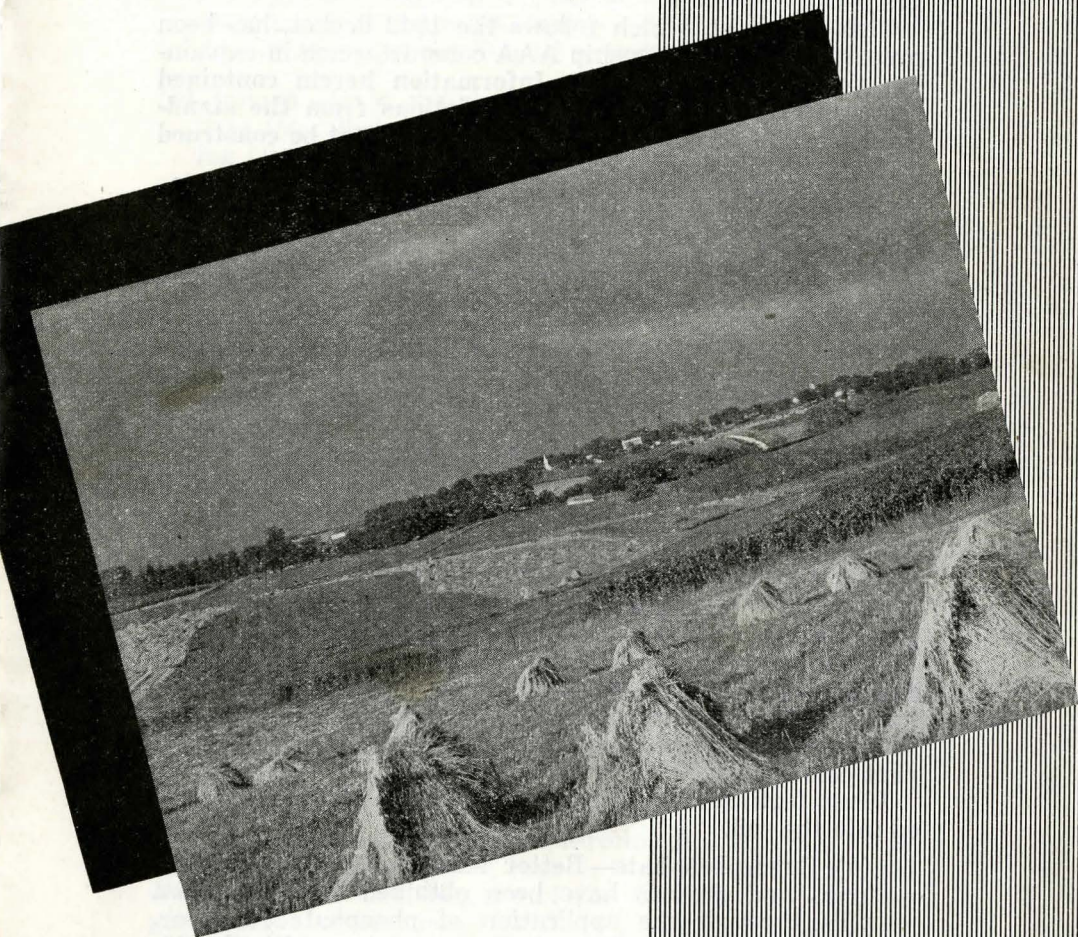


# A A A Soil-Building Program for Iowa in 1942



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Iowa's farms, big and little, must make their war contribution in the production of food through increased efficiency. Only sound soil-management practices will keep each acre in maximum production. Soil erosion must not be allowed to occur. Farmers should be encouraged to use these soil-building practices as outlined in the 1942 Farm Program.

This pamphlet, which follows the 1942 docket, has been prepared to assist township AAA committeemen in explaining the various practices. **Information herein contained represents the college's recommendations from the standpoint of good farming practice and should not be construed as administrative rulings.**

Application of practices described herein may be seen in most counties. Additional information, including bulletins and circulars, may be obtained upon request made to the County Extension Office or to the Agricultural Extension Service, Iowa State College, Ames, Iowa.

## APPLICATION OF MATERIALS

(1) **Fertilizers**—It must be recognized at the outset that limestone is the basis of any good soil-management program. For most efficient results fertilizer should be applied only to land that has been well limed or for which tests show no need for lime.

The most satisfactory method of applying fertilizer to seedings is with a grain drill and fertilizer attachment which applies both the fertilizer and the seed at the proper place in the soil. Fertilizer also can be broadcast with an end-gate-type or trailer-type lime spreader.

When granular fertilizer (which has granules about one-half the size of wheat grains) is used, the fertilizer can be spread with an endgate seeder. All fertilizer-spreading machinery should be thoroughly cleaned after using to prevent corrosion.

When fertilizer is broadcast, it should be thoroughly disked into the soil.

(a) **Superphosphate**—Better stands and yields of legumes and grasses have been obtained on many Iowa soils through the application of phosphate fertilizer. The phosphate fertilizer most commonly used is the 20-percent or 0-20-0. However, many farmers use higher analysis phosphate such as 0-45-0.

To earn one unit under the 1942 AAA docket, the following amount must be applied on crops classified as non-depleting:

|        |            |
|--------|------------|
| 0-16-0 | 300 pounds |
| 0-20-0 | 240 pounds |
| 0-45-0 | 107 pounds |

Recommended rates of application for specific crops are as follows when 0-20-0 is used:

**Alfalfa**—200 to 300 pounds per acre applied at the time of seeding. **Red, sweet and alsike clover**—150 to 200 pounds at the time of seeding. If other superphosphates are used they should be applied on the phosphorus equivalent basis. **Permanent Pasture**—200 to 300 pounds per acre disked in at the time of reseeding.

- (b) **Potash**—Used mainly in northcentral Iowa on high-lime (so-called alkali) soils. Muriate of potash, containing 50 percent of available potash (0-0-50) or its equivalent, is applied at the rate of 100 pounds per acre previous to seeding legumes. **Potash-phosphate mixtures**—On soils which need both phosphorus and potassium, a fertilizer containing both plant food elements is recommended. On sandy or peaty soils or on poor soils that have received little manure, use 0-20-10; on mixed peat and high-lime soils use 0-20-20. The recommended rates of application are 200 to 300 pounds per acre for alfalfa seedings and 150 to 200 pounds per acre for red, alsike and sweet clover seedings.

To earn one unit under the AAA docket, the following amounts of potash or phosphate-potash fertilizer must be applied on crops classified as nondepleting:

|        |            |         |            |
|--------|------------|---------|------------|
| 0-0-50 | 150 pounds | 0-20-10 | 183 pounds |
| 0-0-60 | 125 pounds | 0-20-20 | 147 pounds |

- (c) **Basic Slag or Rock Phosphate**—Superphosphate furnishes available phosphoric acid more cheaply and is usually preferable. The usual rate of application for rock phosphate is 500 to 1,000 pounds per acre. Basic slag is not used in Iowa because of freight rates.

- (2) **Gypsum**—Gypsum is not recommended as a fertilizer for use in Iowa.

- (3) **Limestone**—Any system of farming that does not maintain an adequate supply of lime in the soil leads to a rapid decrease in fertility, because of the difficulty in obtaining good stands of legumes. Fully 75 percent of Iowa's soils are acid and in need of lime for the best growth of alfalfa, clover and other legumes. In the eastern and southern parts of the state about 90 percent of the soils need from 2 to 4

tons of ground limestone per acre. In the rest of the state many of the soils also need lime. If the lime requirements of soils are not known, take samples to your county agent or vocational agriculture teacher who is equipped to test them free of charge.

(a) In using ground limestone apply the quantity indicated by soil test as being necessary.

(b) Whenever possible, apply 6 months to a year ahead of legume seedings to allow time for the lime to neutralize the soil.

(c) Work into the soil by disking or cultivating. It should not be plowed under, since this will put the lime too deep for good, early legume growth.

(d) Use proportionately larger amounts if the limestone is not 90 percent or above in purity and crushed fine enough so that 90 percent or more passes a 10-mesh screen.

(4) **Mulching Materials**—Two hundred pounds of mulch per tree per year is recommended; this would be 3 tons per acre in the average orchard with 30 trees to the acre. In addition to straw, some orchardists use sweet clover after it is threshed for seed, soybean straw or shredded cornstalks. The mulch should be kept  $1\frac{1}{2}$  to 3 feet away from the trunks of the trees because of danger of damage to the bark from field mice. Mulching is rarely used on commercial vegetable land in Iowa.

## SEEDINGS

### (5) Special Legumes and Bromegrass.

**Alfalfa**—Alfalfa is grown with success in every county in Iowa.

(a) Alfalfa should be seeded only on well-drained fields.

(b) It requires a soil that is well supplied with lime and available phosphorus.

(c) For seeding where bacterial wilt is present, Ladak, Cossack and Hardistan varieties are recommended.

In stands to be maintained only 3 or 4 years, Ladak or Cossack probably will outyield all other varieties. If stands are to be kept longer than 4 years, the highly wilt-resistant Hardistan will give the best results. On areas not infested with bacterial wilt, besides Ladak and Cossack, Grimm and the northern grown common strains are satisfactory. In general, the variegated strains such as Ladak, Cossack, Grimm and Canadian Variegated are more winter-hardy than are the common strains.

(d) Alfalfa should be seeded at the rate of 12 to 15 pounds of clean high-germinating seed per acre. Ten to

12 pounds of alfalfa and 4 pounds of timothy may be seeded instead of straight alfalfa. This mixture is desirable on rolling ground for the grass will help to make a complete ground cover, thus aiding in preventing erosion.

**White Clover**—Under this heading are white Dutch and Ladino. Neither is a dependable crop in Iowa, both being sensitive to drouth and heat.

White clover requires a soil very retentive of moisture and thrives best in moist weather with moderate temperature. Three pounds per acre are considered a full seeding if seeded alone.

**Bromegrass**—One of the best perennial grasses for permanent and long-rotation pastures. It is recommended for fertile to average soils and is especially desirable for seeding on the deep, porous soils of western Iowa. Because it forms a sod rapidly and uses considerable nitrogen from the surface soil, it should always be seeded with legumes, such as alfalfa, sweet clover or red clover.

Seeding an alfalfa-bromegrass mixture is recommended, the best rate being 8 to 10 pounds of each—alfalfa and bromegrass—per acre. The best way to establish an even alfalfa-bromegrass stand is to seed the bromegrass with oats or other grain used as a nurse crop and to seed the alfalfa separately in the usual way.

Bromegrass seed produced in Iowa and neighboring states is preferable.

**Crested Wheat Grass**—Crested wheat grass is not recommended in Iowa.

(6) **Sweet Clover**—This crop will thrive on almost any Iowa soil that is well supplied with lime. Sweet clover is recommended as the most valuable soil-building crop adapted to Iowa if left over the second year. If seeded alone, use 10 to 12 pounds per acre.

If primarily intended for pasture it usually is preferable to mix 3 pounds of medium red clover and 4 pounds of timothy with 7 pounds of biennial sweet clover per acre. On low or heavy, poorly drained soils, 1½ to 2 pounds of alsike should be substituted for the red clover in the above mixture.

**Annual Sweet Clover**—Annual sweet clover or Hubam is not recommended in place of biennial sweet clover unless for an annual cash seed crop or for plowing under at the end of the first year to escape trouble caused by biennial sweet clover volunteering the following spring.

## (7) Grasses and Legumes.

**Red Clover**—Red clover is more tolerant of soil acidity than sweet clover or alfalfa, but good stands are not usually obtained on poor, acid soils without the addition of lime and phosphate. Red clover usually responds to applications of lime on any soils that are acid.

For straight seedings of red clover use 8 to 10 pounds of seed per acre.

It often is advisable to seed in mixtures with timothy, or alsike and timothy. Recommended rates are:

4 pounds red clover, 2 pounds alsike and 4 pounds timothy, or  
8 pounds red clover and 4 pounds timothy.

The addition of 2 to 4 pounds of alfalfa to a clover-timothy meadow mixture is recommended. The yield, either as hay or pasture, will be definitely improved by the presence of some alfalfa.

**Alsike Clover**—Alsike tolerates more acidity and poorer drainage than red clover but does not yield as well on well-drained soils well supplied with lime. Alsike contains twice as many seeds per pound as red clover; therefore, use half as much.

**Mammoth Red Clover**—Not ordinarily as valuable as medium red clover. On soils inclined to be a little sandy and therefore subject to drying, it is a little more likely to make a successful stand. It matures 2 weeks later than medium red and usually makes but one crop of hay per season plus an aftermath which may be pastured.

**Reed Canary Grass**—This is valuable as pasture in boggy, wet places where water is likely to stand for a considerable time.

**Korean Lespedeza**—Recommended only in southern Iowa on poor, acid soils where better legumes do not thrive. It appears to have considerable promise for building up badly eroded unproductive pasture areas.

**Annual Rye Grass**—Can be used in an annual pasture seeding, but small grains, particularly oats, are more plentiful and usually cheaper to seed.

(8) **Timothy and Redtop**—Timothy is recommended in mixtures with alfalfa, red clover, sweet clover and alsike. Timothy can well be added to all legume seedings on rolling ground where erosion is a problem. Redtop is not recommended in Iowa except in pasture mixtures and then only on the poorer soils, or for waterways and terrace outlets.

## NURSE CROP MANAGEMENT

For all spring seedings of alfalfa, clovers and grasses made with a nurse crop, the following methods of handling the nurse crop are suggested:

- (a) Use half normal rate of grain seeding.
- (b) Pasture off the nurse crop, preferably with cattle or sheep, avoiding overgrazing.
- (c) Cut for hay or clip the nurse crop if there is evidence of it competing too strongly with the clover or other new seeding.
- (d) In case of drouth, cut or pasture off the nurse crop before it robs the new seeding of needed moisture, regardless of whether or not the nurse crop has reached the best stage for hay.
- (e) If to be harvested for grain, use an early, stiff-strawed variety or use flax.

## PASTURE IMPROVEMENT

(9) **Partial Seedings**—The following procedure is recommended to improve permanent pastures.

- (a) Lime the soil, if acid.
- (b) Apply 200 to 300 pounds of 0-20-0 per acre.
- (c) Disk thoroughly on the contour very early in the spring, until the sod is thoroughly cut up and the ground exposed. Then harrow once with the teeth sloping if the ground is rough.
- (d) Broadcast or drill the seed and roll.
- (e) Control the grazing to permit the new seeding to become thoroughly established.

**Reseeding Mixtures**—For average conditions, use a mixture of 5 pounds of sweet clover, 3 pounds of red clover and 2 pounds of alsike per acre, if there is a fair stand of bluegrass.

If there is a very poor stand of bluegrass, add 4 or 5 pounds of timothy and 3 pounds of Kentucky bluegrass seed per acre to the above mixture, and use about a bushel of oats per acre as a nurse crop.

If there is some acidity and lime is not applied, increase the red and alsike clovers and cut down on the sweet clover.

Reseeding without thorough seedbed preparation, proper soil treatments and controlled grazing usually is of little value. Very early spring seedings are most successful.

(10) **Dams for Livestock Water**—Farm ponds are most successful in regions where tight subsoils prevail. Properly constructed and maintained, ponds can serve the double

purpose of gully control and water storage. The drainage area into the pond should be protected by grass or timber.

Run-off from fields protected by conservation practices is satisfactory, however, for drainage into a pond. Run-off from unprotected fields usually carries considerable silt which tends to decrease the life of the pond. If the fill is made of earth, the side toward the pond should have a 3 to 1 slope, and the back side should have a 2 to 1 slope. A well-sodded spillway is imperative and should be sufficiently large to carry the flow during the periods of peak run-off. Ponds should be fenced to protect them from livestock.

**(11) Contouring Pastures**—Contour furrows are made with a plow, a small grader or a special contour-furrowing plow, the furrow slice being turned downhill. They should be constructed on as nearly the exact contour as possible and should be dammed at intervals of 100 feet or less in order to prevent flow of water along the furrow. There should be about 1-foot vertical drop between the furrows.

Where moisture conservation is an important item in maintaining pasture land, contour furrows provide a means of intercepting and holding the run-off water.

Contour furrows are a hindrance to the mowing of pastures and are of doubtful value on pasture having a good sod.

## **GREEN MANURE CROPS AND GO-DOWN CROPS**

**(12, 13 and 14) Green Manure Crops and Go-Down Crops**—Hubam clover is recommended as an annual legume, green manure crop. It is to be preferred to the non-leguminous green manure crops, because they increase the nitrogen content of the soil, whereas non-legumes do not.

Any of the small grains, sudan grass, millet, annual rye grass, buckwheat and sweet sorghums may be used as green manure crops and are about equal in value but definitely inferior to legumes.

Crops grown for green manure are seeded in the usual manner.

Crotalaria and sesbania are not recommended in Iowa.

**Green Manure Crops for Commercial Orchards**—Crops most commonly used for this purpose in Iowa are sweet clover, red clover, oats and rye. Do not use soybeans or alfalfa in orchards, because they harbor the buffalo tree hopper which ruins young orchards and causes serious damage to mature fruit trees.

## EROSION CONTROL

(15) **Construction of Terraces**—Terracing supported by necessary cropping practices is primarily applicable on sloping lands that must be used for crops and on which less expensive conservation measures will not provide adequate erosion control. Terracing should not be considered for land that can be kept under permanent vegetative cover, except possibly where terraces may be required for moisture conservation or diversion of water for gully control, or as aid in establishing permanent vegetation. Where erosion can be controlled through contour tillage, crop rotations and strip cropping, terracing is not necessary.

(a) When planning a terrace system, consider the whole farm instead of fields or parts of fields.

(b) Provide practical and effective outlets for the drainage water. Natural outlets are preferable to road ditches or artificial outlets.

(c) Be sure no water from fields above drains onto fields to be terraced, unless some means is provided to intercept the headwater.

(d) Terracing should begin at the top of the hill. The location and construction of the top or "key" terrace is very important, as the success of the whole system depends on it.

(e) Farmers should not attempt to construct terraces until they are thoroughly familiar with necessary requirements for spacing, slope, size, etc. Your county agent can assist you in obtaining technical advice.

(f) Terraced fields must be farmed on the contour if the terraces are to be effective.

(16) **Dams for Erosion Control**—The construction of concrete and masonry dams for erosion control is quite similar to that of a masonry wall. Dams higher than 6 feet are not recommended, generally, unless the services of an engineer are obtained. Larger masonry dams are not often recommended for gully control due to their high cost.

Details of construction can be obtained from Farmer's Bulletin 1813, U.S.D.A., "Prevention and control of gullies."

In general, it costs less and is more satisfactory to control waterways with low rather than high dams.

(17) **Strip Cropping**—Strips of sod or closely growing crops planted across the slope approximately on the contour between intertilled crops, divide up long, seriously erosive slopes, reduce the velocity of run-off water, filter from it a large part of its load of silt and allow more time for absorption of the water into the soil.

The width of each strip depends upon the slope, rotation of crops, type of soil and intensity of rainfall.

In chinch-bug areas there is an objection to having adjacent strips of small grain and corn because of the difficulty of controlling the chinch bugs. It is recommended that grass strips, called "buffer strips," be used in such areas.

Rotation strip cropping is easily started on meadow or hay land by leaving strips in the existing vegetation.

Existing grassed waterways should be carefully preserved. Natural drainageways not already grassed should be prepared and seeded to grasses or close-growing crops.

**(18) Contouring Intertilled Crops**—Contour farming consists essentially of laying out contour lines around the slopes and planting the intertilled crops parallel to these guide lines.

(a) Contour farming increases crop yields by conserving moisture. It also decreases soil losses and lessens power requirements, because the machinery is operated on the level.

(b) Contour guide lines can be satisfactorily established by the use of a hand level, carpenter's level, string level or regular surveying instrument. The top line should be from 6 feet to 12 feet vertically from the top of the hill.

(c) The rows on a hillside should not be perfectly level but should drain slightly toward grassed waterways. The drop from the contour should not be more than  $1\frac{1}{2}$  to 2 feet per 100 feet, and less is preferable.

(d) Headlands should be left in meadows to facilitate turning at the ends of the contour rows.

**(19) Contour Seeding**—Contour drilling of small grain on land where erosion is a problem is a very practical and effective practice for reducing both soil and water losses.

Although several accurate base lines as planting guides are desirable, approximate contouring is satisfactory but less effective. A satisfactory method of approximate contouring, especially on uniform slopes, is to establish one base line midway on the slope, and seed both ways from it.

**(20) Permanent Sod Waterways**—All permanent sod waterways should be built wide enough so that at maximum run-off periods there will be sufficient width of sod to carry all water and prevent any cutting at the edge of the cultivated field. The width of the waterway should be determined by the acreage of land draining from above and the size and

depth of the ditch or gully to be plowed in and grassed over. All waterways should extend up the slope to a point where all small gully fingering will be seeded to permanent grass.

In establishing seedings on soils of low fertility a heavy application of manure and the use of 250 to 300 pounds of 0-20-0 or its equivalent is often necessary. If the supply of manure is limited, a complete commercial fertilizer, such as 4-16-4, should be used. Lime also will be necessary on acid soils. These materials should be thoroughly worked into the soil previous to seeding.

A heavy rate of seeding is recommended on a well-prepared seedbed. Regular seedings of meadow mixtures may be used with the addition of such grasses as timothy, red-top, bromegrass and bluegrass. Nurse crops should be used at half the normal seeding rate.

**(21) Waterway Dams**—Stake, wire, sod brush, rock dams and similar structures are useful as temporary means of gully control. They are helpful in leveling small gully bottoms and aid in converting a raw gully to a grassed or tree-protected waterway.

## FARM FORESTRY

Farm wood lots, properly managed and protected from livestock, can be made to yield fence posts, poles and fuel for the farm, and in many cases will bring in an additional cash income from the sale of wood products. Most farmers prefer to locate their wood lots on land unsuited to the growing of other farm crops—irregular or remote pieces of good land or land that is eroded, poor or stony.

A good windbreak of evergreen trees around a farmstead will materially decrease the cost of heating the home and will prevent the snow from banking around the buildings and blocking the farm lot. Livestock can be kept in condition on less feed when protected by an efficient windbreak.

### **(22) Planting Trees—**

**(a, b and c) For Wood Lots, Erosion Control or Protective Plantings**—Although the docket specifies 650 trees per acre, a more thrifty plantation can be obtained by planting trees according to the spacings recommended below. A 6' x 6' spacing will require 1,210 trees per acre.

Following are the varieties of trees recommended for these purposes in Iowa:

**FOR FARM FORESTS AND WOOD LOTS**  
 Broadleaf species (1- or 2-year seedlings or transplant)  
 Evergreen (3 years or older)

| Species                                                  | Spacing                           | Use of Wood                                                              | Site Requirements                   |
|----------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------------|-------------------------------------|
| White and Green Ash                                      | 6' x 6'                           | Fuel, poles, handles                                                     | Moist or dry slopes                 |
| *Butternut                                               | 6' x 6'                           | Logs, fuel                                                               | Rich moist soils                    |
| Hardy Catalpa                                            | 6' x 6'                           | Posts, fuel                                                              | Moist or dry slopes                 |
| Red Cedar (Not within 2 mi. of commercial apple orchard) | 6' x 6'                           | Posts                                                                    | Dry slopes, hilltops                |
| Wild Black Cherry                                        | 6' x 6'                           | Furniture                                                                | Moist or dry slopes                 |
| Elms (White, Red)                                        | 6' x 6'                           | Fuel, poles, logs                                                        | Moist, dry slopes, stream borders   |
| *Hickories                                               | 6' x 6'                           | Fuel, handles                                                            | Dry or moist slopes                 |
| Black Locust                                             | 4' x 4'                           | Posts                                                                    | Dry slopes, steep gully sides       |
|                                                          | to 6' x 6'                        |                                                                          |                                     |
| Soft (Silver) Maple                                      | 6' x 6'                           | Fuel, logs                                                               | Dry or moist slopes, stream borders |
| Hard (Sugar) Maple                                       | 6' x 6'                           | Logs                                                                     | Moist clay slopes, dry rich slopes  |
| Mulberry (Red)                                           | 6' x 6'                           | Posts                                                                    | Dry and moist slopes                |
| *Oaks (White, Red, Bur)                                  | 6' x 6'                           | Logs, posts, fuel                                                        | Dry or moist slopes                 |
| Osage Orange (Hedge)                                     | 4' x 6'                           | Posts                                                                    | Dry or moist slopes                 |
| Southern half of state only                              |                                   |                                                                          |                                     |
| Pines (White, Red, Jack, Austrian, Western Yellow)       | 6' x 6'                           | Logs<br>(Keep white pine 900 ft. or more from currants or gooseberries.) | Dry slopes                          |
| Cottonwood (Cuttings)                                    | 10' x 10'                         | Fuel                                                                     | Moist sites                         |
|                                                          | to 6' x 6'                        |                                                                          |                                     |
| *Black Walnut                                            | 30' x 30'                         | Logs                                                                     | Moist bottomland, rich soil         |
|                                                          | or 40' x 40'                      |                                                                          |                                     |
|                                                          | and interplant with other species |                                                                          |                                     |

\*When planting nuts and acorns use the same spacings but place 2 nuts in each hill. If both nuts produce seedlings, the less desirable one should be cut out.

**Preparation of Soil**—On areas with a heavy sod or other heavy vegetation this cover should be removed to allow each tree to have a spot 18 inches in diameter relatively free of competing vegetation. Furrows may be plowed at the proper intervals in place of clearing heavy vegetation by hand. On slopes, furrows should be plowed with caution and always on the contour. On areas where there is little or no vegetation present, no preliminary preparation of the soil is required.

**Sources of Trees and Shrubs**—Many of the trees listed may be obtained from commercial nurseries. Farmers may use trees which they have grown from seed. A few species of forest trees and nuts for game planting and erosion control are supplied in quantities of not less than 1,000 trees per order from the State Forest Nursery, care Iowa Conservation Commission, Des Moines, Iowa, at reasonable prices. Nuts may be gathered in fall, stratified in cold, moist winter storage, and planted in the spring. For further information about state nursery trees see your county agricultural agent.

**For Windbreaks**—The AAA docket specifies 300 trees per acre must be planted in windbreaks. Evergreens, spaced as recommended below, will total from 189 (20' x 20') to 222 (14' x 14') per acre. Three rows of evergreen trees are considered adequate for a permanent windbreak. In order to fill out the required number of 300 trees, a temporary windbreak of mulberry, osage orange (southern Iowa), black locust, hardy catalpa, willows or cottonwoods can be planted in one or more rows outside the evergreens and spaced 6' x 6'.

Following are the recommended species of evergreens for windbreak planting (all evergreen trees should be 3 years of age or older):

| Species            | Spacing   | Species             | Spacing   |
|--------------------|-----------|---------------------|-----------|
| Norway Spruce      | 16' x 18' | White Pine          | 20' x 20' |
|                    |           | (Northeast Iowa)    |           |
| White Spruce       | 16' x 18' | Austrian Pine       | 20' x 20' |
| Black Hills Spruce | 16' x 18' | Red Cedar           | 14' x 14' |
| Douglas Fir        | 16' x 16' | Western Yellow Pine | 20' x 20' |
|                    |           | White Cedar         | 14' x 14' |

**Preparation of Soil**—Soil should be thoroughly prepared by deep plowing and disking before the windbreak is set out.

**Protection**—The windbreak should be permanently protected from livestock, poultry and fires. Clean cultivation should be given the first three or four seasons.

(23) **Tree Maintenance**—Trees for replanting should be of species and spacings as listed above.

(24) **Timber Improvement**—

(a) Timber stands can be improved by cutting out dead, diseased, insect-infested and undesirable trees, removal of which will yield fuel wood, posts or poles and will allow the straighter, more thrifty trees more room in which to grow. The cutting does not include the removal of any mature or immature, well-formed trees of the better species, which should be left to be removed only as a harvest-cutting when they are mature and when there is a use or a sale for them. The improvement cutting should not be so severe as to make large openings in the stand, for this would allow too much light and too much wind to reach the forest-floor, dry it out and encourage the growth of grass, weeds and brush which would prevent or retard the growth of seedling trees which should be permitted to fill the openings.

(b) In a dense, brushy stand of tree sprouts, or seedlings, a thinning will be of benefit if the cutting is not too severe and if only the tallest, straightest stems of the best species are left.

(c) All timber stands should have livestock permanently excluded therefrom and fire never permitted. Livestock and fire destroy young trees, damage the forest soil and injure the trunks of larger trees.

## ORCHARDS

(25) **Contour Orchard Planting**—New orchards planted on sloping land are much more likely to withstand adverse drouth conditions if planted on the contour. Orchardists should not attempt to construct terraces or set trees until they have obtained prior approval of the county committee. Such an approval is a safeguard, since the spacing of terraces, location of trees on the terraces and frequency of the terraces are important factors in the life of the orchard. Information in section (15), while not directly applicable, indicates some of the possible problems. Generally a small-type terrace for each row will be most satisfactory. The trees probably should be planted on or near the terrace ridges about 10 feet from the terrace channel. Auxiliary erosion control may be obtained through sod barriers in the tree-row middles or by additional contour furrows, automatically provided in the case of row crops, such as corn when used as orchard intercrops.

(26) **Apple Tree Removal**—Permanent apple trees may be removed in 1942 under the program. Fillers or semi-permanent trees do not qualify. The payment varies with the diameter of the tree. Prior approval from the county committee must be obtained.

## **WEED CONTROL**

(27) Recommended weed-control practices may be successfully employed in controlling the primary noxious weeds of Iowa. One year is not sufficient to eradicate noxious weeds, but it is a beginning in a control program which may be worked out from year to year, depending upon the extent and seriousness of the infestation, and the stage to which the infestation has been reduced. The following methods; namely, chemical control and clean tillage, are the two methods of most interest to Iowa farmers.

**Chemical Treatment**—Chemicals are recommended only for small areas, scattered patches, or areas such as ditch banks, fence rows, and hilly or stony areas inaccessible to mechanical treatment.

Either sodium chlorate or atlacide may be used. The chemical is dissolved at the rate of  $1\frac{1}{2}$  pounds to a gallon of water and applied with a pressure sprayer. The plants when sprayed should have abundant foliage and should have reached the blossom stage. All spraying should be done on cool, cloudy, moist days or in the evening—never during extended periods of heat or drouth. The solution is applied at the rate of 1 to 2 gallons per square rod, depending upon the density of the foliage, but all plants must be thoroughly wetted. All plants which reappear or survive should be re-sprayed as often as necessary. All clothing and equipment used should be washed thoroughly to prevent danger from either fire or corrosion. All livestock should be fenced out of sprayed areas.

**Clean Tillage**—For the control of weeds on larger areas the following recommended smother crops may be used in conjunction with clean tillage operations.

**Control of Quack Grass**—Plow in the spring, cultivate the infested area repeatedly whenever green growth appears. Prepare a firm seedbed and seed such heavy smother crops as sorghum, sudan grass, millet or soybeans. Repeat program a second year.

**Control of Canada Thistle, Perennial Sow Thistle and Horse Nettle:**

(a) Plow infested area in late-bud or early-blossom stage, prepare a firm seedbed immediately and drill in

such smother crops as soybeans, sweet sorghum, millet, or sudan grass. The following rates of planting are recommended: soybeans  $2\frac{1}{2}$  bu. per acre, sorghum 3 bu. per acre, sudan grass 2 bu. per acre, millet 2 bu. per acre. Soybeans should not be used as a smother crop for horse nettle, but are recommended for the control of Canada and perennial sow thistles. Drilling in the crop saves cultivation.

(b) Plow and summer fallow thoroughly and seed to fall rye. After the disposal of the rye, alfalfa should be seeded on a well-prepared seedbed.

(c) Plow and summer fallow thoroughly. Seed directly to alfalfa on a well-prepared seedbed.

(d) Seed directly to alfalfa providing the weeds are weak and the infestation light, or seed to alfalfa after one season of summer fallowing, or after one season of smother crops as in (a) or after fall rye as in (b).

#### **Control of Field Bindweed (Creeping Jennie), Leafy Spurge, Perennial Peppergrass and Russian Knapweed**

Plow the infested area when the bindweed resumes growth in the spring. Fallow repeatedly at regular intervals whenever green growth appears. Between June 1-15 **plow again, immediately** prepare a firm seedbed, and drill in soybeans at the rate of  $2\frac{1}{2}$  bushels to the acre. After the disposal of the soybeans, plow immediately, and fallow until the ground freezes. Repeat until bindweed is eradicated.

**Note:** Selected cropping practices should be repeated until the weeds are eradicated.

Soybeans and summer fallowing are not recommended on lands subject to erosion. The contour drilling of soybeans, or following soybeans with a winter cover crop such as rye, which is plowed down in the spring, may permit the use of soybeans as a smother crop for weeds on slightly rolling areas. It is best, however, to confine their use insofar as possible, to level areas.