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Progressive Agriculture

IN ARIZONA



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Controlling FLIES with a *Space Sprayer*

By F. G. Harland and G. D. Butler
Depts. of
Dairy Science and Entomology

Dairy barn fly control is important to the Arizona dairyman because it affects his personal comfort, the cow's milk production, and the wholesomeness of the product.

Fly reduction is accomplished by a combination of practices in and around the barn. Sanitation about the premises eliminates many of the fly-breeding places. In addition, periodic spraying of the entire premises with malathion, malathion bait sprays, and the more frequent use of space sprays with pyrethrins in the barn materially reduces the fly population.

Use Every Day

Space sprays are used as often as every day during the worst part of the fly season. Therefore, a simple, labor-saving, standby spraying system is needed in the milking barn. Equipment used in the University dairy barn and observed in use in other barns has produced a very satisfactory fog of a suitable insecticide to produce fast fly knock-down and kill.

The equipment needed to disperse the insecticide includes a small air compressor similar to the 3 C. F. M. paint-sprayer compressor used about the home. Compressed air lines of 1/4 inch galvanized pipe are attached to nozzles capable of dispersing 2 ounces of insecticide in 5 minutes in particle sizes of 4 to 10 microns and mounted on 1/2-gallon jugs. Two or three such nozzles are needed in

Space sprayer in the University of Arizona dairy barn operating from compressed air. (This unit and spray materials were furnished to the University for trial, by the Indian Head Manufacturing Co., Phoenix.)

the average milking barn, depending on shape, to obtain complete coverage. One nozzle placed in the adjoining milkhouse also controls flies in that portion of the building. Here again, the spray should be used prior to the washing of the equipment after milking-time. The equipment can be turned off automatically after the specified length of operation through use of a time switch.

The equipment illustrated in this article was designed for use in either the milking parlor or the conventional, level milking barn. It produces a good fog with 4 ounces of insecticide per 10,000 cubic feet of air. The average walk-through or parlor barn has approximately 7,500 cubic feet of air space and 10 minutes of operation is ample.

Non-Poisonous Insecticide

The insecticide used must be non-poisonous (non-toxic) and in a clear, odorless oil base. Pyrethrum or synergized pyrethrins (piperonyl butoxide) weighing 6.7 pounds per gallon was very effective in killing the flies in these milking barns.

The space sprays are very appealing to dairymen as a supplement to the use of residual sprays in fly control. Space spraying is a convenient, quick-killing method to use whenever the effectiveness of the residual sprays has worn off and the flies become a great nuisance once again.

The space spray varies widely in its adaptability for application. Fogging may be done either with or without the cows in the barn. When the cows are in the barn, they benefit directly as the spray kills the flies on the animals.

The barn may be fogged while the operator is assembling the milking machines in the milkhouse. Another alternative is at the conclusion of the milking and before clean-up operations begin.

SHARE P.A.

Do you have a neighbor or friend interested in Arizona agriculture who does not regularly (4 times a year) receive *Progressive Agriculture in Arizona*?

We'd consider it a favor — and we hope he would too — if you would send his name and address to the editor. We'll be glad to mail our magazine to him. This applies to homemakers, too, for we include one or two articles especially for them in every issue.

Also, if by any chance your work and interest is such that you no longer read *Progressive Agriculture*, a "Drop my name . . ." message would be appreciated.

THE COVER PICTURE

Field of Upland Cotton on the University of Arizona farm at Tucson, 1954. Notice the University farm buildings at edge of the cotton field. Photo by W. E. Bryan.

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Groundwater Recharge of the Upper Santa Cruz Valley

By H. C. Schwalen and R. J. Shaw
Agricultural Engineering Dept.

The summer rainy season of 1954 provided one of the most effective periods of summer recharge from flood flows in the last 50 years. No new records for either daily or monthly maximums in precipitation were established at rain gage stations. However, the summer rainfall was above normal and well distributed with few days without sufficient rainfall in some portion of the drainage area to cause runoff in the Santa Cruz River.

Usually the summer floods are not considered to be particularly favorable for groundwater recharge because of their short duration and flashy characteristics. Records from the U. S. Geological Survey stream gaging stations indicate that for about 90 days during the summer of 1954 there was flow at the Nogales station; and for about 60 days, at Tucson. At the Nogales gaging station the total flow for the summer amounted to about 28,000 acre-feet and at Continental about 37,000.

The total flow of the Santa Cruz River at Tucson for the summer exceeded 35,000 acre-feet. Only a small part of the Nogales runoff actually reached the Tucson gaging station. Because of the large amount of unmeasured surface inflow from Nogales Wash, Sonoita Creek, Sopori Wash and numerous smaller tributaries, it is impossible to estimate the actual loss by seepage between gaging stations on the Santa Cruz River.

The map of the Santa Cruz Valley between Rillito Station and the Mexican Boundary shows the extent of recovery in water levels along the river both in area and amount of rise as shown by water level measurements in the spring of 1955, compared with 1954.

Effective Recharge

Recharge was most effective in those sections where the stream bed is wide and flat with a coarse sand or gravel bed. Such conditions combined with flows of long duration resulted in a maximum recovery of about 30 feet in the vicinity of the Nogales City pumping plant, completely filling the groundwater reservoir to the stream bed. There was recovery of an almost equal amount in the area below the junction of Sonoita Creek and Nogales Wash with the Santa Cruz River,

decreasing to about 4 feet at Tumacacori.

Downstream from Tumacacori and extending as far as Continental the conditions for infiltration are not quite so favorable with the result that recovery of only between 2 and 4 feet took place, sufficient to make up for the 1953 and 1954 pumping draft. In the Sahuarita area, where lowering due to increased pumping in 1953 had been particularly severe, excellent recovery was observed, although not enough to bring water levels back to the 1953 spring position.

From Sahuarita northward past the City of Tucson the river channel is narrower in width, with less pervious stream bed, and recharge was limited to about a mile in width of the bottom land in which the water table was back to about its 1953 position. Northward and extending to Rillito, significant recovery took place, varying between 3 and 6 feet and offsetting a greater part of the losses of the past two seasons.

Lowering Since 1939

Since 1939 water level measurements have been made along the Santa Cruz River from Rillito to the Mexican Boundary and, with few exceptions, consistent lowering has been observed in all areas, accelerating in those areas of increased pumping draft.

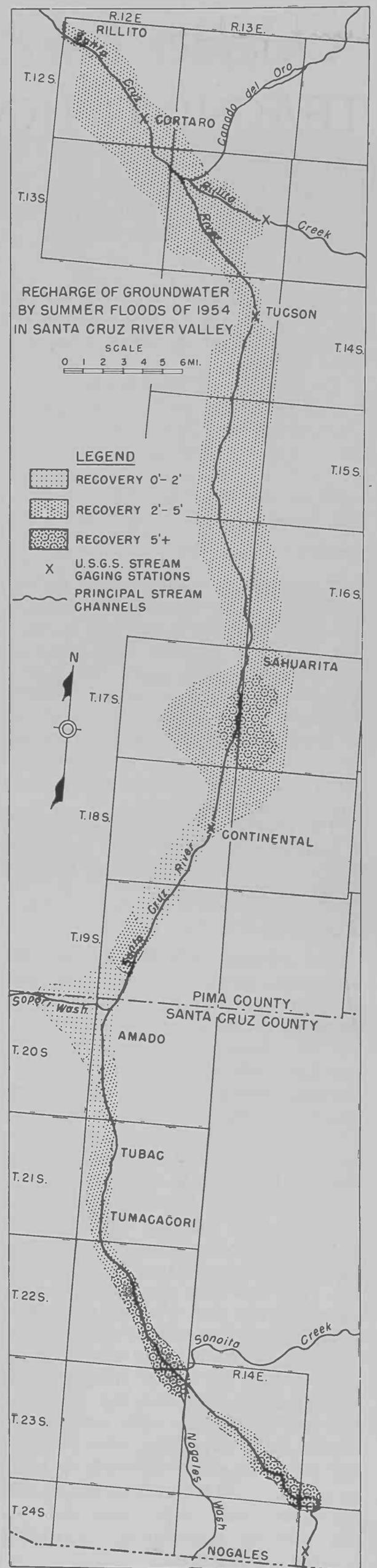
Flooding of fields in some areas and reduced demand for irrigation water due to summer rains are responsible for part of the recovery, particularly in those areas of normally heaviest pumping draft. The general recovery throughout the entire valley shown by the 1955 spring water level measurements is, however, indicative of the effectiveness of recharge from the more continuous type of stream flow occurring in the summer of 1954.

Recharge Reasons

Flooding of fields by runoff from valley slopes and to a minor extent from overflow of the Santa Cruz River, together with summer rains resulted in some decreased pumping draft. Thus, all of the recovery or reduction in rate of lowering cannot be credited to direct recharge from stream flow. However, the general recovery in water levels adjacent to the Santa Cruz River is indicative of most effective recharge from the long duration flood flows of the summer of 1954.

In contrast with the Santa Cruz River very limited opportunity for recharge occurred from stream flow in Rillito Creek, the principal tributary of the Santa Cruz. Summer flood flows amounted to only 6,600 acre-feet and lowering of water table from 0 feet to 10 feet was observed.

Better than words this map shows the area and amount of groundwater recharge in the Santa Cruz River Valley.



A Career For You - - TEACHING HOMEMAKING

By June B. Wall
Department of Agricultural and
Home Economics Education

Doing some heavy thinking about a career? What to do after high school days are over? How about home economics?

The teaching of homemaking today is a good career and while you are getting professional training, you can also obtain knowledge and experience that will help you later to become an efficient, understanding and happy homemaker, wife and mother.

Qualifications

The teaching of homemaking requires enjoyment of the activities and skills involved in home economics and in teaching: a liking for work with people, a sympathetic attitude and a readiness to help others; a sense of humor; a likeable personality, and good health; resourcefulness and adaptability in meeting new situations; willingness to work hard; and interest in volunteer service to the school and the community.

The educational qualifications include a bachelor's degree in home economics education from an accredited four-year college or university.

Activities

The subjects you will teach in home economics include: selection and construction of clothing, nutrition for the family, selection and preparation of food for the family; personal, family, and group relationships; child care and development; management of time and money; housing and home furnishings; selection and use of household equipment; family health; home care of the sick; first aid; and safety in the home.

As a teacher of homemaking, working with boys and girls, you will create opportunities for young people to practice the skills of homemaking and family living. You will help them learn to share their work and play. You will guide them in working out solutions to personal and family life problems. You will encourage them in their big job of growing up; it is an exciting and challenging experience. You will work with other teachers and school officials in planning school projects and social functions. You will maintain an attractive and homelike atmosphere in the homemaking department and you may plan for redecorating, remodeling, or other improvements.



A student teacher (left) helping a student evaluate a home project which is to be submitted as one of the requirements for a degree in the Future Homemakers of America.

Opportunities

The opportunities for positions in teaching homemaking are very good and beginning salaries are high. Positions are available in communities of all sizes and in all sections of the country. There are now approximately 22,000 home economics teachers employed in 18,750 public secondary schools in the United States. This is the largest group in any wage-

earning home economics field. The demand for these qualified homemaking teachers is greater than the supply—an estimated 4,000 to 5,000 new teachers are needed each year. The placement situation is especially good in Arizona where the number of multiple-teacher departments has doubled in the past ten years.

There are possibilities for advancement which can come rather quickly in home economics teaching. Very often you can advance by improving or enlarging the homemaking program in the school where you are; or you may choose the school system of a larger community with a corresponding increase in salary. Later you may wish to consider specialized graduate study to equip yourself for an administrative or supervisory position, or a place on a college faculty, including teacher training to help others become successful teachers of homemaking.

There are many satisfactions in teaching homemaking. You will see many evidences of growth and development of students; a source of great satisfaction and one of the matchless rewards of teaching. You will gain personal satisfaction from helping people get new ideas and learn new ways of working. You will feel needed when others turn to you for counseling and advice. You will have the satisfaction of knowing that you are developing your own skill in working with people, are gaining in understanding of others, and are proving yourself capable of the work required for successful teaching.

A student teacher (right) guiding the instruction of a high school student in a clothing project. The supervising teacher is observing.



Cantaloups RESISTANT to Crown Blight

By R. E. Foster

Department of Horticulture

Considerable progress has been made in the University of Arizona's cantaloup breeding program. One of the breeding strains is now resistant to crown blight to the point that, even in reasonably heavy crown blight years, it could be harvested for ten additional days after PMR 45 is abandoned to the disease. In plots not severely affected by crown blight, this variety produces the same as PMR 45 in regard to both number of fruit and size of fruit.

This strain shows no difference to PMR 45 in external shape of the fruit nor in blossom-end thickness of the flesh, rind thickness, cavity dryness, flesh firmness, net thickness, net density, or the sutures. The Arizona strain has a narrower cavity and is significantly higher in sugar content. This particular strain needs only to be stabilized before it can be released to Arizona growers and with an intensification in the breeding program, this could be done in one or two years.

Crown Blight Serious Problem

Behind this progress toward crown-blight-resistant melons is the story of the seriousness of crown blight of muskmelons. Crown blight of muskmelons has been described as the worst disease of cantaloups in Arizona (Progressive Agriculture, Vol. 6, No. 1, 1954). The severity of crown blight may vary from year to year, but each year growers lose melons, and in severe cases up to two-thirds of the crop may be destroyed. With the dying of the center or crown leaves of the plant, not only is the normal development of the fruit impaired, but those fruit that attain marketable size are exposed and may become unmarketable because of sunburn.

Crown blight occurs in all of the cantaloup growing areas of Arizona and is an important problem in Imperial Valley, California. In 1952 the disease became serious in Arizona and in 1953 concentrated research was begun by the University of Arizona in cooperation with the University of California and the U. S. Department of Agriculture.



Crown blight resistant cantaloup strain on the right compared to susceptible strain on the left.

Cooperative research has been continued by these institutions and specialists are investigating various phases of the physiology, pathology, entomology, and biochemistry of the disease. So far no measures have been found to control the disease. Fortunately, according to tests conducted since 1952, there is some hope for the control of cantaloup crown blight through the use of varieties apparently resistant to the disease.

Tests Show Differences

Seven cantaloup variety trials were conducted by the University of Arizona in 1952,* 1953,* and 1954 and in each test, Arizona breeding stocks were compared with the standard commercial varieties. Crown blight occurred in each one of the tests. In all of the tests the University of Arizona breeding strains showed less crown blight disease than the standard PMR 45 variety or any other variety tested. Another commercial strain, PMR 6, has been consistently the variety most susceptible to crown blight. Since (1) the Arizona breeding stocks are less susceptible to crown blight than PMR 45 under a wide range of

conditions, and (2) the PMR 6 variety is always the most susceptible, indications are strong that the reaction to crown blight is controlled by the genetic makeup of the varieties. Plant breeding methods may, therefore, be used to increase resistance to a valuable level.

Breeding for cantaloup crown blight resistance has become a very important part of the vegetable breeding program conducted by the Horticulture Department of the University of Arizona. All of the breeding stocks in the program are being tested and compared for crown blight resistance. Hybrids are being made between resistant strains and between resistant stocks and the susceptible commercial varieties. Individual plant selection and other breeding techniques are being used to intensify resistance and to combine it with other desirable characteristics.

In addition to the breeding conducted on the University Experiment Station, Mesa (to be increased with the new facilities at the Yuma Station), work is being done in the greenhouse to determine the nature of crown blight resistance and to obtain some information regarding the cause of the disease.

*By J. K. Stewart



Field of Pima S-1 Cotton showing height and productiveness of the plants. At the University of Arizona farm at Tucson, 1954.

PROSPECTS FOR PIMA S-1 COTTON

By W. E. Bryan
Department of Plant Breeding

Lint yield per acre both in plot tests and in commercial fields, extending well over the entire Egyptian long-staple-cotton district of the Southwest indicates that Pima S-1 yields satisfactorily. Also, the spinning tests show that Pima S-1 can be used for spinning most of the fabrics for which Pima 32 and Egyptian Karnak are used. It is, therefore, believed that if yield and spinning quality can be maintained at levels which have been obtained up to the present time with Pima S-1, this variety will be able to compete with the best imported long staples.

This article sets forth the origin and both merits and limitations of Pima S-1 as seen now.

Yield Tests

The following table shows the lint yield in pounds per acre as an average of four years (1951-1954). (From data furnished by Dr. R. H. Peebles of the U.S. D.A.)

Location	Lint per acre in pounds	
	Pima S-1	Pima 32
Sacaton, Arizona	640	580
Mesa, Arizona	850	615
State College, New Mexico	535	384
Ysleta, Texas	778	712
Average	701	573
Average difference	128	
Percent excess of Pima S-1	22.3	

Spinning Tests

The following tabulation shows the results of a laboratory spinning test conducted by the United States Department of Agriculture Spinning Laboratory. The results are averages from samples grown at Brawley, Calif., Yuma, Ariz., Sacaton, Ariz., State College, N. M., and Ysleta, Texas. (From data furnished by Dr. R. H. Peebles of the U.S.D.A.)

	Skein Strength		Yarn App.	Comber Waste
	36's	60's		
Pima S-1	109.6	57.2	115	10.84
Pima 32	110.3	57.6	109	13.84

In skein strength, the two cottons are very similar. In yarn appearance, Pima S-1 is about 1/2 grade better than Pima 32. In comber waste, Pima S-1 is significantly less wasteful in the spinning process than Pima 32, due to a smaller amount of short fiber in Pima S-1.

In 1954, the National Cotton Council of America conducted a commercial spinning test with 11 spinning mills in the United States comparing Pima S-1 with Pima 32 and Egyptian-grown Karnak. In 1954 the Council summarized the results of this test as follows:

1. The processing efficiency of Pima S-1 was equal to that of Karnak and Pima 32, and Pima S-1 produced 1-2 percent less waste than Karnak from opening through combing.
2. Pima S-1 produced 25-50 percent less neps than Karnak when carded at the same rate.
3. For a given twist Pima S-1 consistently made a stronger yarn than Karnak with the amount of twist required to obtain maximum strength being approximately the same for all three varieties.
4. For a given draft, yarns made from Pima S-1 were consistently stronger than those made from Karnak when processed under the same conditions.
5. Pima S-1 yarns were consistently more uniform than Karnak or Pima 32 regardless of processing variables.
6. Regardless of twist or draft, yarns made from Pima S-1 exhibited a higher elongation than Karnak or Pima 32 when processed under the same conditions."

Origin

Pima S-1 originated as a single plant selection from crossing the following varieties:

Pima (original)

Stoneville 4 (upland)

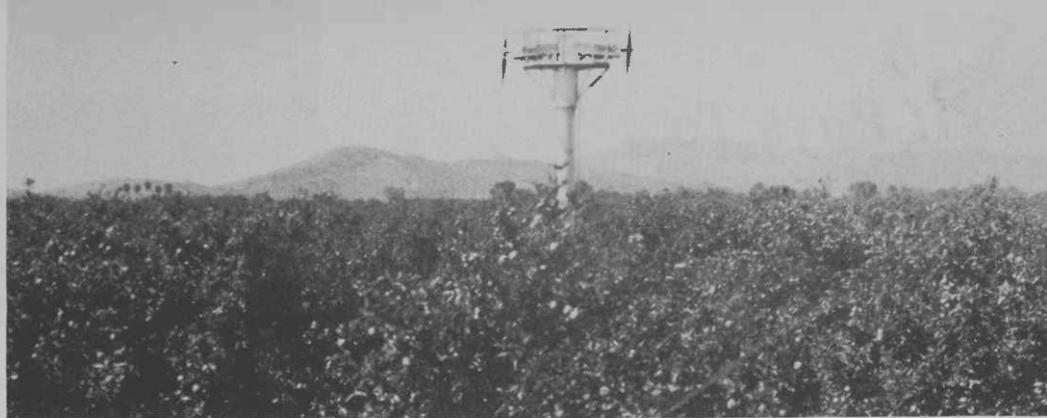
Sea Island (later type, with low plant)

Tanguis, from Peru of South America.

Crossing was begun in 1934 and in 1947 a single plant selection was made which gave rise to the Pima S-1 variety. The population from which this single plant was selected was the result of six basic crosses between the original varieties and selected plants within the crosses, each of which had one or more desirable characters. The characters used as a basis of selection were low plant, productiveness, large well-opened bolls, medium length of lint, and higher lint percentage. After three years of testing at Tucson the selection was transferred to the United States Field Station at Sacaton, Arizona, for further testing and seed increase by the United States Department of Agriculture. At this time when it became apparent that the selection might have possibilities as a commercial variety it was given the name Pima S-1 in order to identify it with the Egyptian long staple cotton varieties, since "Pima" has become somewhat of a generic name for this class of cottons.

WIND MACHINES for Frost Protection

By R. H. Hilgeman and L. H. Howland
Department of Horticulture



In Arizona, very little performance data have been obtained on wind machines until 1954-1955 when an unusually cold winter provided an opportunity to obtain information on 14 nights around a rotating machine in the center of the 40-acre University of Arizona Citrus Experiment Station tract near Phoenix. The machine had two 75 brake-horsepower gasoline motors powering 13.5-foot propellers.

Air Drift

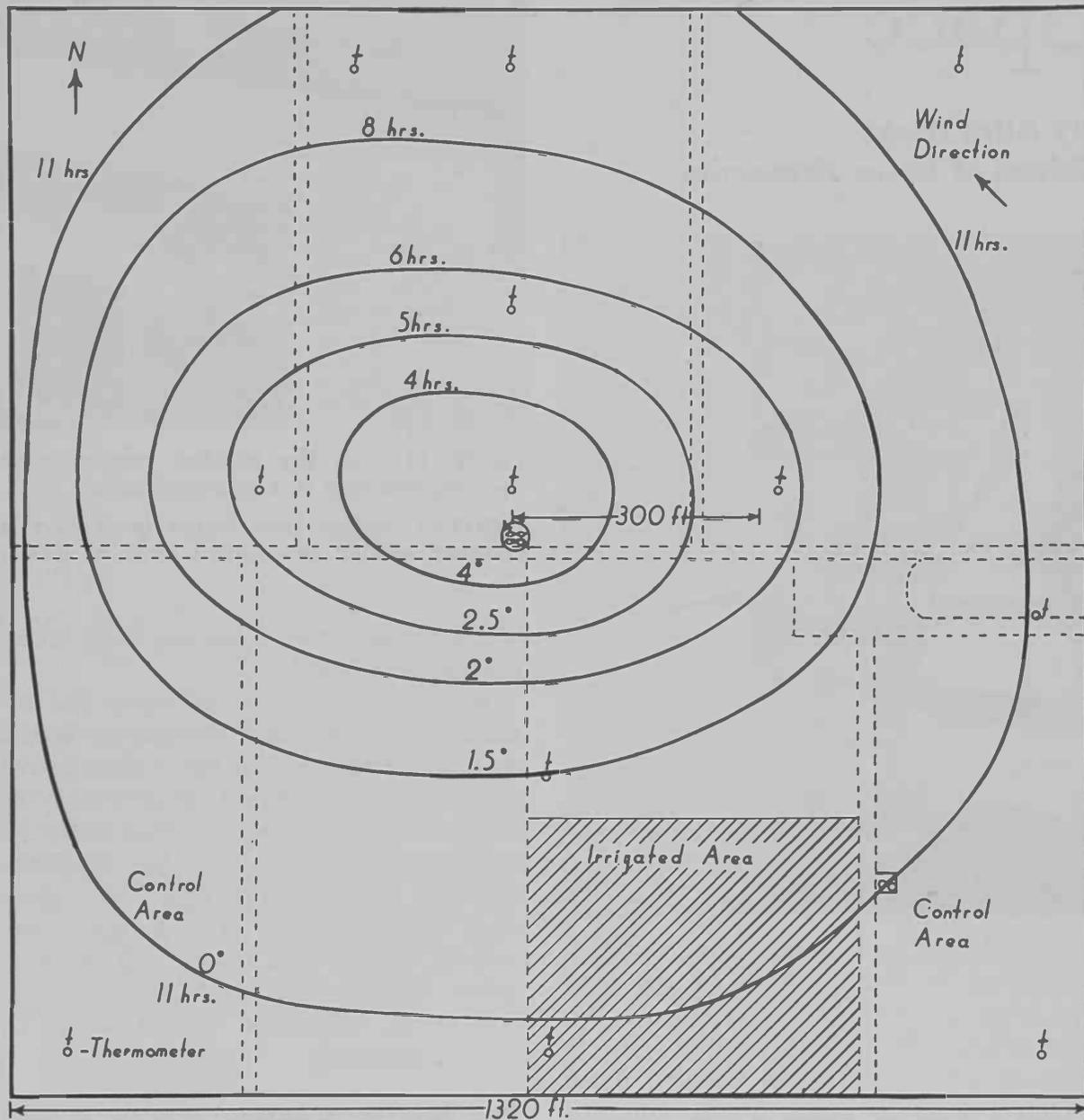
The machine raised temperatures the most to the northwest because of the air drifts from the southeast. On one night the temperature just outside the area influenced by the machine dropped rapidly to 26 degrees and gradually and rather uniformly thereafter to a low of 20 degrees. The wind machine retarded the rate of drop so that the number of hours below 26 was reduced from 11 on the south side of the tract to five within 300 feet of the machine on the northwest side. The pattern of protection was reflected in the fruit injury which occurred in oranges and grapefruit and the defoliation of lemon trees.

Loss Variation

A complete loss of fruit and 100 percent defoliation of lemons occurred in the 8- to 11-hour zone, excepting the irrigated area. The damage became progressively less as the number of hours below 26 degrees was reduced. Within the five-hour zone about 10 percent defoliation occurred on lemons and although "slush ice" formed in oranges, freezing injury did not develop and the fruit showed no signs of frost damage. In the 5- to 8-hour zone variable degrees of damage developed. The most seriously damaged fruit was graded out. About 60 percent of the crop was packed as first grade.

Irrigation Affects Temperature

Irrigation water at 59 degrees applied to healthy vigorous Valencia orange trees raised the temperature between 2-3 degrees and, even though "slush ice" developed in fruit on that night and repeatedly in subsequent freezes, about 75 percent of the fruit was packed as first grade.



TOP: Wind machine used in tests.

BOTTOM: Pattern of temperature increases with hours below 26°F. around wind machine in center of 40-acre tract. Outer circle represents 11 hours below 26° with minimum temperatures of 18-20°F. Average temperature inversion 9.5°F.

The irrigation water increased the moisture content of the leaves early in the morning following the freeze. This suggests that high soil moisture may also induce a physiological change which provides more cold tolerance within the fruit and leaves.

Data obtained on all of the 14 cold nights reveals that the increase in temperatures approximated the average on the downdrift side of the machine. The increase in temperature was always markedly greater downdrift from the machine rather than upwind.

Temperature Inversion

The temperatures of the air at 50 feet and at 5 feet above the ground were

measured to determine the amount of the temperature increase caused by the wind machine. When this inversion difference was more than nine degrees, from 2.3 to 3.7 degrees increase in temperature occurred 300 feet downdrift, whereas when the inversion was below seven degrees a lift of 1.3 to 2.2 degrees was obtained.

It is clear that both the area of protection provided by a wind machine and the increase in temperature will vary with climatic conditions. Air drift was not consistent and in this location wind machines could not be distributed symmetrically without reference to the "prevailing" drift. It is necessary to provide supplemental heat for more complete protection.

It Pays To Organize Kitchen Space

By Alice Books
School of Home Economics



The American homemaker of today is interested in finding ways of reducing the time and energy she spends in the performance of her daily tasks. She is motion-minded and seeks simpler, more effective ways of doing things. She appreciates the value of good posture in housework and conserves her energy by sitting for long, tedious jobs. She studies and buys labor-saving equipment. She uses new products which make her work easier or which save time. She accepts simpler standards for finished products.

Aims at Simplification

With simplification of work in mind the homemaker may find it worth while to take a long and thoughtful look at her kitchen. Such appraisal may reveal the need for reorganizing work space and rearranging storage of tools, cutlery, utensils, and equipment. If customary storage of these small articles has been a single central drawer, they should be separated and stored in the places where they will be used. Some of these articles are more easily grasped when they are hung singly or pre-positioned in racks. Duplicate sets of measuring spoons, mixing spoons, paring knives, measuring cups are often worth their cost because



LEFT: Having the mixing center near the refrigerator is a convenience.

ABOVE: Notice that items used at the cooking center are stored near at hand.

of the convenience of having them accessible when needed.

When reorganization of space and rearrangement of large equipment seems desirable in the kitchen, the skillful homemaker makes the changes after a study of kitchen activities. She finds that the usual activities can be classified. She therefore organizes kitchen work space into three main categories: the mixing center, the cooking and serving center, and the sink center. Organization on the basis of function is an important consideration in kitchen planning.

The Mixing Center

The mixing center may be located adjacent to the refrigerator with advantage. A table or counter top at the refrigerator door opening is a good starting point for organizing this center. Equipment stored at this unit may include: electric mixer, rotary beater, sifters, mixing bowls, mixing spoons, measuring cups, measuring spoons, spatulas, some knives, baking sheets and pans of various size and shape, casseroles, racks, refrigerator dishes, bowl covers, special baking and decorating equipment. Foods stored here include flour, sugar, fat, leavenings, spices, flavorings. Waxed paper, aluminum foil, seals, and tapes are convenient for use when kept at this center.

Cooking and Serving

The cooking and serving center may best be set up around the kitchen range. Here are a counter top and cupboard space for storing frying pans, kettles, double boilers, saucepans, stirring spoons,

thermometers, turners, lifting spoons. Lids are stored in racks near the range. Serving dishes such as platters, vegetable bowls, and gravy boats are stored here. Food supplies at this center are flour, coffee, tea, and seasonings.

Sink Surroundings

The American homemaker finds that the sink center becomes doubly useful when tools used for the preparation of fruit, vegetables, and poultry are close at hand. Brushes, strainers, paring knives, a cutting board, kitchen scissors, liquid measuring cups are used here and may well be stored along with the usual dishwashing and scouring equipment at the sink.

For the dishwashing function of the sink center, she considers arranging work space with the right-to-left sequence. At the right of the sink is enough clear space to accommodate stacked dishes to be washed. The left drainboard is free for the dish drainer. Shelves above the left drainboard provide good storage for dishes which are not in use. Supplies and materials stored at this center include soaps and synthetic detergents, scouring pads and powders, metal polishes, dish cloths, dish towels, paper towels and paper bags.

Surveying the results of reorganizing her kitchen on the logical basis of areas of activity, the homemaker appreciates the efficiency of such an arrangement. She knows that the results will mean to her fewer steps, fewer motions, less time spent in searching for the right tool. All of these add up to real work simplification.

REPORTING ON *New Strains of Cotton* TESTED IN 1954

By E. H. Pressley
Department of Plant Breeding

YIELD AND SPINNING QUALITY OF 15 NEW STRAINS COMPARED WITH 44

Strain	Yield % of 44	Bolls per lb. of SC	% Lint	Length U H M	Fine- ness	Strength of 22S Yarns	Yarn Appear- ance	Nep Count
44	100	58	37.8	1.09	4.30	131.6	97	15
124-47-11	99	69	36.9	1.09	4.32	139.5	105	15
124-62-6	104	62	37.2	1.07	4.72	137.9	105	11
124-67-6	101	59	37.8	1.09	4.59	137.8	105	11
124-68-1	103	58	38.4	1.07	4.64	137.4	110	9
124-68-4	105	58	37.4	1.08	4.66	131.1	115	10
124-68-5	102	57	38.0	1.09	4.87	131.1	105	8
124-70-9	99	66	37.4	1.09	4.73	137.2	110	11
124-70-10	103	65	37.8	1.08	4.75	134.8	110	12
124-79-3	101	70	38.5	1.06	4.32	121.9	95	19
101-4-1	109	58	38.1	1.13	4.27	128.1	100	16
102-55-5	104	63	37.4	1.11	4.17	125.3	100	18
T 101-86-3	92	68	36.7	1.15	4.47	133.1	105	12
T 103-25-2	101	63	36.2	1.13	4.46	129.1	110	12
Q 101-9-1	104	60	37.0	1.10	4.62	128.9	100	19
725-7	99	63	37.1	1.08	4.63	131.5	110	10

In 1954, 25 new strains of cotton were tested at the University of Arizona research station at Mesa. These new strains resulted from crosses made in 1948 between Arizona and California varieties, each of which has one or more desirable characters. In 1949, the first generation of each cross was backcrossed to each of its parents. Selections were made each year, and a large number of individual plants were studied in the field and laboratory. From this great mass of hybrid material the new strains now being tested were derived.

Development of Strains

Throughout the years since 1949, elimination has been carried out on the basis of plant characters shown in the field and fiber qualities as determined in the laboratory. By far the larger number of strains retained at the end of 1954 are from the backcross A X D (44 x A X D). A X D is a strain developed at the Sacaton Station from the cross Acala x Durango. Among its many good characteristics are high yielding ability and strength of stalk as well as better than average spinning quality.

Strains of Promise

In the following table all strains with numbers beginning with 124 were derived from this backcross; while 725-7 is from a straight cross of 44 and A X D. Of the 25 new strains tested in 1954, fifteen were considered of enough promise agronomically to justify testing for spinning quality. (See the table.)

Fiber Length

Fiber length was calculated from determinations made on the fibrograph, and is the average of the work of two laboratories. Fineness of lint was determined on the micronaire. Values for yarn strength, yarn appearance, and nep count were furnished by the spinning laboratory at College Station, Texas.

Spinning Quality

While yield is of the utmost importance, the spinning quality of the fiber produced must be given due consideration. The yarn strength of the new strains was in most cases equal to or superior to that of 44. In only one case was the yarn

appearance inferior to 44. This strain, 124-79-3, was poor for practically all determinations, and has been discarded from the breeding stock.

If 44 is included there were five strains in the test with a micronaire reading of 4.32 or less. This is considered rather fine for upland cotton. Their average yarn appearance was 99. The other 11 strains

had micronaire readings of 4.46 or higher, and their average yarn appearance was 108. This is a difference of one yarn grade in favor of the coarser fiber.

Nep Count

There was also a marked difference in the nep count. The five finer-fibered strains averaged 16.6 neps per 100 sq. in. of card web, while the 11 coarser ones averaged 11.4—a difference of 31 per cent.

Some of the test rows of developing cotton strains at the University of Arizona.





The author inspecting a few of the more than 1/10th million insect specimens in the University of Arizona collection.



identifications. It is easier and more satisfactory to compare an unknown specimen with one already determined than it is to identify it by comparison with a description in the literature.

For Many States

Secondly, the University collection is a study collection for entomologists in many states. Arizona entomologists benefit from similar collections in other states. At the University we are attempting to get a sample of all of the insects that occur in this state. When a specialist studies a particular group of insects, he can gain knowledge of our species without actually visiting the areas from which they came. Specialists usually work on all the species in a group from a very large area and cannot be expected to visit all the states they cover. They must depend on the collections amassed by others. Work of entomologists in other states is helped by the inclusion of our material; and we benefit from their studies and by getting back a series of authentically named specimens.

For the Record

Thirdly, the collection is a file of unalterable records. A specimen saved, with its date and locality of capture, authenticates a written or published record. Without them it is not easy to build on the work of the past. Our activities in connection with the Cooperative Economic Insect Survey are resulting in many new records of economic insects; specimens are added to the collection which will result in a truly permanent record of the insect activities during this period.

In most cases a specimen consists of a dried insect, pinned directly or glued to a small triangle of cardboard which is pinned. The specimen is worthless scientifically unless a label giving at least the locality and date of collection is on the pin, too. A specimen bearing still further labels is of considerably greater value, particularly if an additional label tells the food plant or other host on which it was taken. If the host is a plant or animal that provides all or part of our livelihood we are, of course, immediately concerned; often an apparently unimportant host proves to have an important part in the support of insect pests that are detrimental to us.

How We Are Affected

There are many indirect ways in which insects affect us. Most noteworthy are those that kill other insects: the predators and parasites that keep down the numbers of crop pests. We do not yet have a sample of all of these—not do we

know them all by name. It is of importance to learn whether these insects are restricted to crop pests in their feeding or whether they also affect insects on other plants. If they do, we may eventually want to encourage a high population of the parasites and predators.

Then there are the many insects that are involved in the pollination of plant crops. As more and more of these are collected on certain plants, a clearer picture emerges, which shows which ones are our best friends. These, too, could well be encouraged.

Lastly, there is a very large number of species that do not seem to be associated with agricultural ventures, but with the plants of the desert, grassland or forest. We do not know what most of them are doing most of their lives. Each must affect the balance of the other animals and plants of these areas in some small way. The occasional periods of great abundance of otherwise very scarce species indicates that each is being kept down by another and perhaps by several others. We cannot yet predict what these interrelationships may be, but our unalterable insect file makes us better prepared for whatever insect problem that might face us.



The Arizona Farm and Ranch Hour has been suspended for the summer, as has the College of Agriculture's TV show "Across the Fence." Watch for early fall announcements of stations and hours for renewal of these programs. The county agricultural extension agents programs will continue as follows.

Cochise County

Wednesday, 6:30 a.m.—KAWT

Coconino County

Tuesday and Thursday, 8:15 a.m.—KCLS

Tuesday and Thursday, 6:00 a.m.—KCLS

Graham County

Saturday, 10:30 a.m.—KGLU

Greenlee County

Saturday, 12:30 p.m.—KCLF

Maricopa County

Monday through Saturday, 6:10 a.m.—KTAR

Sunday, 8:45 a.m.—KOY

Friday, 8:00 p.m.—KTVK, channel 3, "County Agent's Notebook"

(Continued on Page 11)

The What and the Why of the UNIVERSITY INSECT COLLECTION

By F. G. Werner
Department of Entomology

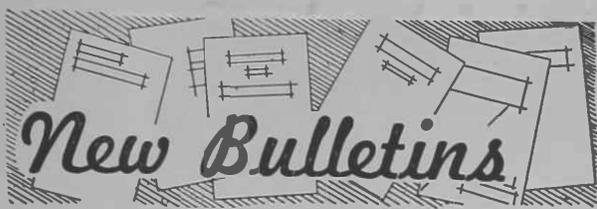
On the third floor of the College of Agriculture building, University of Arizona, Tucson, are about 115,000 insect specimens. They fill about 300 insect mounting boxes and 400 larger drawers. This collection has been years in the making and is currently being expanded as fast as time and facilities permit.

Why? Why collect so many "bugs"? (Incidentally, although many people use "bugs" as a general term for insects, most insects are not bugs. To an entomologist a "bug" is a member of but one of the several orders, or major categories, of insects.)

15,000 Species

The fact is that, large as the number seems, the University does not have any sample at all of some kinds or species known to Arizona. This shortcoming may never be completely overcome. There are an estimated 12 to 15 thousand species already known from the state and this number grows annually as more and more specialists study our insect population.

An insect collection can have many functions. First, it serves as the basis for



Agricultural Extension Service

High Altitude Cakes, Circular 224.

Grain Sorghum Insects and Diseases. Circular 225.

Feeding Arizona Dairy Cows. Circular 226.

Diseases of Garden Crops. Circular 227.

You Can Make a Sewing Cabinet. Circular 228.

Special

List of available publications of the Agricultural Experiment Station and the Agricultural Extension Service. Special bulletin. Revised to June 30, 1955.

Insects on Alfalfa in Arizona. Special report. No number.

Agricultural Experiment Station

Chemical Control of Morning Glory and Annual Grasses in Cotton. Bulletin 263.

Growing Sweetcorn In Arizona. Bulletin 264.

Tissue Analysis as an Index of the Nutritional Status of Arizona Vineyards. (Technical) Report 116.

Nutrient Requirements of Arizona Cotton. (Technical) Report 117.

The Use of Flaming and Mechanical Methods for Weed Control in Cotton. Report No. 119.

Tune In

(Continued from Page 10)

Pinal County

Monday through Friday, 6:50 to 6:55 a.m. (county agent), 8:50 to 8:53 a.m. (home demonstration agent)—KCKY

Yavapai County

Monday, Wednesday, and Friday, 8:45 to 8:50 a.m.—KYCA

Yuma County

Monday, Wednesday, Friday, 7:20 a.m. (Western Farm Digest)—KYUM

Tuesday and Thursday, 7:20 a.m. (On the Farm Front)—KYUM

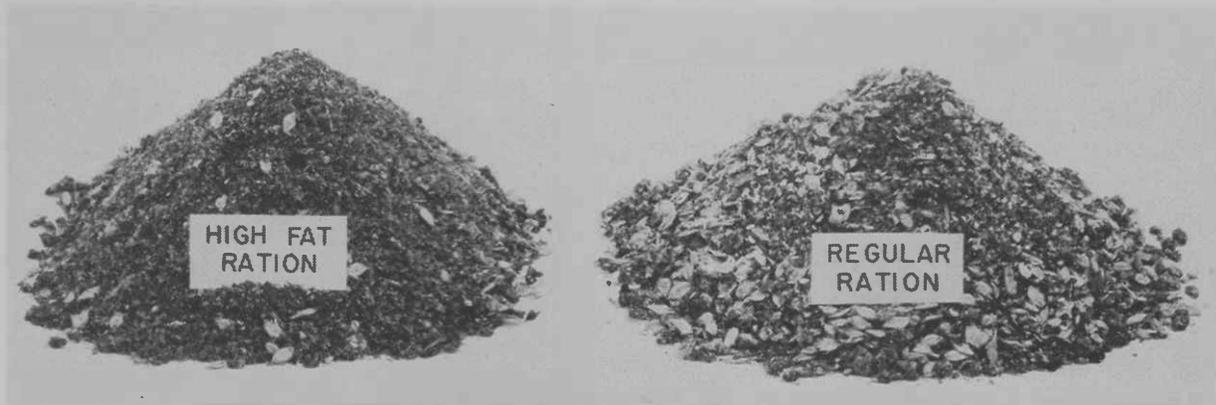
Thursday (TV), 6:15 p.m.—KIVA

Thursday (TV), 7:30 p.m.—KIVA, channel 11, "Farm Front"

Rendered Animal Fat in Dairy Feed-- MORE ENERGY PER FEED DOLLAR

By J. W. Stull and F. G. Harland

Department of Dairy Science



Addition of animal fats to dairy feeds has some effect on their texture, as shown in this picture.

During the last 10-15 years, the development of synthetic detergents has greatly decreased the amount of animal fat used for soap manufacture. This change has created a large surplus of animal fat as a by-product of the meat packing industry. The Department of Dairy Science at the University of Arizona is investigating the possible utilization of this material as a feed in the rations of dairy cattle.

Fat Means High Energy

Fat is a high energy nutrient. It has from $2\frac{1}{4}$ to $2\frac{1}{2}$ times as much energy as carbohydrate or protein. The expected cost of the stabilized animal fat is seven cents per pound. Its relatively low cost and its high energy value indicate that it may be economical as a part of the ration for dairy cattle.

The total digestible nutrients in a concentrate mixture should cost less per pound when the mixture is a high-fat one. At current feed prices, the cost of a pound of T.D.N. in a high-fat mixture is 4.4c; the cost of a pound of T.D.N. in a mixture identical except for the added fat is 4.5c. Put another way, in a high-fat feed one can buy as many pounds of T.D.N. for \$3.15 as he can for \$3.21 in a low-fat mix, at current prices.

Effect on Milk Production

The research at the University of Arizona is being conducted to study the effect of a high animal fat ration on milk production, milk composition and physiological changes such as body weight variations. The stabilized animal fat was incorporated into the concentrate mixture at a level of 7% of the total weight.

The mixture included rolled barley, cottonseed meal, dried citrus pulp and molasses. In the experiment, one group of cows was fed the regular concentrate mixture while a second group received the high fat mixture. Both groups were fed similar amounts of roughage in the form of hegari silage and alfalfa hay. The two groups were placed on a 3-month double reversal feeding experiment.

Is Palatable

It was found that the high-fat mixture was quite palatable. All animals ate it readily and no digestive disturbances were noticed. Some of the results are:

	For cows on high fat ration	For cows on regular ration
Milk (lbs./day)	30.8	28.5
Fat (%)	4.54	4.44
Body weight (lbs.)	1212	1217

The results show that the high-fat ration slightly increased total daily milk production and the average per cent fat in the milk. There was no significant change in the average body weight of the animals in the two groups.

Study Continuing

Work on the project is continuing. Feeding trials will be conducted during the summer to observe the effect of high environmental temperatures on the utilization of animal fat in the ration. A long term project is planned at the University of Arizona wherein young calves at weaning age will be fed a high-fat concentrate mixture continuously up to the start of lactation and throughout their productive life. In this manner, any accumulative effects on growth, breeding characteristics and production can be observed.

Effects of Nitrogen in Cabbage Fertilization

By W. D. Pew
Department of Horticulture

Cabbage grown in the Salt River Valley has shown marked responses to nitrogen fertilization. The nitrogen fertilizer applications increased the total number of marketable heads and, therefore, increased yields (see table below). There also resulted a striking effect on the uptake and accumulation in the cabbage of certain other fertilizer elements in the soil.

Perhaps the most interesting feature of the results is that applications of nitrogen not only increased the nitrogen content in the plant tissue, but also the phosphate and potash percentage.

Nitrogen Sources

A close evaluation of the data also reveals the relative values of the various sources and types of nitrogen in a fertilizer program for cabbage production. With differences so small as indicated between nitrogen sources, it is apparent that advantages often ascribed to certain nitrogen sources or types have probably been overemphasized. Whether the nitrogen is supplied in the nitrate, ammoniacal, or urea form appears to make no appreciable difference in the final yield or plant composition, if the same amount of nitrogen is applied.

Reasons Not Clear

The fact that striking increases in the percentage of all three major fertilizer elements occurred in plants receiving nitrogen alone as compared to plants from the check areas would indicate a somewhat different concept in the relationships between nitrogen, phosphate and potash than is normally realized or expressed. Just why this relationship exists among nitrogen, phosphorus and potash is not entirely clear. In this connection, however, a close examination and comparison of the root systems developed under a high nitrogen level to those from the unfertilized area is quite revealing. (Compare the two pictures.)

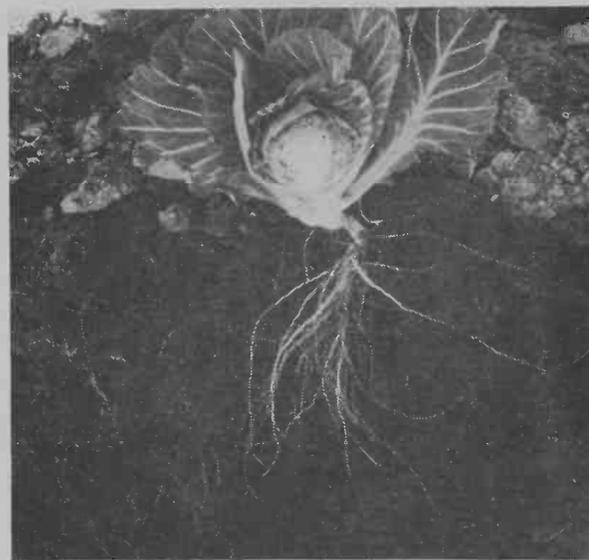
Nitrogen, Roots, and Tops

Many investigators have reported that increasing the nitrogen supply to certain types of plants causes a relative reduction of roots to tops. And, associated with this relative reduction in roots to tops the

root systems usually become more fibrous. This increase in the number of fibrous roots indicates more effective and efficient



Nitrogen fertilized cabbage plant. Note excellent lateral root development and extension, well defined tap root, and numerous fibrous roots.



Unfertilized plant. Note well developed lateral roots, rather poor and undefined tap root, and limited number of fibrous roots.

absorption of water and fertilizer elements.

Root Efficiency

The effectiveness is suggested by a wider and more thorough invasion of a given volume of soil by the roots, thus increasing the accessibility of the naturally occurring and residual supply of these elements. The efficiency is related to the close association of the more actively absorbing fibrous roots to the soil particles containing these nutritional elements.

N, P, and K

The summation of these two effects, where nitrogen alone was supplied, resulted in increased absorption of phosphorus and potash, and improved yield and quality of the marketable product.

These findings point out the need for a thorough understanding of fertilizer needs and the responses that may be expected from the applications of specific fertilizers. The regulatory function of phosphorus on nitrogen utilization is often mentioned in fertilizer element relationships and interpretations of plant responses to fertilizers. However, there has been shown herein the effects of nitrogen on phosphate and potash absorption and utilization. Certain fertilizer elements inherently present in the soil may be more effectively utilized by proper selection of the fertilizer to be applied.

Restricting root systems through limited levels of nitrogen may cause external plant appearances different from typical nitrogen deficiency symptoms. And, above all, it must be remembered that the portion of the plant which grows beneath the surface of the soil is more important than many growers generally realize.

EFFECTS OF CERTAIN NITROGEN SOURCES ON CABBAGE PLANT COMPOSITION AND YIELD

(The nitrogen fertilizers were applied at the rate of 60 lbs. of nitrogen per acre)

Treatment	% N.	% P.	% K.	Ave. Wt. Per Head	Yield Tons/Acre
Cal Nitrate	3.78	.246	2.40	3.62	7.71
Nu Green	3.94	.261	2.20	3.64	8.36
Ammo Nitrate	3.80	.248	2.42	3.86	8.53
Ammo Sulfate	3.79	.254	2.22	3.84	7.87
Urea	3.96	.254	2.21	3.84	7.87
Check	2.23	.215	1.90	2.90	1.91