting, manure, cellulose and fiber are decomposed and water is lost. The total mass or volume of the waste is reduced. On the average, 4 to 6 tons of beef cattle manure will be converted to one ton of finished compost. Depending on the climatic conditions, composting feedlot manure can take 6 to 10 weeks of periodic turning and aerating to produce a finished product. This process can go on during the winter months because heat is being generated.

**Nutrients in Manure and Compost**—Fresh beef cattle manure has about 3.5 per cent nitrogen. A considerable amount of this nutrient can be lost if the waste is not managed properly. Composting under controlled conditions will conserve and concentrate the nitrogen in the manure. If the compost pile is allowed to overheat, nitrogen can be lost as ammonia. Under these conditions, a strong odor of ammonia can be smelled when the waste is turned.

It has been found that about 50 per cent of the nitrogen in beef cattle manure is available to plants the first year. Since composted manure is partially decomposed, it is not known what percentage of the nitrogen is available to plants during the growing season. Research is currently underway to establish the rate of availability of nitrogen in composted manure.

The phosphorus, potassium, sulfur and zinc contents of beef cattle manure are increased or concentrated when this waste is composted.

If 10 tons of feedlot manure with 50 per cent moisture are compared with two tons of composted feedlot manure with 19 per cent moisture, using the data in Table 1, the nutrient values would be as follows:

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Composted Feedlot Manure</th>
<th>Feedlot Manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>45 – 75 lbs.</td>
<td>65 – 97 lbs.</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>15 – 25 lbs.</td>
<td>29 – 39 lbs.</td>
</tr>
<tr>
<td>Potassium</td>
<td>30 – 90 lbs.</td>
<td>91 – 113 lbs.</td>
</tr>
<tr>
<td>Sulfur</td>
<td>10 – 15 lbs.</td>
<td>13 – 19 lbs.</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.4 – 0.6 lb.</td>
<td>0.5 – 0.7 lb.</td>
</tr>
</tbody>
</table>

The value of applied manure or composted manure is increased far (Continued on next page)
Composting...

beyond the commercial value of the above nutrients if one considers the effects on the soil. Applying organic wastes to soils markedly improves soil structure, increasing its water intake rate and soil aeration. With moderate continued applications of organic wastes, there is a bonus of greatly reduced runoff of rainwater. Conservation of rainfall, associated with the benefits of recycling organic wastes on soil-water relations, can become important in reducing the cost of efficient crop production. This benefit would apply to both dryland and irrigated fields.

**Municipal Wastes**—Approximately 90,800 tons of solid sewage wastes are produced every year in Nebraska. These wastes vary in physical nature from a slurry of solids to filtered solids with from 70 to 90 per cent moisture. On a dry weight basis, the nitrogen content of these sewage sludges have varied from 2.0 to 3.0 per cent. These wastes are just as important a resource to the agriculture of Nebraska as are animal wastes. While sewage sludge suspensions can be injected into the soil, it requires the costly transportation of a large amount of water.

Filtered sewage sludge with 70 per cent moisture does not present a problem for composting. However the 90 per cent moisture sludge has the physical nature of gelatin. The high moisture sludge does not aerate easily. It is necessary to mix this sewage sludge with some drier bulky mass such as hay, straw, corn cobs or feedlot manure. These will absorb some of the moisture from the sludge and permit air to penetrate the waste. The natural heating that develops during composting will reduce the moisture content of the sludge. Sewage sludges from Nebraska communities are valuable sources of other essential plant nutrients in addition to nitrogen. On a dry weight basis, sludges have varied from 0.38 – 0.77 per cent phosphorus and 2.98 – 5.71 potassium.

Recent visitors to mainland China have noted that all organic wastes there are utilized or recycled through the soil. Garbage is fed to animals and all manures and sewage materials are returned to agricultural soils as a source of nutrients. This practice has been followed for thousands of years. As a result the agricultural soils of China are still...
productive and show little evidence of nutrient deficiencies. About 70 per cent of all nutrients are being supplied by waste recycling. The savings in energy needed to produce commercial fertilizers is very great.

Nebraska communities have an unusual opportunity to recycle their sewage wastes. Primary and secondary treatment sludges can be composted and converted into an economic resource.

Filtered primary treatment sewage sludge (70 per cent moisture) can be composted easily without mixing with crop residues. The heat generated during composting would pasteurize and kill all pathogenic organisms present. This would eliminate the need for secondary treatment of the solids.

Composting primary treatment filtered sludge could result in huge savings to taxpayers. Taxes needed to build and operate secondary treatment plants and landfill wastes could be eliminated. The cost of composting primary treatment would be more than covered by selling the product to the farm, lawn and turf trade.

Farmers are paying $25 a ton for composted manure in bulk. Milorganite, the dried sewage sludge of Milwaukee, is sold in bags in Lincoln for $125 per ton wholesale and $230 per ton retail. It should be mentioned that Nebraska sewage wastes have much less toxic metals than the wastes of Milwaukee or Chicago.

When it is not feasible for a community to do its own composting because of equipment and labor costs, custom composting operators are available. These custom operators charge about half the retail value of the composted waste. Smaller communities can cooperate by bringing their sewage wastes to a common site for composting. This would provide enough sludge to be handled economically. Sewage sludge is currently buried in landfills at a considerable cost to taxpayers and recycling this waste in agriculture would be a great savings to taxpayers.

**Paunch Manure**—About 94,000 tons of this waste (stomach contents of slaughtered cattle) are produced in Nebraska. This material is now incinerated or buried in landfill areas. Paunch manure supplied by the American Stores Packing Co. for recycling studies averaged about 1.4 per cent nitrogen on a dry weight basis. Composting is an excellent pretreatment for paunch manure before applying it to the soil. The very high moisture content and associated bad odor of paunch manure can both be eliminated through composting. This eliminates the problem of flies being attracted to the waste as a breeding site. At Mead, composting of paunch manure has been enhanced by mixing a window of the waste with composted feedlot manure. After short periods of turning and aerating the pile, there were no flies or noxious odors.

By mixing a high carbon content ash (such as that from the Quaker Oats Co. furfural plant in Omaha) with fresh paunch manure, the bad odors of the waste are eliminated by absorption, even though the moisture content is high. Composting reduces the moisture content. However, diluting the waste with carbon ash results in a reduction of the final nitrogen content of the finished compost. Using carbon ash in the first stages of composting manures, sewage sludge and paunch manure would be of special benefit near Nebraska’s towns and cities. Eliminating odors would greatly curtail the attraction of flies to the wastes.

**Nebraska’s Organic Resources**

—A calculation of the amount of waste production in Nebraska based on animal and human populations is shown in Table 2.

**Organic Nitrogen Energy Conservation**—It is very clear that if all the animal and human wastes could be used, and applied to Nebraska’s corn crop, there would be enough to apply about 10 tons per acre. Unfortunately part of the livestock wastes are spread on pastures and part of the human wastes are disposed of in septic tank systems. However, the remainder, which can be recycled in agricultural soils, is a valuable resource.

The total organic wastes contain about 1.3 million tons of nitrogen. It takes 40,277 cubic feet of natural gas to produce a ton of nitrogen in the form of anhydrous ammonia fertilizer. To recycle the organic wastes in agricultural soils for crop production would result in saving as much as 52.3 billion cubic feet of natural gas. Considering the need to conserve energy, animal and human manures must be regarded as valuable resources. While there is energy required to apply the organic nitrogen resources to agricultural soils, reducing the waste volume and moisture content by composting will accomplish further savings in energy needed to recycle the nutrients for crop production.

There are just not enough organic wastes available for recycling in agricultural soils to supply all the nutrient needs for crop production. Commercial fertilizer will continue to play a major role in agriculture. However the combined use of these organic resources and the additional needed commercial fertilizers will result in increasing the productivity of Nebraska soils. The benefits will apply to irrigated and dryland fields. Available moisture is the key to the benefits from organic resources. Under drought conditions, the organic wastes applied to soils are not lost but become available when rainfall resumes.

*Leon Chesnin is associate professor of Agronomy.*

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**Table 1. Composition range of beef cattle feedlot manure and composted feedlot manure from the Mead Agricultural Field Laboratory and Mid America Compost, Gothenburg.**

<table>
<thead>
<tr>
<th>Source of manure</th>
<th>Feedlot Manure</th>
<th>Composted Feedlot Manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture %</td>
<td>50 - 80</td>
<td>19 - 25</td>
</tr>
<tr>
<td>Nitrogen %</td>
<td>0.9 - 1.5</td>
<td>2.0 - 3.0</td>
</tr>
<tr>
<td>Phosphorus %</td>
<td>0.3 - 0.5</td>
<td>0.9 - 1.2</td>
</tr>
<tr>
<td>Potassium %</td>
<td>0.6 - 1.8</td>
<td>2.8 - 3.5</td>
</tr>
<tr>
<td>Sulfur %</td>
<td>0.2 - 0.3</td>
<td>0.4 - 0.6</td>
</tr>
<tr>
<td>Zinc ppm</td>
<td>82 - 125</td>
<td>156 - 226</td>
</tr>
</tbody>
</table>

**Table 2. Animal and human manure production in Nebraska.**

<table>
<thead>
<tr>
<th>Source of manure</th>
<th>Tons/year, wet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>61,251,380</td>
</tr>
<tr>
<td>Swine</td>
<td>2,189,290</td>
</tr>
<tr>
<td>Poultry</td>
<td>603,861</td>
</tr>
<tr>
<td>Sheep</td>
<td>27,010</td>
</tr>
<tr>
<td>Total animal manure</td>
<td>64,071,541</td>
</tr>
<tr>
<td>Human</td>
<td>90,800</td>
</tr>
<tr>
<td>Paunch manure (slaughter houses)</td>
<td>94,000</td>
</tr>
<tr>
<td>Total organic resource</td>
<td>64,256,341</td>
</tr>
</tbody>
</table>
How can a mere 1,200 acres of farmland be worth billions of dollars to Nebraska’s economy? It can when those acres are the seed base for a sizeable share of the $4 billion Nebraska farmers receive for the goods they produce each year. The role of the Foundation Seed Division of the University of Nebraska—Lincoln Agronomy Department is to assure a continuous supply of genetically pure seed varieties and lines to the people who market seed to the commercial farmers.

Without the Foundation Seed Division, the improved crop varieties that have helped make Nebraska one of the nation’s leading agricultural states could not be maintained economically.

The importance of maintaining seed purity to keep a solid base for Nebraska’s improved agriculture can be seen in the statistics of improved wheat yields. When Turkey Red—the variety from Russia which put Nebraska in the business of raising hard red winter wheat—was the primary variety raised, yields averaged 14.2 bushels per acre (955 kg/ha). This was from 1921 to 1940.

Today, improved varieties and production practices have increased
Nebraska’s average production per acre to 35 bushels (2,354 kg). The same story could be told about other crops. Much of this wheat is exported. The value of Nebraska wheat and flour exported in 1974 amounted to $261 million. Other grains and meat products exported boosted this figure to $938 million.

Agricultural exports are all that have been keeping the U. S. balance of trade in the black in recent years, helping pay the increasing cost of such needed imports as oil.

Under the direction of Dick Mills, the 20 to 30 workers of the Foundation Seed Division maintain and distribute more than 150 different varieties and lines of 14 different crops. These crops include wheat, oats, barley, soybeans, corn, sorghum, millet, rye, field beans, alfalfa and grasses.

The importance of the operation is in maintaining the purity of improved varieties painstakingly developed over the years by plant breeders. When planted in commercial fields, crops are exposed to pollination from a variety of outside sources. This is of no concern when the seed is to be marketed for food or feed, but makes the seed impure genetically and often unfit for use when raising another crop.

**Isolated Patches**

To accomplish their task, Mills and his helpers plant in patches isolated from any crop that could contaminate the seed. Thus, a sorghum inbred line is planted alongside corn, wheat, soybeans, etc., but never next to another sorghum line.

To complicate things, Mills must take into consideration the possibility of hail or other weather damage. So, he duplicates plantings around the state, and even at the main Foundation Seed site at the University’s Field Laboratory at Mead. There, since hail storms generally follow a northwest to southeast path, plantings are duplicated on the northeastern and southwestern parts of the acreage.

Seed also is produced at the division’s 320-acre farm at Genoa, at the High Plains Agricultural Laboratory at Sidney, and at various times on farmers’ contracted acres. Some seed is produced in other states, when special growing conditions demand it.

Besides the usual hazards faced by farmers, Mills has special problems, such as with soybeans, which are particularly susceptible to damage.

“A farmer can bounce his beans around as much as he likes, since he will be selling them for processing, instead of seed. However, we must handle them carefully, because if you drop a soybean five inches or more onto a hard surface it will be damaged, even though you may need a microscope to see the crack,” Mills said. Thus, his harvesting and processing equipment is modified to meet the special needs.

**Combines Modified**

Combines have been modified and all cracks are sealed so the machines can be cleaned easily and completely. The modern seed cleaning and bagging plant also is designed to prevent damage to seed and for easy and complete cleaning. The need for absolute varietal purity means that a combine can only be used to harvest a single variety. “For instance, if we have nine varieties of wheat, we need nine combines,” Mills said.

In addition to present varieties, the division gets the job of increasing seed of new varieties. A good example of this was in fall 1969 when Mills was given 3½ bushels of Centurk wheat to increase to enough bushels to pass around among certified seed growers. In fall 1970 the division had nearly 1,000 bushels of Centurk seed to distribute.

**Various Locations**

To get such maximum seed production and minimize the risk of hail, Mills planted the wheat on dryland at North Platte, and under irrigation at Mead, Genoa, and at two locations in Colorado. All were in 40-inch (102 cm) rows.

The division does not produce hybrids, as such. However, it does maintain breeding lines, such as single-cross corn, that can be used in further crosses to produce hybrid seed for farm plantings. With all the different varieties and lines to raise, the operation looks like a checkerboard when plotted in the office. The office is in the old loadline building at the former Army ordnance depot at Mead.

“We need to keep close track of what we have planted and where so we know what we are working with at harvest time,” Mills said.

The operation is completely supported by the seed industry, with no tax dollars involved.

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*Grant L. Johnson is assistant extension editor in Agricultural Communications.*
operation including the power unit, or the cost of a hired custom operation.

Fixed machine costs — The depreciation, interest, taxes and insurance costs for owned machines and power units, including irrigation.

The final section of the budget contains a summary of the production costs.

Cash costs—These are what the name implies—items that require cash. This is a useful figure for a farmer's short-term planning when evaluating the potential return over cash costs of alternative crops. This figure is also useful to lenders, as it is an estimate of the operating capital required by a particular crop.

Labor—This is the total of the labor requirements shown in the “labor min./acre” column in the second section. The minutes are converted to hours, and an overhead allowance of 20 per cent is added. Overhead labor includes time for adjusting machinery, driving to and from fields, buying and hauling supplies, etc. The wage rate which was typed in earlier is then multiplied by the total labor requirement. The labor requirement figure is a useful item to use when balancing out a limited amount of labor among alternative crops in a detailed farm plan.

Fixed costs — These are the costs which would normally occur whether anything was produced or not. These include a total of the fixed machinery costs and a charge for the taxes and interest on land. The land taxes and interest total 7 per cent of the value which was typed in earlier, and approximate a cash rental charge.

Overhead and management—These two items are not normally included in farm enterprise budgets as they are relatively fixed, regardless of how a farm is operated. Thus, they are not relevant when deciding among alternative enterprises. However, if we want to estimate total costs, these items should be included. Overhead costs are items which cannot be allocated to an individual enterprise. Examples are the costs of operating a pickup, subscriptions to farm magazines, and income tax preparation fees. Overhead costs typically amount to about 5 per cent of the cash costs in a farm business.

So far in the budget the only reward for the farmer is the labor charge at an hourly wage rate. The time spent in decision-making has not been rewarded. Yet the price of most things the farmer buys includes both a labor and a management charge. So, an attempt is made to estimate a management charge which is equitable, and which a farmer might realize in the long run. In the corn budget shown, a charge of 10 cents per bushel was used.

The total cost per acre and per unit of production includes all costs. But, as mentioned earlier, you might want to use some of the subtotals, depending on what questions you wish to answer.

Estimated returns — The gross returns, based on the estimated yield and price which were typed in earlier, are then calculated for both the main crop and any crop residues which should be valued. Finally, the net return per acre is shown.

Earlier, I mentioned that developing enterprise budgets “by hand” was a tedious and time consuming chore. The description of the computerized process may sound equally as tedious and time consuming. But a complete budget may be calculated in 15-20 minutes with the CROPBUDGET Program, while it may require a half-day or longer if done with a pocket calculator.

The resulting budgets are used in a variety of ways. Farmers may use information from enterprise budgets in developing annual crop and livestock production plans. National agricultural policy planners use cost data from enterprise budgets in developing and administering farm laws, such as establishing target prices, disaster payments, etc. Tenants and landlords use them in developing equitable leasing arrangements. Lenders use them in evaluating the capital requirements and repayment capacity of farm enterprises. These budgets also serve as a basis for improved communication between farmers and consumers.

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