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Agricultural and Home Economics Experiment Station

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For Your Interest...

**soils**

**Corn Planting Rates Studied**

Each spring Iowa farmers make the important decision of how much corn to plant per acre. They know that high stands can be advantageous or detrimental, depending upon climatic factors, fertility or fertilizer application rates.

Experiments show that heavy stands may actually decrease yields under conditions of drouth or low fertility. On the other hand, during better seasons and with adequate fertilizer, heavy stands are needed to use efficiently the land, labor and capital going into corn production.

Experiment Station agronomists conducted rate of planting research on Galva and Monona soils comparing the performance of adapted and early hybrid corn varieties. Four corn population levels of 8,000, 12,000, 16,000 and 20,000 plants per acre were compared.

Results showed that even in a year with a poor early season outlook because of low subsoil moisture, a plant population higher than 8,000 per acre is desirable. On Galva soil it proved advantageous to go even higher than 12,000 plants per acre, and going to 14,000 plants per acre did not bring about serious losses on Monona soil. The early variety didn’t have comparable yields to the adapted variety until the stand reached 16,000 plants per acre. At 19,000 plants per acre it outyielded the adapted variety.

There’s evidence that it is possible to increase stands of shorter season varieties and get yields that are comparable to the adapted varieties. By using this principle it’s possible to spread the work load at harvest time since the early variety will be ready for picking sooner. Under this system the early hybrids should be planted as early or earlier than the adapted ones. If this isn’t done, the advantage is lost because late-planted early varieties will be ready for harvest at about the same time as early planted adapted varieties.

These studies were conducted by Ray Nicholson and John Pesek.

**How Do Corn Residues Affect Nitrogen Availability?**

Experiment Station soil scientists are studying how corn crop residues affect the availability of soil and fertilizer nitrogen. They’ve found that fertilizer nitrogen which is initially immobilized or "locked" by corn residues becomes available later to crop plants. The total amount of nitrogen so immobilized is not constant and depends on the rate of nitrogen applied to the soil as well as on the amount of crop residue present.

In these studies potted soil samples with controlled moisture and temperature conditions are used to obtain a better understanding of what occurs under field conditions. While these preliminary findings are not exactly applicable to the field, researchers conclude that the largest fraction of applied nitrogen immobilization takes place at the lower rates of nitrogen application. On the other hand, with higher nitrogen application rates, a lesser fraction is immobilized, report Robert Munson and John Pesek who worked on these studies.

**Attempt to Renovate Coal Mine Spoil Banks**

Spoil banks from coal strip mines—those mounds of soil, boulders, stone and shale left by exhausted mines—present many problems in attempts to replant them with vegetation. The Experiment Station, in cooperation with the Iowa Coal Research Association, is conducting long-term studies to develop suitable methods for reclaiming these spoil banks.

Findings suggest that the seeding of drouth-resistant legumes on the flat tops of partially leveled spoils is likely to produce an acceptable crop during years of adequate rainfall. Seeding on spoils that have not been leveled, however, is a hazardous undertaking at best. During seasons of severe drouth, the production of a crop is not likely to be successful, except on leveled spoils or north-facing un-leveled slopes with high fertility.

In addition to legumes, the researchers are attempting to establish tree plantations on the strip...
mine banks. They are studying the ability of various species to survive when planted on spoil banks. Also under study are the effects of sawdust mulch, shade, hardwood leaf compost and wind protection on tree survival.

**Deep Placement For Insecticides?**

Recently there has been much publicity about new starter fertilizer applicators which place a single band on one side of the row and well below the seeding depth. When used to apply insecticide-fertilizer mixtures, the insecticide is also deep placed. Up to 1957 only the conventional "split boot" type of starter fertilizer applicators were used for insecticide-fertilizer mixtures.

Results of preliminary trials of the deep-placement applicators when used for insecticide placement showed that, on the average, the insecticide treatment gave only about 50 percent control at best. That is, it showed at least half as many rootworms as corn treated with the same fertilizer but without the insecticide. The same insecticide dosage applied with conventional equipment, however, quite consistently gives controls of more than 90 percent effectiveness.

More tests are needed on the new deep-placement equipment, reports J. H. Lilly who directed the trials. But, he adds, these preliminary trials indicate that the new type of applicator isn't an efficient way of applying soil insecticides.

**Can We "Outguess" The Iowa Weather?**

What are our chances of getting any precipitation on any particular day during the year? How much rain can we expect to get, on the average, during the month of July in Iowa? What are our chances for a good corn crop next year? Information of this type would be helpful in planning storage, irrigation and drainage programs and in selecting suitable cultural practices for successful crop production in Iowa.

Though no one can predict with certainty the amount of precipitation we will receive at any particular time in the future, we can figure the "chances" or "probabilities" of precipitation. Methods of developing these probabilities—using 54 years of recorded weather data—have been developed by Robert H. Shaw and co-workers at the Experiment Station in cooperation with the U.S. Weather Bureau.

It's important to know the amount of subsoil moisture available, too. For this reason, subsoil moisture samples are taken to a depth of 5 feet at selected Iowa locations in April, June, August and November of each year. This information on soil moisture conditions, coupled with known probabilities for rainfall in a given year, makes it possible to forecast general crop prospects for the state. The soil moisture situation and general crop prospects are published each year in the January issue of *Iowa Farm Science*.

**List Insecticides To Control Pests Attacking Potatoes**

In Experiment Station trials for the control of potato insects, test plots received six sprays 7 days apart applied with a tractor-mounted sprayer. The following insecticides are listed in descending order of their ability to prevent leaf damage by the potato beetle: dieldrin at ½ pound per acre, Sevin at 1 pound per acre, Thiodan at ½ pound per acre, Guthion at ¼ pound per acre, DDT at 1 pound per acre, parathion at ½ pound per acre, Demeton at ½ pound per acre, Diazinon at 1 pound per acre, and Perthane at 1 pound per acre.

When tested for control of damage by potato leafhopper, the same compounds ranked as follows: DDT at 1 pound per acre, Diazinon at 1 pound per acre, Perthane at 1 pound per acre, parathion at ½ pound per acre, Guthion at ½ pound per acre, Thiodan at ½ pound per acre, Sevin at 1 pound per acre, and Demeton at ½ pound per acre.
acre, Thiodan at ¼ pound per acre and dieldrin at ¼ pound per acre.

These tests are part of a larger study which includes studies of the biology of important insect pests of Iowa and their economic control. E. T. Hibbs was the key person working on this Experiment Station study.

Waxing Hybrid Rose Canes Improves Keeping Quality

WAXING THE canes of container-grown hybrid tea roses seems to offer the plant ample protection from drying out before being sold and replanted, says J. P. Mahlstede who is studying the culture of container-grown ornamentals.

Since waxing eliminates the necessity for high humidity conditions, fungus and other disease problems may be minimized through providing free air movement around the plants. Wax-ed plants can be forced to bloom sooner than unwaxed, protected plants. This suggests that potting should be delayed somewhat. Disbudding to force supernumerary buds or pruning waxed canes to slightly longer lengths is also indicated from these studies.

Mahlstede is also testing the effect of different wax temperatures on the performance of hybrid tea roses. He reports that because most roses contain both large and small diameter canes, the upper temperature for waxing should be about 190°F. with an immersion time of not over 3 seconds—probably less. Though the exact temperature for quick dipping can’t be determined, the limits will fall between 190°F. and 210°F. depending on the grade and temperature of the plants being waxed.

Geranium Virus Diseases Are Difficult to Detect

IDENTIFYING virus-type geranium diseases is a real problem in greenhouse production of this plant. For example, one type of virus disease affecting geraniums, called measles, is capable of causing symptoms of other virus diseases—such as crinkle, mosaic and streak—on the same plant.

Because of this problem, “indicator” geranium seedlings are being developed at the Experiment Station to study the diseases troublesome in this area, to develop disease-resistant lines and to facilitate keeping standard varieties free from disease. An interesting side development of this program, report C. H. Sherwood and M. C. Shurtleff who are directing the study, has been the finding that seed does best when sown a full week before it is usually considered ripe.

Study Role of Biotin in Nutrition

EXPERIMENT STATION scientists are investigating the part played by the vitamin biotin in the maintenance of normal growth of guinea pigs.

In early studies young guinea pigs on a semi-synthetic diet containing the anti-vitamin avidin grew slower than those fed the same semi-synthetic ration containing liberal amounts of biotin. Liver analysis showed that biotin concentrations were reduced in the avidin-fed animals. The experiment was repeated with confirming results. The avidin-fed animals had a slower growth rate, and many animals developed a biotin deficiency and lost weight. No differences in liver concentrations of fat, moisture or nitrogen were observed.

This project is being conducted by Charlotte Roderuck and G. L. Borchers.

Find Improved Home Laundering Methods

THE EXPERIMENT STATION’S long-time research on home laundering methods, directed by Florence Ehrenkranz, is now completed. Here are some findings to help Iowa homemakers do a better job on washday:

- Dacron is easier to wash than cotton; that is, under the same washing conditions more soil is removed from dacron.
- Cottons are cleanest when rinsed in softened water. With dacron on the other hand, about.
the same results are obtained after a hard water wash by rinsing in either hard or soft water.

- As soft water rinses are best for cotton, washers that automatically add packaged water softener to the rinse are a boon for laundering the cotton articles which still make up the bulk of the weekly wash load.

- Special water heaters to get extremely high water temperatures are not necessary for home laundering. Neither is it necessary to adjust thermostats of standard-type water heaters to excessively high settings. Tests showed no meaningful difference between wash water temperatures of 140° F. and 160° F.

- A cold rinse water temperature will conserve hot water, and tests between washers having cold rinse-water and warm rinse-water settings did not find any particular advantage for either type.

- Discount the current claims for cold water washes for cotton fabrics. Experiments point up that a wash water temperature of 120° F. is much inferior to 140° F.

- Avoid excessive use of soap or detergent. An excess leaves a build-up in the washed fabric that may require as many as 13 rinses to remove. This creates an especially undesirable situation when water is in short supply as it often has been in recent years.

This device is used to measure the degree of lean of cottonwoods in Experiment Station studies of the physical properties and characteristics of so-called tension wood.

Conduct Basic Study On Tree Competition

Most people are aware that plants compete among each other for available sunlight and soil moisture. Much about how and how much they compete, however, is still unknown. To learn more about this process, Experiment Station foresters have started a critical analysis of the effect of light and soil moisture on plant competition of five tree species.

Nine temporary greenhouses have been constructed from lumber, lath, polyflex (a plastic which is more durable than polyethylene) and muslin. The greenhouses are designed to allow varying degrees of sunlight to reach the plants (see photos). Also, within each greenhouse two different levels of soil moisture are maintained. Other physical factors, such as temperature and humidity, will be checked and compared with plant growth and survival.

The tree species under study are European larch, hazelbrush, white pine, dogwood and Norway spruce. Gordon Gatherum, A. L. McComb, Glen Deitschman, John Krajicek and Mans Eillerhoff are conducting this study.

Compare Tension And Normal Woods

TENSION WOOD, an abnormal type of wood which occurs in many hardwood species, is developed mainly on the upper side of leaning trees. Two Experiment Station studies are presently under way to learn the physical properties of this tension wood and its effect on various characteristics of cottonwood.

One of the studies is designed to determine the effect of the environment in which the trees are grown on the formation and concentration of tension wood. The researchers also hope to learn the causes of tension wood formation and to develop some methods of forest management for handling the tension wood problem.

The other study was planned to compare certain strength properties of tension and normal wood from leaning cottonwood trees. Strength tests of compression parallel-to-the-grain and toughness were chosen for the comparison.

The compression parallel-to-the-grain test is a measure of the endwise compression of wood and is related to the use of wood as short posts or props in many types of construction. Toughness is a term describing the ability of wood to resist shock. The toughness test is used largely as an over-all estimate of the quality of wood for critical uses.
Results of the toughness testing showed that tension wood in eastern cottonwood is much tougher than normal wood, and toughness values increased from the pith to the bark. In the compression tests, however, normal wood was found to be considerably stronger than tension wood.

The Iowa Experiment Station cooperated with the Forest Products Laboratory, Madison, Wisconsin, in the second of these studies. Key personnel working on this general problem of tension wood are: Graeme Berlyn, Laurence E. Lassen, D. W. Bensend, J. R. Sass, F. J. Homeyer and Maxon Pillow.

Test Wood Joints For Glue Line Failure

The development of modern resin glues and their growing importance in many phases of the wood products industry has pointed out the need to improve methods of measuring glue line quality. Because of this, researchers are comparing glued wood joints of varying quality. Stresses are placed on the glue line and the percentage of wood failure is noted. Further work is necessary, however, before recommendations can be made, according to Ray Renaud and D. W. Bensend, who are conducting the tests.

Seek Ways to Identify Dwarf Carriers

A simple and reliable method of identifying animals carrying the dwarf gene is needed before we can eliminate dwarfism from Iowa herds.

So far, radiographing the loin vertebrae of young calves continues to be the most promising method for identifying dwarf carriers. As yet the technique is not sufficiently accurate for general use by breeders. This is due to some apparently normal variations in vertebrae which, while they are not associated with the dwarf gene, cannot be distinguished from those caused by the dwarf gene.

Other dwarf sleuthing techniques are physiological studies of the blood components and the changes in blood components which are associated with stress. These studies are still in the preliminary stages, but show future promise because of their simplicity and the endless variety of tests which can be performed.

This work is a part of a larger study bearing on the Experiment Station's research in beef cattle breeding. In two other approaches the station is developing intensely inbred lines and is studying the relationship between carcass quality and production. Key personnel include L. N. Hazel, G. L. Patles, J. L. Lush and L. E. Johnson.

Study Off-Flavor Milk Problem

Experiments aimed at finding the causes and controls of off-flavor milk are being conducted by C. F. Foreman and co-workers at the Experiment Station.

Monthly checks on the milk flavor of each cow in the Iowa State College herd were made by a three-man "taste panel" for a year. Only slight flavor score differences existed between breeds or months. However, the panel found a large number of different flavor defects or characteristics. Those that are caused by feeds can largely be eliminated. For example, silage should not be fed until after milking, while many pasture flavors can be controlled by taking the cows off pasture 2-3 hours before milking and feeding them hay.

In a study designed to discover methods of eliminating oxidized flavors, research workers fed cows menadione (vitamin K) and tocopherol (vitamin E). Tocopherol showed more promise than menadione in controlling this flavor defect, though only preliminary results have been obtained so far.

Future experiments will attempt to uncover the effects of seasonal variations, stage and length of lactation, age, breed, climatic conditions and results of stress and disease on milk flavors. Other workers on these studies include E. W. Bird, F. E. Nelson and W. S. Rosenberger.