

Landscaping the Farmstead

*Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service*

*A man of eighty, planting!
To build at such an age might be no harm,
Argued three youngsters from a neighbouring farm,
But to plant trees! th' old boy was plainly wanting.
'For what, in Heaven's name,' said one of them,
'Can possibly reward your pains,
Unless you live to be Methuselah?
Why tax what little of your life remains
To serve a future you will never see?'*

'Is it so?' said he.

*'My children's children, when my trees are grown,
Will bless me for their kindly shade:
What then? has any law forbade
The Wise to toil for pleasure not his own?
To picture theirs is my reward to-day,
Perhaps tomorrow also: who shall say?'*

Jean de la Fontaine, 1621-1695

Landscaping the Farmstead

To Willes and Janet

Down the hill, across the bridge, around the curve . . .

"I see the white fence, I see the barn!"

Farmers are the landscape architects of Kansas.

They are the ones who, over the past hundred years, have modified the natural landscape into the cultural landscape we know today.

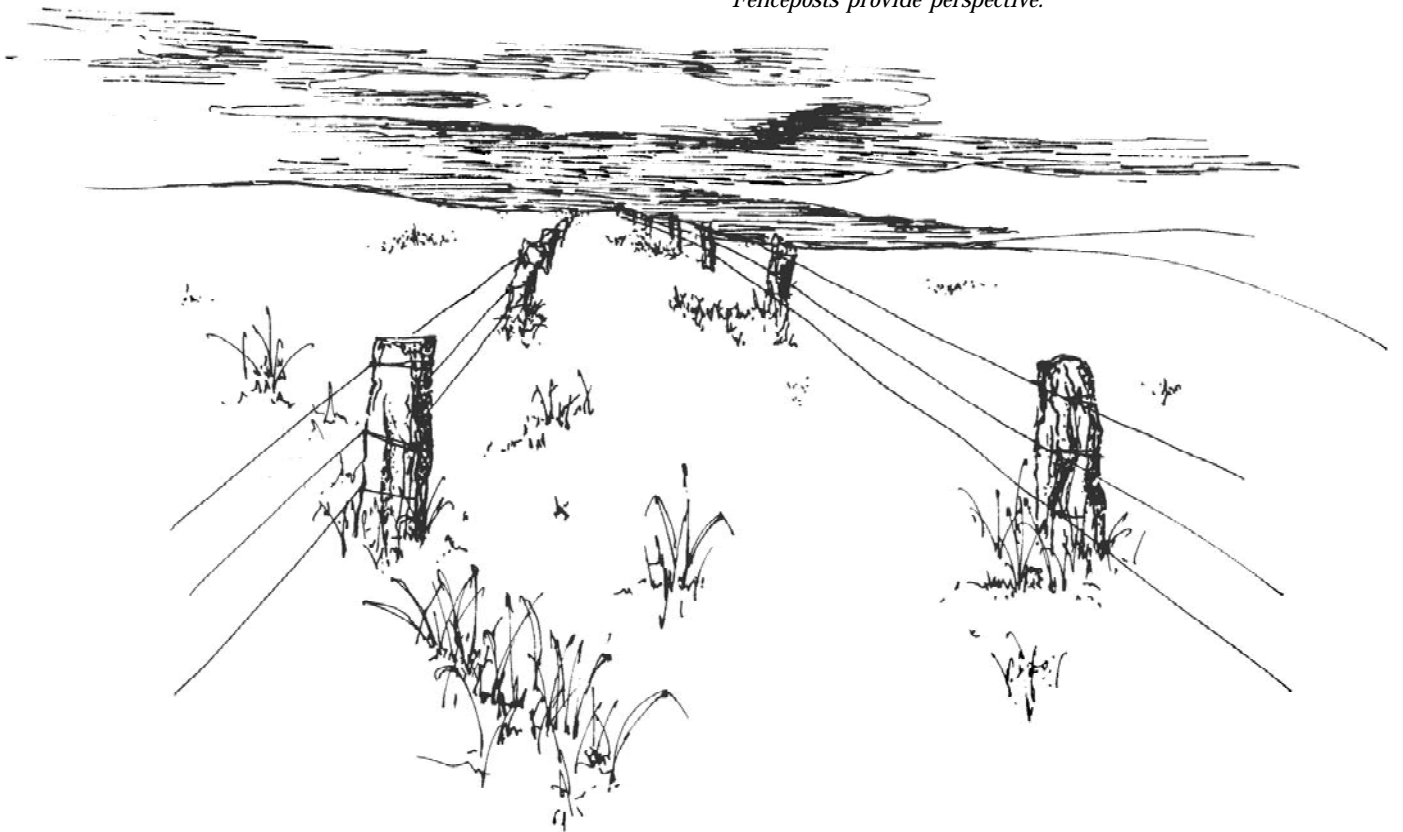
The natural prairie landscape was changed, with the help of barbed wire, making it possible to control livestock and set aside land to grow crops. The result is the quilted pattern of land we see today. Buildings were erected—barns, sheds, silos, and homes. Those kept in good repair grace the countryside with their historic form and color.

If you cannot appreciate the rural landscape for its beauty, it might be well to realize that in many parts of the world the rural countryside provides a recreational experience for both urban and rural people. The countryside is something to be enjoyed. It is an amenity. Amenity, in the sense of a pleasant environment, is something most people consciously or subconsciously strive to attain throughout their lives.

Farming is a business—and a tough business at that—and such things as beauty and amenity are perhaps the least on farmers' minds when prices are down and foreclosure is threatening. Yet, it is still important that we look closely at our rural landscape, analyze where its character came from, and accept it as a pleasurable experience for ourselves, our children, and those who travel through it.



Stacked haybales create temporary diversity in the landscape.



Fenceposts provide perspective.

Homesteading Kansas

A hundred years ago, when Kansas was settled, homesteaders devoted much energy to creating functional and attractive environments. Nobel L. Prentis, in 1885, described how these farm families dramatically changed the natural landscape of Kansas into a cultural landscape.

“I left bare prairie; I returned to find a score of miniature forests in sight from any point of view. The wheat and corn fields were unfenced, of course, but several acres around every house were set in hedges, orchards, lanes, an alley of trees—trees in lines, trees in groups, and trees all alone. In many cases, the houses were hardly visible from the road and in a few years will be entirely hidden in the cool shade. Where the houses were only a few hundred yards apart, as was frequently the case, a path ran from one to the other, between two lines of poplars or cottonwoods.

—*A Day with the Mennonites*



Agricultural landscape.

In shaping their environment, the Mennonites undoubtedly drew on earlier experience and a characteristic landscape they had known in Russia. Here they expressed their native talent on the rigid land use pattern of Kansas. The pattern closely adhered to survey lines running north, south, east and west with roads along the straight boundaries of each section. It was a grid system carried to its ultimate with no respect for topographic changes. This resulted in the quilt-like landscape we recognize today.

Variation is afforded by rivers interrupting the grid's rigidity. Fences draw lines across the hills. Haybales left in the fields create contours.

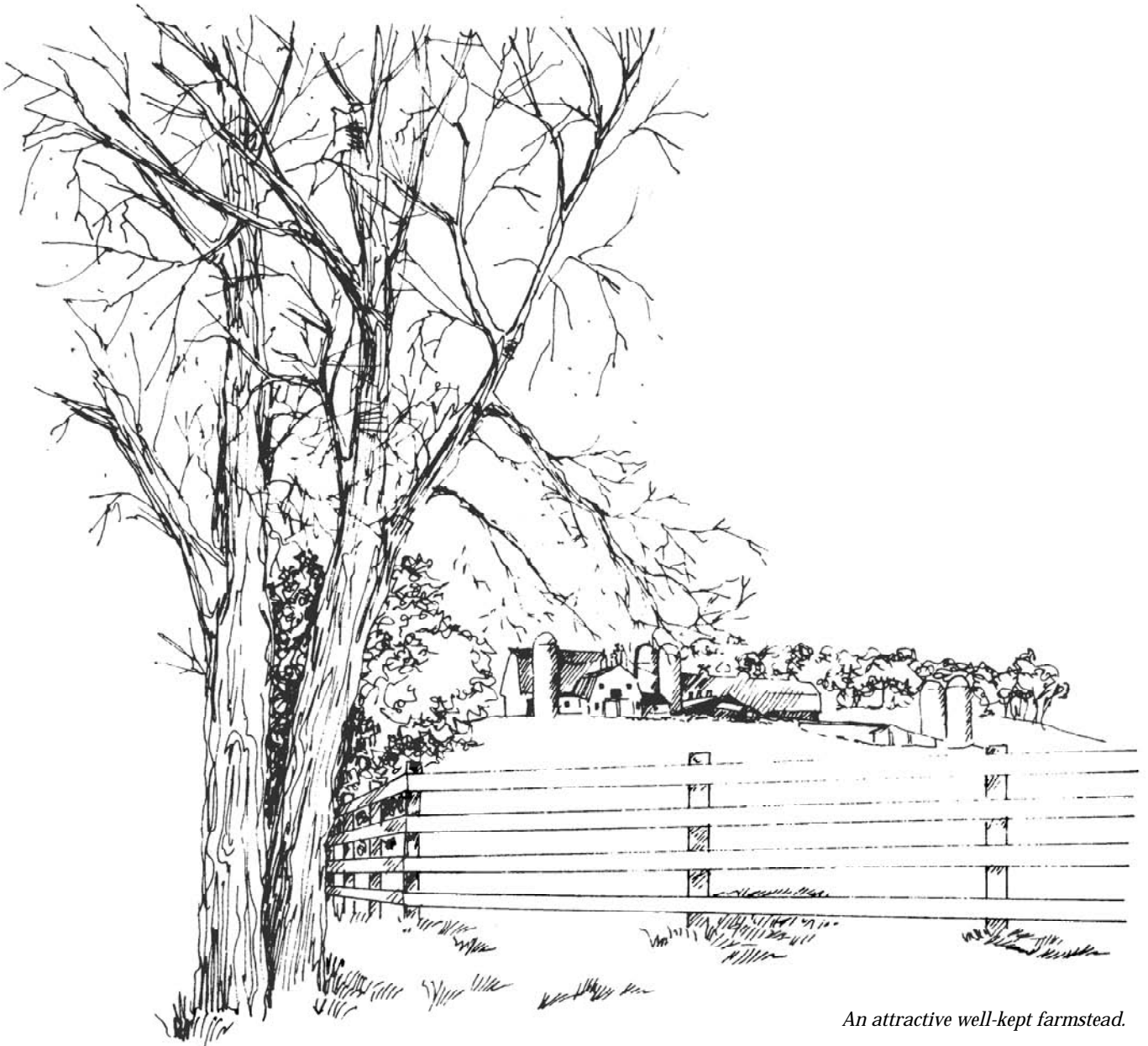
When the Midwest was imprinted with the American organization of space, it was the last region not only to receive the imprint, but also to retain it. The square homestead sitting in a corner of the square section reflects the pattern of the square township. The geometrical pattern is softened by the rolling terrain, the woods, the valleys and streams. A linear culture impressed its grid on a curvilinear landscape.

Today, this agricultural landscape has evolved. The scale of farming has increased with larger machinery and much of the countryside has been destroyed to make room for progress. It is often argued that today we have no time to landscape to create functional beauty. We

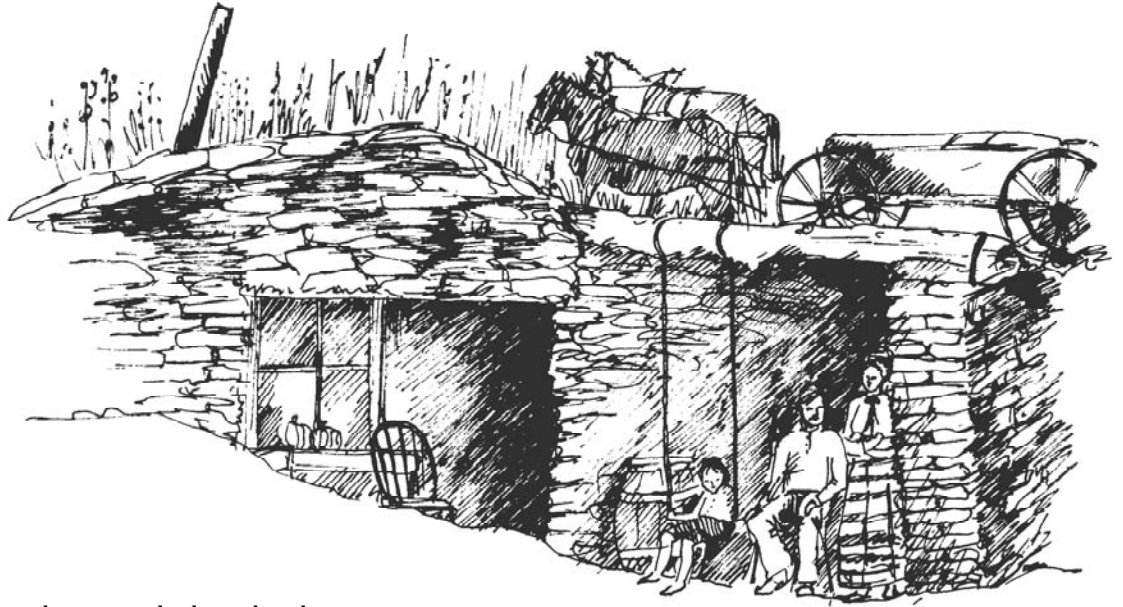
should remember that we are stewards of the land and control soil erosion as well as the beauty of our environment.

Interest in homestead tree and shrub planting has been decreasing because many farm families depend on their air-conditioned homes for comfort. Yet trees and shrubs can contribute to thermal comfort and help conserve energy. Planted at the right place, trees and shrubs can improve the living environment and visually coordinate the different farm structures.

During the early years of homesteading, it was often the women who carried a young tree along on the wagons as they traveled to their future homesites. Foreseeing the need to make their homesteads attractive as well as livable, their vision can serve as inspiration for today's farm families.

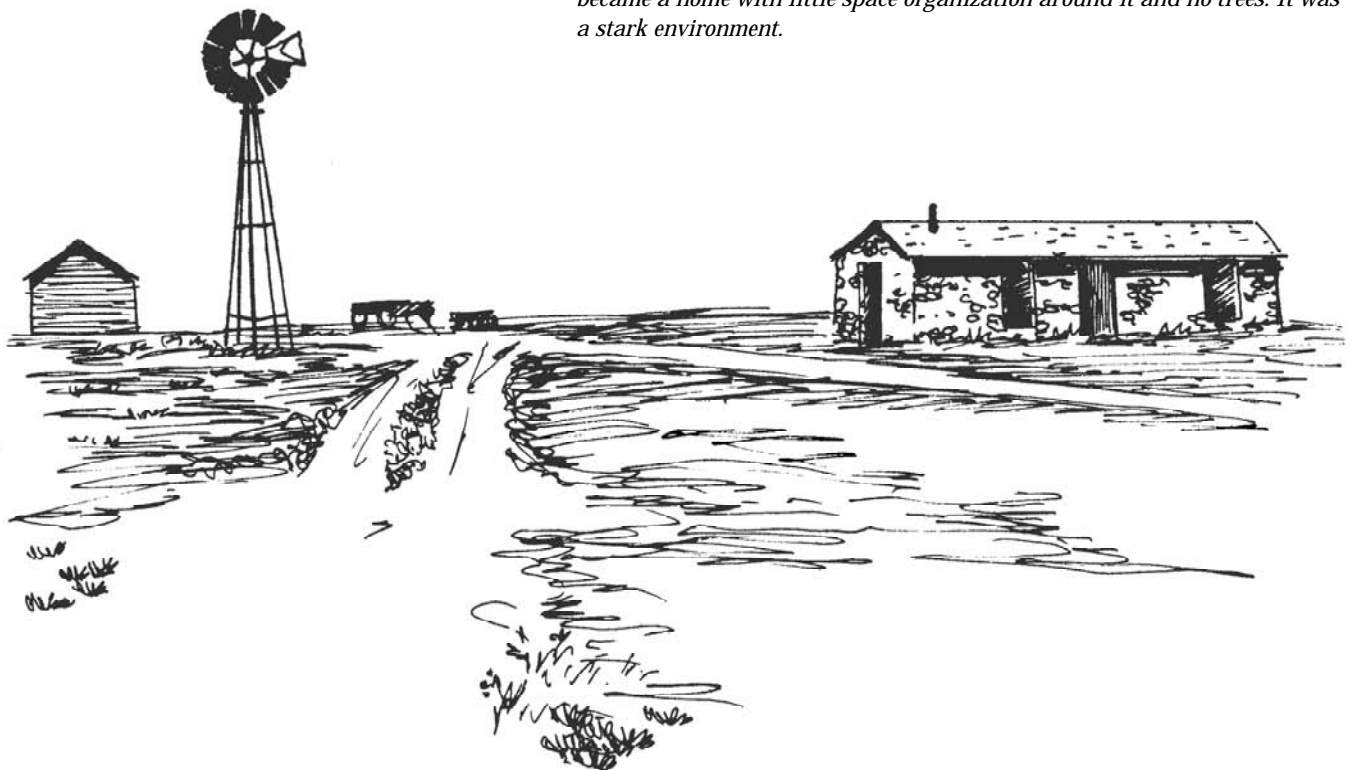


An attractive well-kept farmstead.



In a landscape where no house ever had stood and none were for sale, the first dwelling for homesteaders was often a dugout. Because they were part of the topography, these early homes blended into the landscape.

The above ground soddy created the first visual impact on the landscape. It became a home with little space organization around it and no trees. It was a stark environment.



Designing the Landscape

Start by walking around your home and farmyard making a mental note of what you see—better yet, take a notebook and record your observations. A careful inventory of the assets of the farm landscape will aid in eliminating many unpleasant features. In many cases, simple maintenance jobs such as painting, rebuilding, removing sagging porches, clearing up trash in the yard, correctly pruning trees and shrubs and removing dead or dying trees will make such an improvement that you will be astonished.

After the first steps have been taken toward achieving neatness and good housekeeping in the landscape, the major jobs to be done will stand out clearly—such as remodeling, reroofing, driveway alignment and reorganization of the drive, walks, and parking spaces. It will become clear where plant material can enhance the house and improve the living environment, as well as direct farm traffic.

If the house's height is disturbing, scale it down with trees. Tie the house down with shrub compositions near the corners. Soften the points of junction between the house and later additions with plant groupings. Shrubs and possibly small trees, such as redbud or Washington hawthorn, can be used. Attention will focus upon the plants, and the rough corners will be overlooked.

Tall, narrow, upright plants accentuate height. So avoid planting upright, pyramidal-formed junipers on each corner of your home. If you want to use the upright, pyramidal form, plant more than one so that the overall composition is wider than it is tall. Broad, spreading plants accentuate width and spaciousness.

The simple, functional lines of farm buildings generally call for a somewhat freer use of plant material than generally is practiced. Planting trees away from the



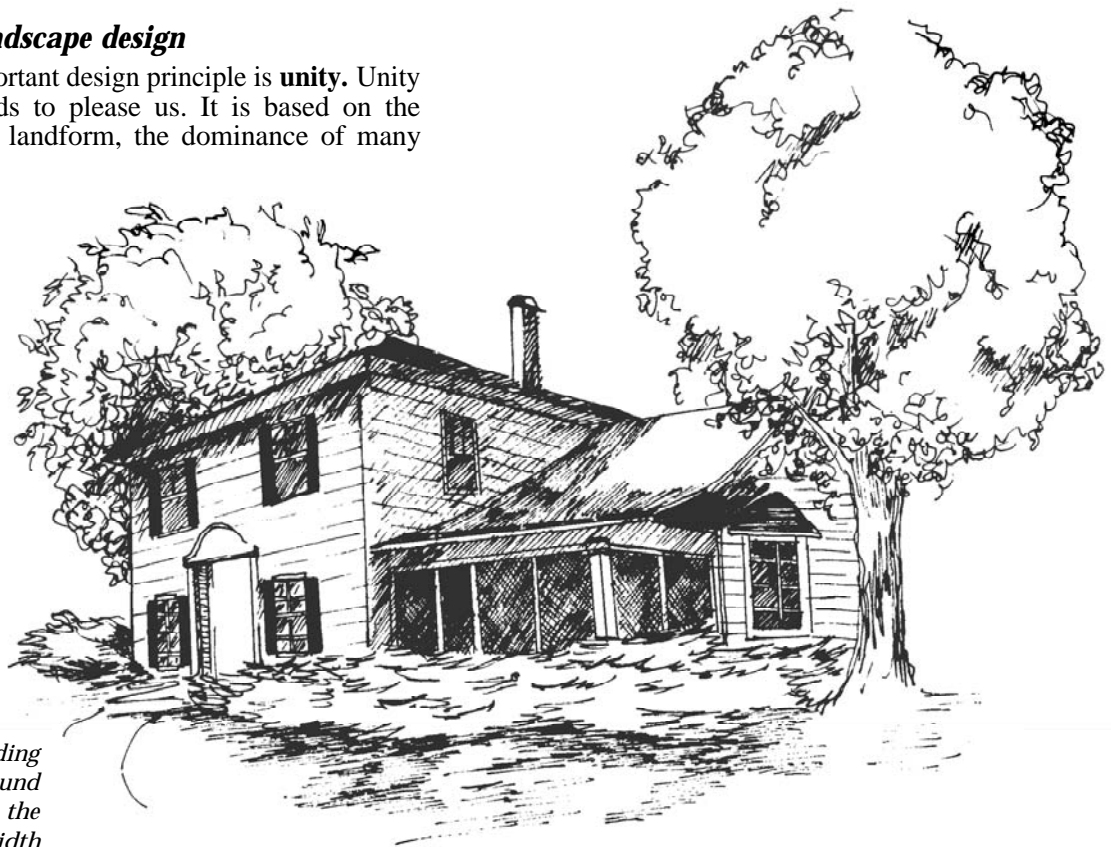
Do not plant upright junipers on each corner of the house.

strict rectangular-square pattern would increase the aesthetics of many homesteads. Well-placed trees increase the feeling of three dimensions—they indicate not only spaciousness through width or depth, but also height when mature.

On a large scale, plants must provide the very structure of the design, just as brick, stone and timber provide the structure of a building.

Principles of landscape design

The most important design principle is **unity**. Unity in landscapes tends to please us. It is based on the rhythm of natural landform, the dominance of many



Low-growing, spreading junipers planted around the foundation of the porch accentuate width and spaciousness.

types of vegetation, and the fact that human use and buildings harmonize with their surroundings. When we observe an unattractive or spoiled landscape, we perceive it as such because it has lost unity.

You can achieve unity in the landscape by coordinating the form, texture and color of plant materials and structures with the eight elements of landscape design: simplicity, variety, balance, emphasis, repetition, proportion of scale, contrast and harmony, and elegance of line and shape.

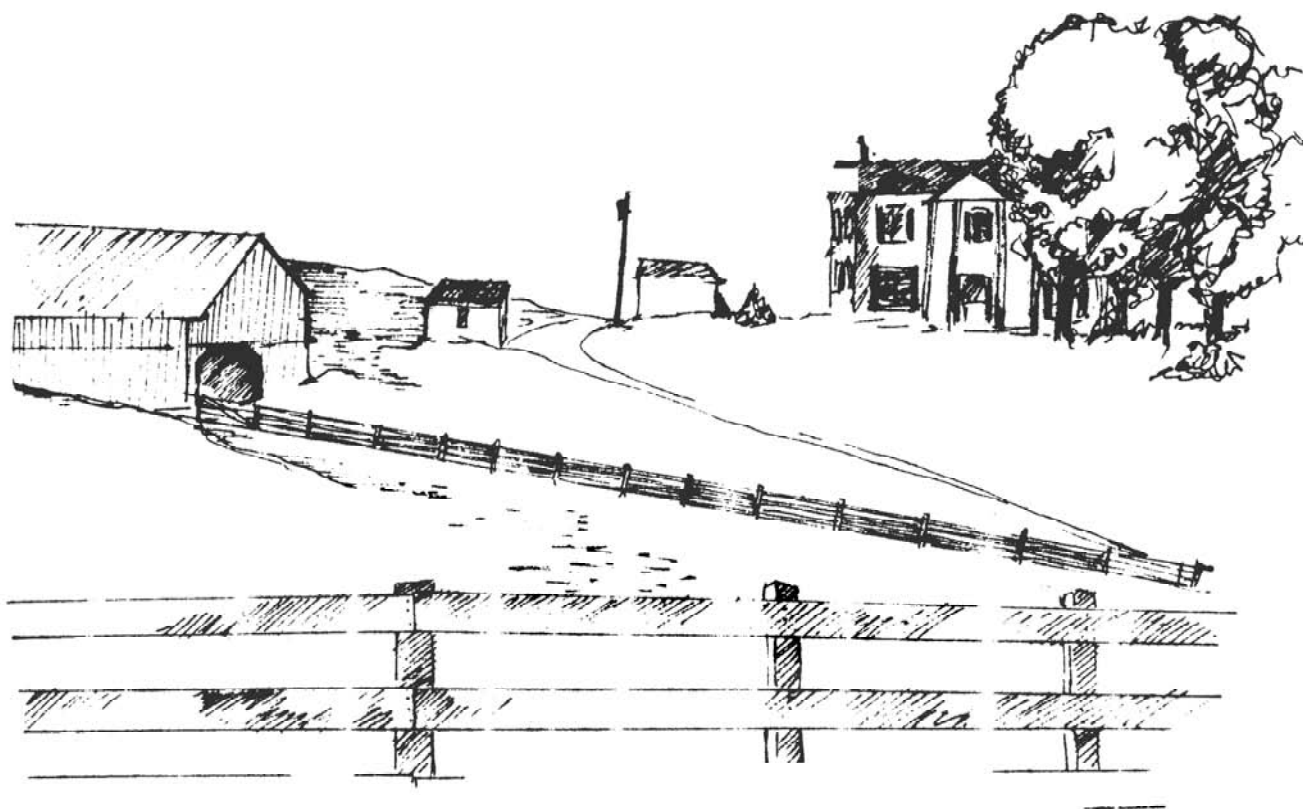
Unity: The component parts, each being a pleasing feature, fit together to form an equally pleasing whole.

Simplicity: Eliminating excess details which have little to do with the overall composition—omitting frills.

Variety: A critical element in design is variety. Too little leads to monotony, experienced so often by early settlers. A delicate balance between extremes produces a pleasant sense of unity in a landscape composition.

Balance: Accents and masses are distributed carefully over an area, without necessarily spacing them symmetrically.

Emphasis: By using emphasis, the eye is directed to one portion or object of the composition. Secondary points of emphasis direct the eye toward plants or other landscape features that contrast less with the overall composition. Vertical elevations such as silos and



Unbalanced landscape. Trees are only on right side of home. Don't cut down the trees . . . but plant trees on the left side. More trees could be planted here, especially as newly-planted trees would be small.



elevators are obviously dramatic, even more so in a flat landscape than in other landscapes. Their emphasis value is high.

Repetition: Repetition gives variety meaning and expression. A variety of lines, forms, textures and colors is needed to create an interesting farmstead landscape, but this does not mean that every shrub and every tree must differ within a design. Repetition usually is achieved by placing individual plants among groups of a single species. In a large-scale landscape, these masses of varying sizes may be repeated.

Proportion and scale: Creating a pleasing relationship among the three dimensions of length, breadth, and height.

Contrast and harmony: Lines flowing harmoniously are pleasing to observe. On the other hand, bold contrast of a curve with a straight line can be interesting, if done carefully. To achieve contrast, mix fine foliage with coarser foliage, rounded outlines with vertical or spiked growth, the harmony of blended flower and foliage color, and the sharp contrast of white flowers against red, or yellow against purple.

Elegance of line and shape: When a designer wants to create or control patterns, he does so by using lines. Lines are designed so that they are pleasing; curves are not interrupted. The eye should be guided from one part to another fluently. These lines may be expressed through paths, rock walls, and fences. In a landscape composition, a carefully planned group of lines will direct the attention of the viewer to a particular area of interest. Lines also are used to control movement. Straight lines suggest movement without hesitation. Interconnecting straight lines create points at the intersections for hesitation, as crossroads do on the Plains. Meandering, curved lines invite slower movement and are used best in areas that are as natural as possible, such as a nature path. The natural landscape of the Plains possesses this feature, but it is contradicted by the prevalence of straight lines.

Form: A composition will be more attractive when plants used are natural looking and graceful when fully grown. The trunk, branches and leaves together create the form of a tree. The different plant forms we recognize are: columnar, round, vase, weeping, pyramidal, oval and irregular. Generally speaking, if the plant is tall, it has a vertical form. If it is low and spreading, it is horizontal. When a group of vertical plants is placed together in large enough number so that the group is wider than it is high, then the mass of plants is horizontal—a windbreak, for example. To establish a relationship in the natural landscape between plant forms and topography, the basic form of the topography is repeated in the native plant materials.

On the Great Plains the flattened, windswept, horizontal form can be seen in plants. The round, low, ground-hugging plant forms can be seen on the rolling prairie. Such forms should be adhered to and predominantly used in local landscape plantings; this is one of the basic principles useful to the landscape of Kansas.

Texture: Texture is a plant's quality of coarseness or fineness of appearance. Seen close up, texture is shown by the size, surface and spacing of leaves and twigs at different seasons. At a distance, texture is the entire mass effect of plants and the quality of light and shadow. The patterns created by light and shade are an important part of texture. The gradation of texture uniformity results in monotony; contrast can be obtained through variations, but extremes should be avoided. On deciduous plants, textures change with each season.

Color: Color in the landscape is important. Most of Kansas does not have abundant fall color as seen in deciduous northern woods. Our colors are more subdued, but do change with the seasons.

In general, reds, oranges, and yellows are considered warm colors and seem to advance toward the viewer. Greens and blues seem to recede in a composition. Dark blue, a cool color, would be suitable as a background color to increase the feeling of depth. Gray is a neutral color and is best used in the background with bright colors in the foreground. On the Plains, more



A few barns in Kansas at one time had, and still show, decorative paintings. Where these decorations were kept up, an old tradition was nurtured with the satisfaction of viewing one's cultural heritage.



Actually a Goldfinch, this bird has the distinction of being called a Distlefink because of its great desire to feed on "thistle seed" and use the thistle "down" for its nest. This hex sign appears among the earliest drawings of the Pennsylvania Germans and has been variously colored. The bird is the symbol for "Good luck or good fortune," the heart for love, and the tulips for hope, faith and charity. The expression Distlefink means "Thistlefink."

color choices are available than might be thought, but the initial problem is the apparent lack of color in the landscape. The color we see in the landscape, however, is affected by the reflective values of the surfaces, as well as by the quality of light and the color reflections of adjacent objects and shadows. The play of light on the Plains adds considerably to the range of color available to the landscaper.

A harmonious color design is obtained most easily by a dominant color. Colors of all the aspects of the composition should be considered—plant materials and their changes as well as structures.

The effect of simultaneous contrast suggests that fences, pavements, and buildings should have a neutral color of low value and intensity that will make them appear smaller and farther away. The plants and resulting space become dominant in the composition. One must decide which elements will be dominant and which will be subordinate in each

landscape that is developed. If each element has equal importance, the result is visual chaos. Conversely, if every element is subordinate, the result is monotony. It is planned contrast between the two extremes that gives a "spark" to design.

W.M. Nelson, Jr., *Landscaping Your Home*

Obviously, designing a landscape on the Plains to avoid either chaos or monotony is a great challenge.

Time

Where many of the arts move in the realm of three dimensions, landscape design has a fourth, namely time. The element of time is more important than the other three because the material is never static; plants take time to grow and in time die. The lifespan of trees is often longer than that of man, and in many instances



Some old homesteads because of care, location and appreciation of heritage have special charm. They are a cultural gem. Sadly, few are left.

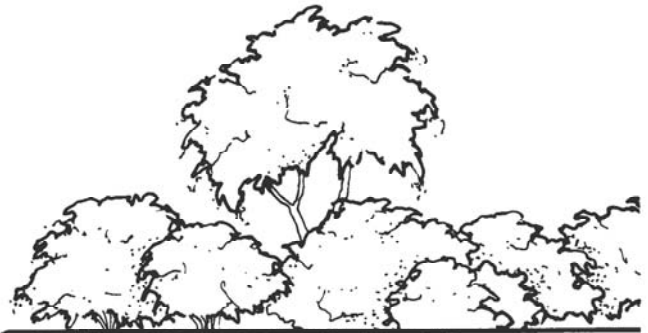
longer than the buildings created today. Trees grouped together in time develop a character. Trees exposed to wind will grow differently from those given shelter. The ultimate realization of our composition may take up to 50 years. Planning can be reduced to an almost three-dimensional problem by using trees and shrubs already well developed. Although using large, semi-mature plants may have its advantages, the ultimate results are less satisfactory than traditional methods, particularly in the case of shelter planting.

“The pleasure of watching things develop in time, and of noting and enjoying each different phase as it appears, is not to be relinquished lightly—to miss out on these intermediate stages is to lose one of those contacts with the soil which our period can ill afford; and the artificial completion of the project at one stroke is one of those means by which civilization impoverishes the realities of living in time.”

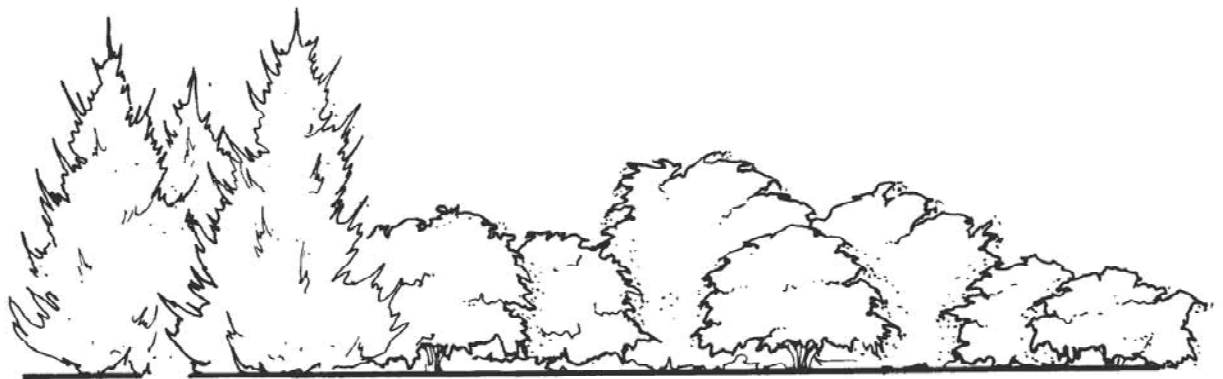
Nan Fairbrother, *The Nature of Landscape Design*



A specimen tree stands by itself



The same tree as part of a plant composition.

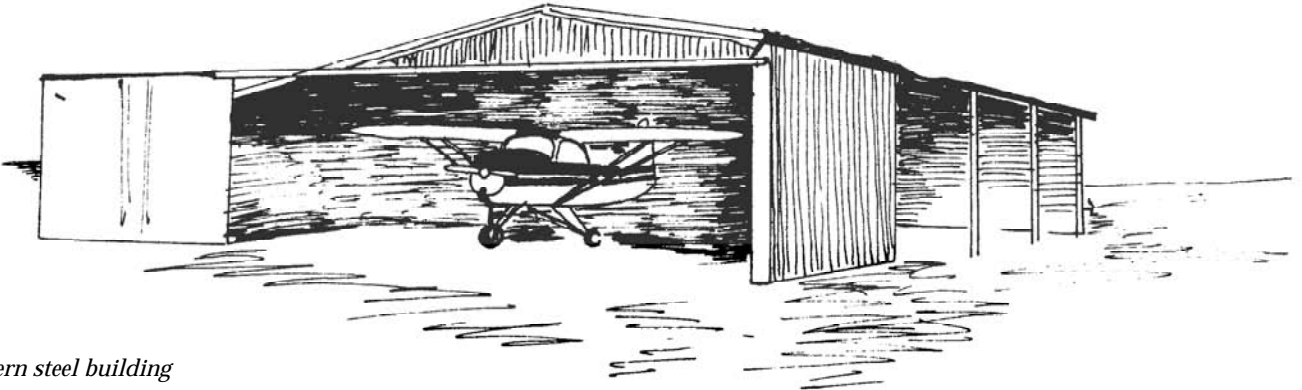


Plant compositions create attractive silhouettes for screening or separating farm-use areas.



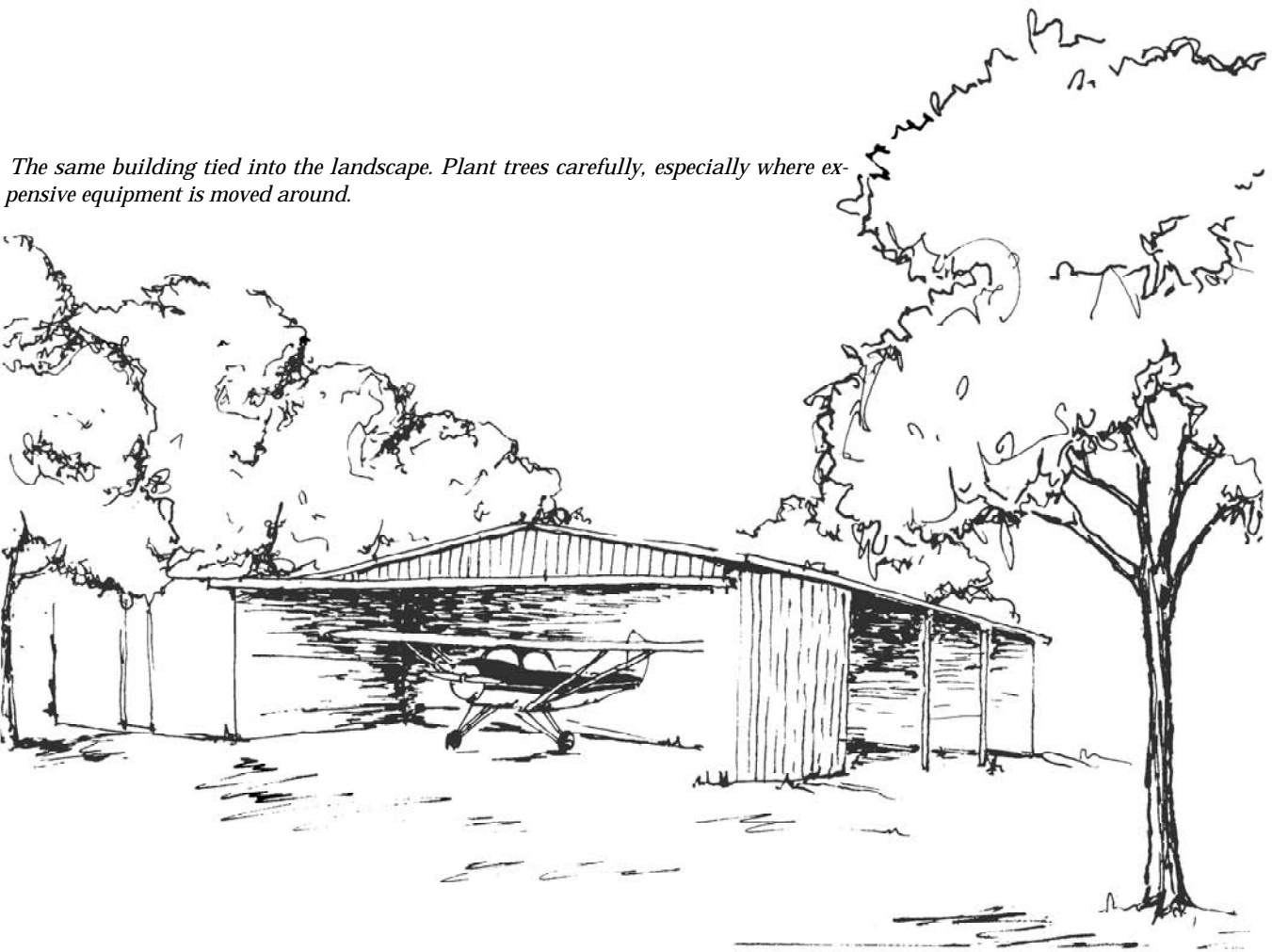
Expressed as a simple formula:

<i>simplicity</i>			
<i>variety</i>			
<i>balance</i>			
<i>emphasis</i>	<i>applied to the</i>	<i>form</i>	<i>of plant material</i>
<i>repetition</i>		<i>texture</i>	<i>and structures.</i>
<i>proportion of scale</i>		<i>color</i>	
<i>contrast and harmony</i>			
<i>elegance of line and shape</i>			



Modern steel building

The same building tied into the landscape. Plant trees carefully, especially where expensive equipment is moved around.



Organizing the Land

In planning, organize the land about your home and farm buildings so that you will have a functional and attractive space division. Some points to consider are:

- Organize areas of the farmstead. Include in your plans areas for approach and for private, service, and farmyard uses.

- Use existing lay of land to advantage by adapting structures to existing slope and local conditions of wind exposure, views, drainage and soil.

- Promote a pleasing appearance of grounds and buildings through good design principles, emphasizing simplicity, neatness and good repair.

- Develop a generous space for a well kept lawn between the road and the home.

- Develop a safe, convenient, and well drained driveway system (15 to 25 feet wide) with area near the home where visitors can park. Also provide ample parking space in the farmyard where farm machinery can be parked neatly and will not interfere with daily routines. Keep dust control in mind when laying out traffic patterns; provide ample drainage.

- Plan adequate walks to accommodate foot traffic. Entrance walks should be at least four feet wide. Service walks maybe somewhat narrower but will function better if at least two and one-half feet wide.

- Decide on surfacing and enclosure materials. An ornamental fence, such as railing or board fence, around the homestead will be more attractive than regular wire. But a well-strung, taut, 4-foot high, 4-strand wire fence is acceptable in a rural environment.



- Use adapted landscape materials to tie buildings together visually and to add the finishing touch to the grounds.

- Plan a windbreak system. Plants can help enclose, screen, and control temperature variations.

Farm service area

The work-service area of the farm or farmyard generally is separate from the house but should be closely linked to it. The farmyard has practical use and should above all be functional and suited to the type of farming enterprise.

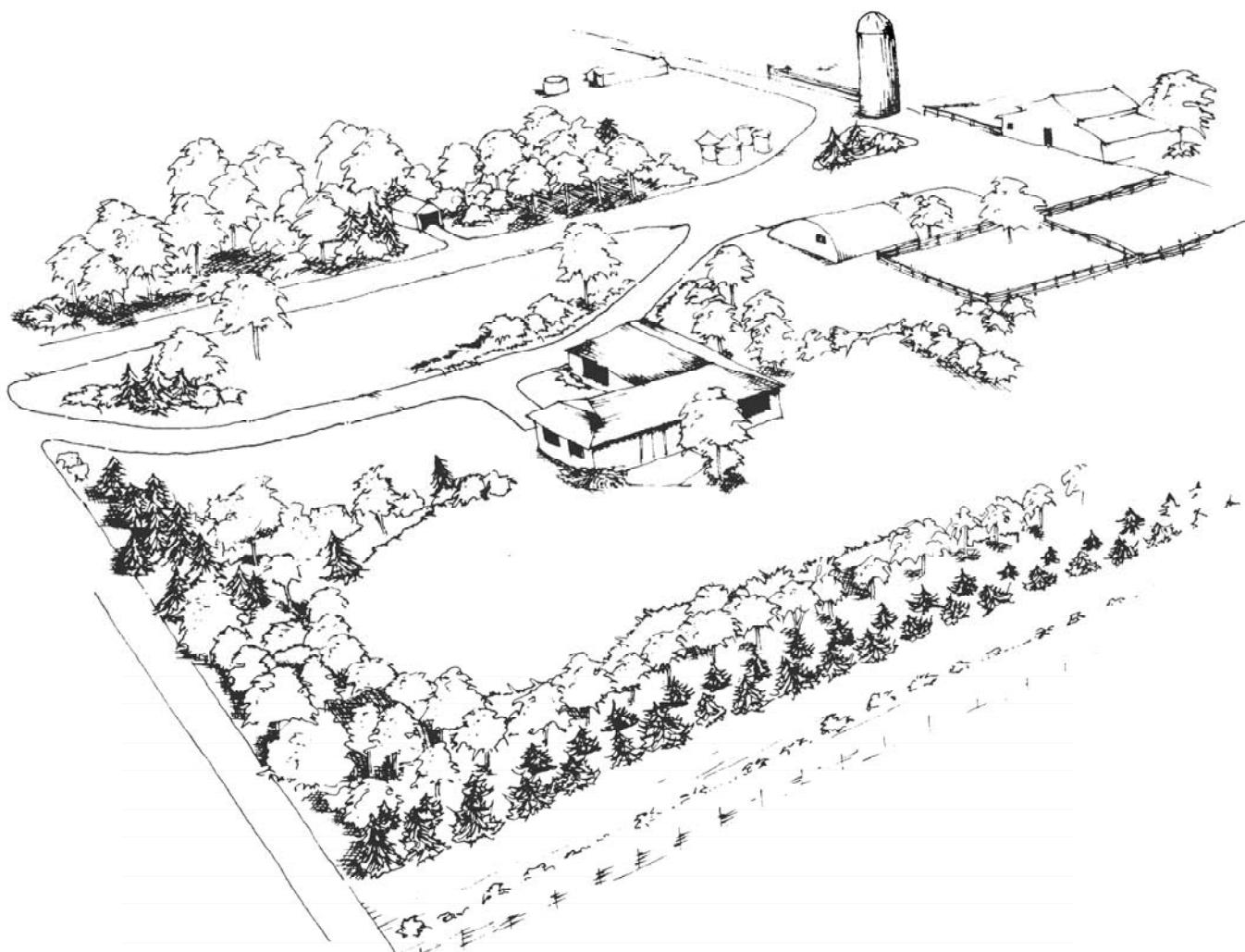
The farmyard can be separated from the home grounds with an attractive, stock-proof fence against which shrubs and trees have been grouped. A group of redbud in bloom against a neat white board fence looks attractive in any farm setting. Poultry, hogs, cattle, horses, sheep, goats, and even pets may damage ornamental plants and sometimes destroy lawn areas.

Inspect and repair fences enclosing barnyards and livestock lots regularly. Much destruction can be done in a few short minutes by loose animals.

The rear of the house and nearby buildings may form part of the farm court enclosure. This eliminates the need to open and close gates to enter the house or other buildings. But having the rear of the house as part of the enclosure increases the problem of blowing courtyard dust. *To minimize dust problems, it is better to separate the house and courtyard.* Plant masses of low and taller shrubs and shade trees in a pleasing arrangement between home and courtyard. Have a sturdy gate in the fence to allow easy passage. It is often unnecessary to enclose the more open, park-like setting of the home property.

For more information on home landscaping, ask your extension office for the publication, *Residential Landscape Design, C-562.*

Well-organized space around a modern farmstead. Good traffic patterns, turning space, many trees and shrubs create a pleasant living environment.



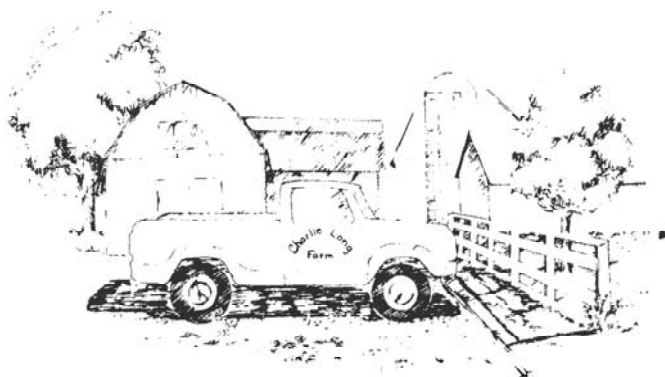
Some of the important requirements to be worked into the service area regardless of type of farming enterprise are:

- The work-service area must be roomy enough to allow easy manipulation of machinery, access to adjacent fields and a safe distance between buildings for fire protection. The maypole supporting utility wires should be in a central position out of the way. Keep in mind wire interference with mature shade trees. Locate stockyards at the rear of the barns. Store irrigation pipes away from all overhead electricity wires to prevent accidents.

- Convenience in reaching the work-service area from the back door of the house, garage, storage and parking space should be considered. The arrangement should allow the owner to come and go regardless of other activities.

- The area must accommodate delivery of feed products, fuel and equipment. A well constructed loading dock can help. Provide ample space for turning and backing vehicles transporting farm products to market.

- Establish clear traffic patterns, eliminating crisscross drives. Provide ample parking space to store out-of-season farm machinery. Keep area mowed and neat. Year around use of the area necessitates good drainage and a durable drive surface of gravel or crushed rock.



Provide ample and clearly-designated parking space.

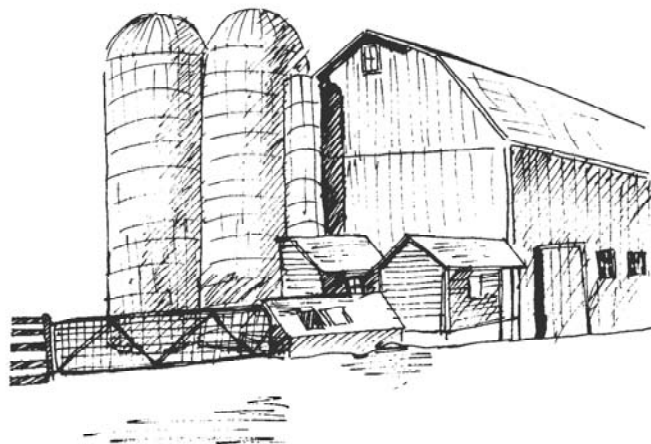
- For best use and appearance, the work-service area should be partially screened from public view, yet easily seen from the rear of the house, especially the kitchen.

- Plant shade trees among buildings to tie the roofline of buildings together and to provide shade. Much of the rain water collected from roofs is wasted. This water can be used to benefit a well branched shade tree. Locate shade trees out of the way; a good location is 15 to 20 feet away from building corners.

- Where space allows, plant a small group of trees together in a corner of the courtyard. Don't let tumbleweeds collect there!

For more information on farmstead planning, ask your extension office for the *Farmstead Planning Handbook*.

Many influences govern the development of the farm service area. The addition of future buildings, such as grain storage units, should be kept in mind while planning.



Farmyard should be functional.

Windbreaks

Although individual and small groups of trees planted among the varied buildings do much to tie them together, the whole farm can be beautifully and functionally held together through a well-maintained windbreak system. Windbreaks are trees planted near the vicinity or around the farmstead. The primary purposes of windbreaks are to provide winter wind protection for people, livestock, and buildings; to reduce soil and dust blowing; and to provide cooling breezes during hot summer days.

In addition to these functions, windbreaks also serve as wildlife habitats and improve the aesthetics of the



Good farm roads are a necessity. They help prevent costly repairs or accidents. Here improving scale and surface is needed badly.

rural land. A well-established windbreak can reduce fuel consumption for farm heating purposes by 20 to 30 percent. Putting a windbreak around home and farm buildings is like adding a layer of insulation because still air is trapped within and behind it. When air is moving, heat is carried away quickly.

A windbreak for a homestead is not a luxury or solely an amenity. It has practical value to people: it improves their psychological and physical well being.

Any windbreak system should allow for future expansion and not inhibit growth. When a present farm operation has reached its limit of space because of an established windbreak, a new windbreak should be established farther out, allowing the old one to remain to help subdivide the service area. Openings will have to be cut in the first windbreak to allow traffic to circulate. With a hole cut in the old windbreak, snow drifts may become a problem until the new windbreak becomes functional. When drifting does occur over drives, walks, and heavily used areas, the cause should be determined. Drifting can be brought about by a freak storm, nearby fence, adjacent plant group, or the combine left standing from the past year's harvest.

Farmstead windbreaks for winter protection normally screen the north and west sides of the area to be protected. A windbreak of pines and cedars with taller deciduous trees and shrubs arranged in an "L" shape has proved practical. Its design, however, is not limited to standardization in every case. Whenever possible, windbreak plantings should be designed in relation to land forms. Too often in the grid system, windbreaks around homesteads lose part of their attractiveness because they simply follow the grid lines. Following a contour line instead, windbreaks still could be functional and attractive.

To add beauty as well as utility to the homestead windbreak, imagination is needed. Instead of only straight rows, curving windbreaks may be arranged to give protection as well as background for the farm buildings. If skillfully arranged, a windbreak may reduce the severity of winter winds and at the same time funnel in and direct the cooling winds for summer comfort.

To **increase** cool winds, groups of deciduous trees are planted on the southwest side near the home as well as along the boundary of the home grounds. Not too many shrubs should be planted under the trees as they restrict air movement. When placed at the right location, shrubs can help direct cool air flow and even lift the cool air up and direct it into the house or across a porch.

Livestock windbreaks

Windbreaks help livestock over severe winter weather, as well as provide shade during hot summer conditions.

Research trials have indicated that the rate of gain and feed efficiency of livestock can be increased substantially if shade is provided for the animals during hot weather and a shelterbelt is provided against winter storms.

Livestock should not be allowed to enter the windbreak. A sturdy fence around the trees prevents animals from tromping on small trees, debarking older trees, and causing soil to decompose around the base of trees—all detrimental to the success of a shade tree or windbreak planting. Shelter planting designs for livestock do not necessarily have to be straight rows. Whenever possible, shelterbelt or windbreak plantings should be designed in relation to land forms.

Shelterbelts

Shelterbelts protect livestock and reduce soil erosion. The design of a shelterbelt is the same as a windbreak except shelterbelts generally are placed along the south or southwest side of a field. Strong winds can be steered away from the ground with a rising planting on the windward side. To reduce soil blowing and crop damage in the past, parallel east-west belts were planted at intervals of 20 times their height or at a distance of about one-eighth of a mile. Today, many of these shelterbelts have been removed because of the large farm equipment used and the large circular irrigation systems. Removing shelterbelts has increased the scale of the Great Plains landscape and has changed its agricultural character, **emphasizing the need for windbreak plantings around the homestead to stabilize this loss of landscape character.**

Planting or removing shelterbelts or windbreaks seldom is considered in visual terms. Yet, some shelterbelts or windbreaks contribute vitally to the landscape. Some hide eyesores; others act as linking elements between other features tying the landscape together. They all provide wildlife habitat.

Many farmers do not consider the importance of windbreak or shelterbelt conservation for visual, ecological, or even historical reasons.

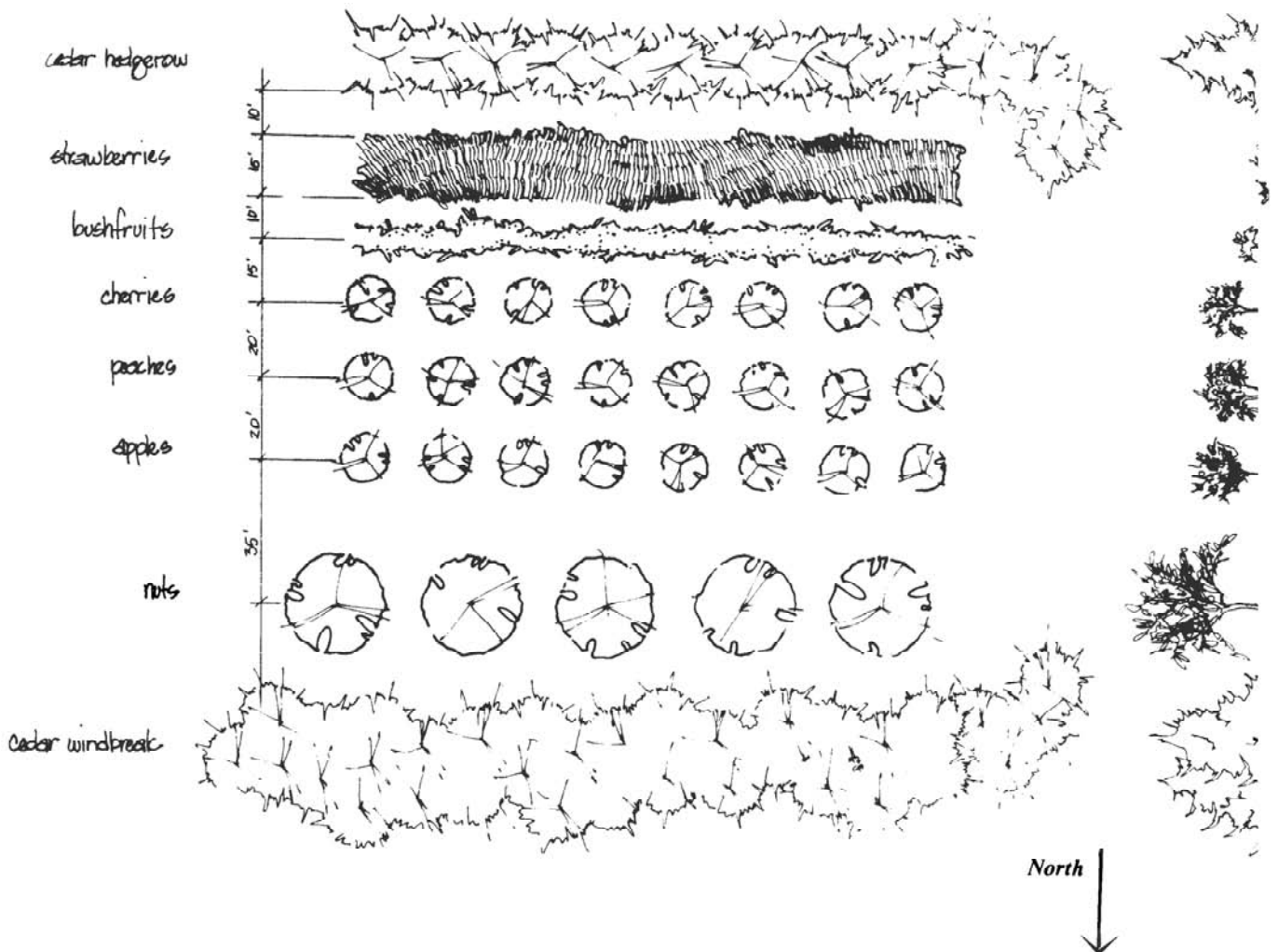
Ecological changes caused by new farming techniques can harm the environment—as in the formation of dust bowls. Soil can be eroded by water or wind. The effect of wind plus soil velocity can move topsoil with the same chain reaction as an avalanche—the finer material is uplifted and lodged in ditches or against other barriers. Maximum velocity in soil movement can be reached within 230 feet (70m) on light soils, or 1,150 feet (350m) on medium land, and more than 3,000 feet (1,000m) on heavy lands.

The loss of drifting topsoil is obviously serious, but equally dangerous is the sandblasting effect blowing topsoil has on flora and crops. Therefore, in the open plains landscape, shelterbelts can reduce erosion, as well as improve the appearance of the landscape and provide wildlife habitat.

On the Great Plains, often small elements have a great impact on the landscape—a group of trees in a cluster or in a row along a stream or road, a single tree near a draw where moisture collects. Because such relatively small elements affect the landscape, any plantings added to the landscape would benefit it.



Livestock should not be allowed to enter the windbreak nor the garden. A sturdy fence around the trees prevents animals from tromping on small trees, debarking older trees, and causing soil to decompose around the base of trees—all detrimental to the success of a shade tree or windbreak planting.



A garden is assured of a better moisture supply when snow is trapped.

Planning Windbreaks and Shelterbelts

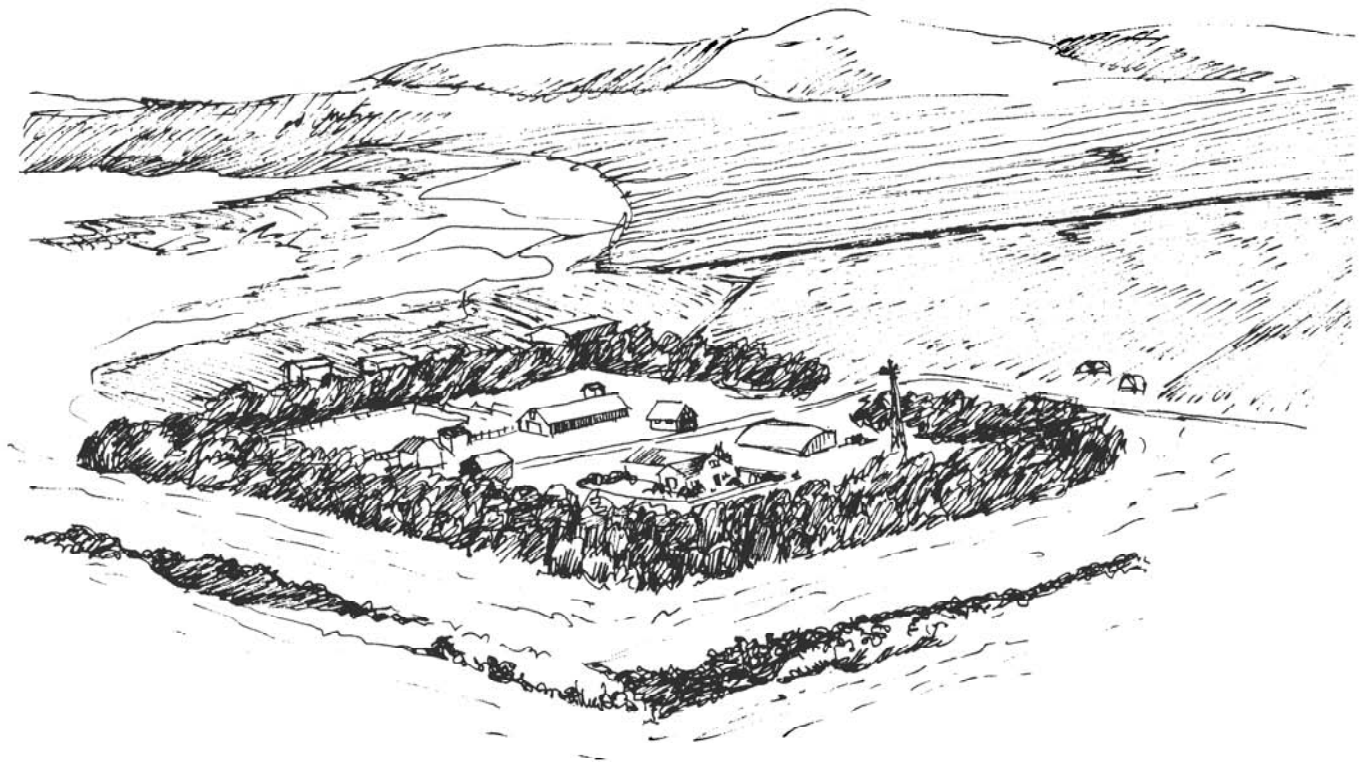
Windbreaks and shelterbelts should be planned according to orientation, length, height, layout, number of rows, permeability and profile.

Orientation: Windbreaks planted directly across the strong winds give maximum protection. Because most winds fluctuate about a general direction, some latitude is allowed in choosing the actual line of the belt. The distance over which wind velocity is reduced becomes shorter when the wind strikes a shelterbelt at an angle. To allow for this, adjust the length or height of the windbreak.

Length: Length regulates shelterbelt efficiency. Because the leeward sheltered area assumes the shape of a blunted triangle, the maximum shelter effect in the center is not obtained until the length/height ratio is 12:1. With cross-wind deviation, the ratio should be 24:1. When planning length, keep the mature height of trees in mind.

Height: Height determines the distance to which protection is afforded by shelterbelts. The effective distance of a windbreak usually is placed as ranging from 10 to 30 times the height of the trees. A figure of 20 times the height often is used.

For shelterbelts planted on the crests of slopes, the effective distance is increased. For those on the sides of slopes, it is decreased.



A well-maintained windbreak system tying home and buildings together improves psychological and physical well-being of inhabitants.

Layout: Scattered clumps of trees incorporated in an overall plan add to efficiency and improve wildlife habitat. Standing isolated in the landscape, they have limited effect on wind control; linked to a shelterbelt, their effectiveness increases considerably.

Entrance to fields should be made through belts parallel to the prevailing wind. Where this is not possible, cut a path through windbreaks at an angle. Where snow may block the thoroughfare, run the opening straight through belt. Such direct openings will cause winds, but, because they are narrow, only a little wind will fan out after passing through.

Number of rows: There are no fast rules about optimum number of rows. It varies according to density and growth form of the trees and shrubs planted. Good design and planting patterns can save useful space. Have at least one row of shrubs or evergreens with dense growth close to the ground, and plant them so close together that there will be no open spaces between.

Single row windbreaks lack flexibility; each tree or shrub is of major importance. When gaps occur, as individual trees die or lose lower branches, good maintenance requires immediate replanting. It is often better to start a new row when the old one has deteriorated.

Permeability: Shelterbelts need to filter and break up the wind force without causing damaging turbulence behind the shelter. Creating a dense windbreak can be

detrimental. Wind passing through a penetrable windbreak retains some of its common flow characteristics but velocity is reduced, thus inhibiting turbulence behind it. It is like sticking your hand out a car window going 45 miles per hour. A closed hand, like a dense windbreak, causes “damaging” air turbulence—but when fingers are spread slightly, air flow is reduced and turbulence eliminated.

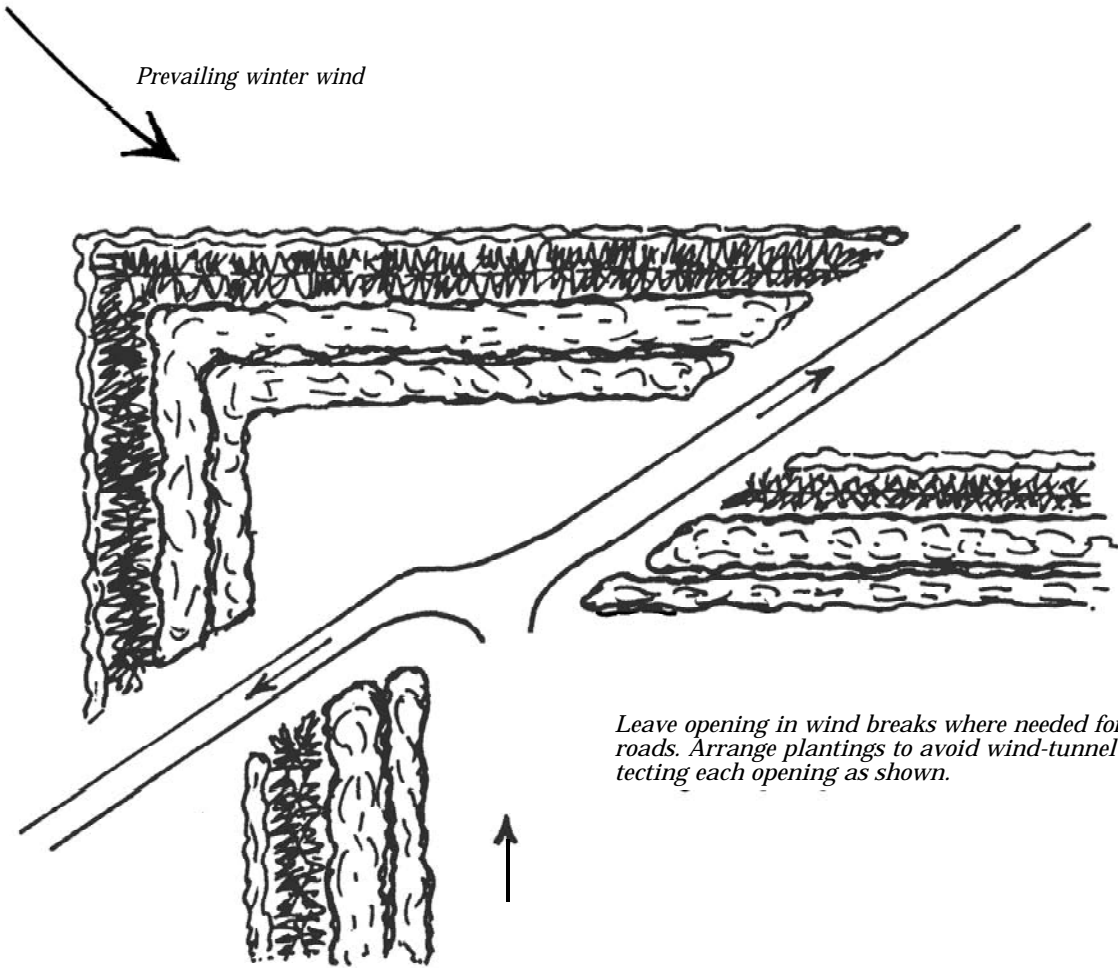
Profile: An irregular canopy level in a windbreak more effectively breaks up the uplifted wind force than a uniform upper edge. A mixture of species in the row of taller growing trees creates this desired pattern.

Selecting the species

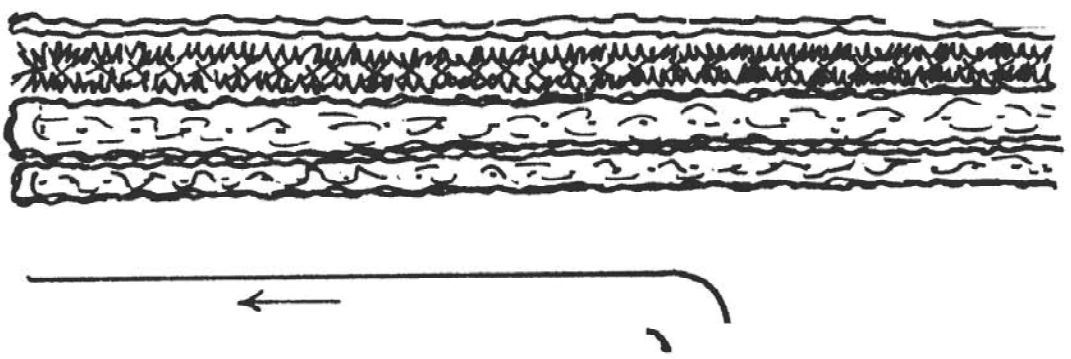
Success of the windbreak depends on choosing a suitable composition and carefully selecting species.

Windbreaks with more or less vertical edges are more effective than those with extended “pitched roof.” Points to remember in selecting tree and shrub species are:

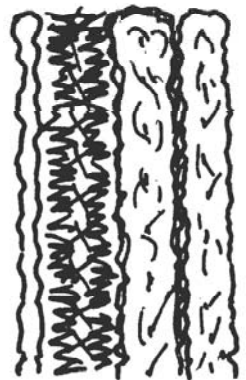
- obtain height as quickly as possible.
- provide for low, near-the-ground shelter to allow tree trunks to grow and open up near the ground.
- stabilize the belt that will be exposed to high winds.
- plant wind-strong trees on the windward side,



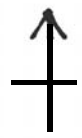
Leave opening in wind breaks where needed for lanes and roads. Arrange plantings to avoid wind-tunnel effect by protecting each opening as shown.



Move opening away from corner if possible and offset rows as shown.



North



- in selecting species, plan for farm game food as well as shelter.
- plan for permanence.
- select tree species which yield marketable timber when mature.
- select adapted species.

Mixed tree and shrub associations have roots feeding at different depths. Different crown heights cause radiative energy from the sun to be absorbed at more than one level—increasing soil and site efficiency. Diversification of species increases resistance. Different species may help each other become established.

When mixing species, simple silviculture principles should be kept in mind. For instance, when a slow-growing species is planted with one that grows rapidly, it must tolerate the shade of the taller of the two and soil conditions should favor both.

The success of closely intermingled species depends upon the respective rates of growth on the particular site. It cannot always be predicted which species will take the lead; therefore, it should be remembered that there are methods other than row-by-row mixed planting. For example, small groups or strips of one variety can be planted to improve its chances against competition.

When planting a three-row windbreak using fast-growing trees, a good distribution pattern with permanent trees may be obtained as follows:

D A B C D A B C
C D A B C D A B
D A B C D A B C

Key

- D — fast-growing species
- A — permanent species
- B — permanent species
- C — shrub-understory species

Understory species—any group of plants sufficiently shade-tolerant to permit their planting at the base and in the shade of other larger plants, especially trees, to mask their bare trunks and create an effect comparable to that of natural underbrush.

In time, the fast-growing species must be removed to make room for the permanent species.

Groups can be planted at random in the windbreak. But planting the trees along lines simplifies planting and maintenance, especially when farm machinery is used to control weeds.

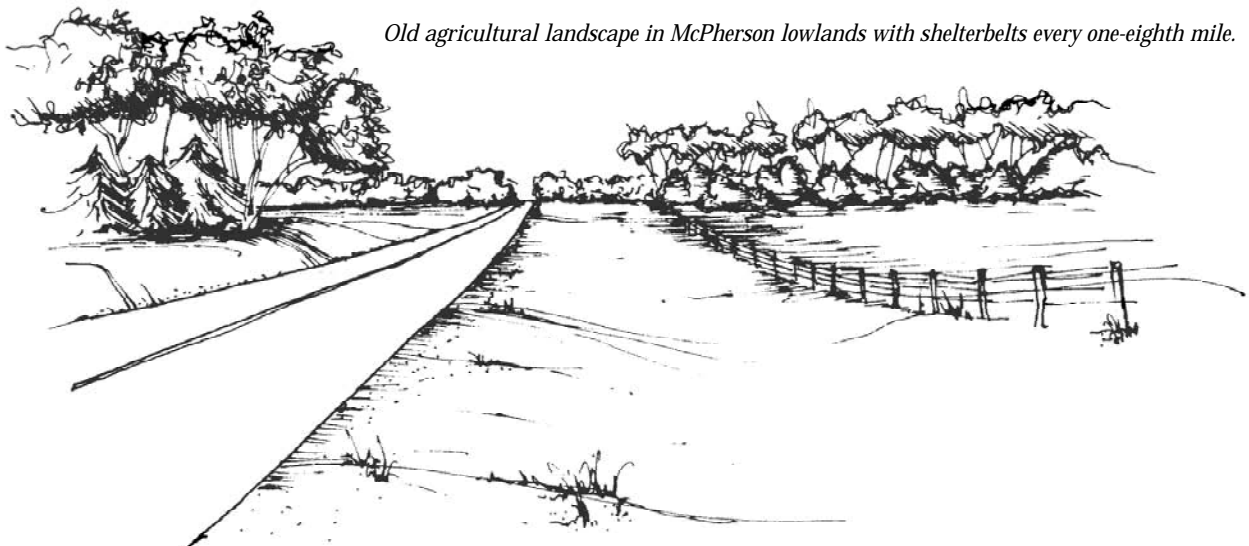
Controlling snowdrifts

Windbreaks must be kept far enough from the circulation system of drives and walks to prevent snowdrifts. A distance of 100 to 150 feet usually will be enough to prevent serious snow deposits as a direct result of the windbreak. Controlling snowdrifts involves the same principles as preventing wind erosion. Different techniques are necessary unless the objective is to deposit snow heavily in a limited area.

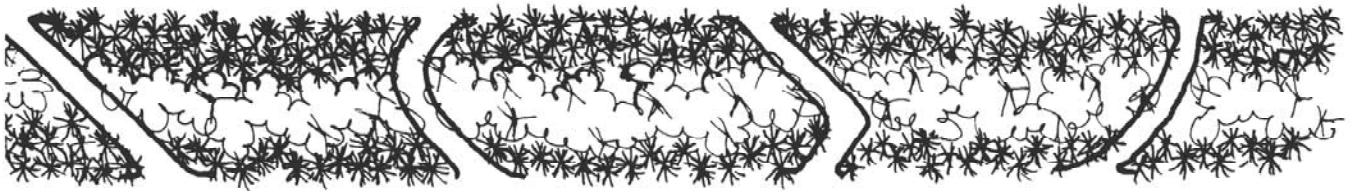
There are two reasons heavy deposits over a limited area may be preferable to an even distribution over a much larger area. The first and most common is to prevent snow from drifting onto roadways and feedlots, or around buildings. The second is to provide more moisture over a limited area, at the expense of land further leeward. This would be desirable in a region of limited rainfall to provide sufficient moisture for intensively cultivated crops, such as the farm vegetable patch.

To secure a relatively heavy local deposit, it is necessary to reduce greatly the wind velocity over that area. This can be done best by using a tight planting. If the shelterbelt is narrow—perhaps two or three rows wide, including shrubby rows—most of the snow will be blown across the trees and deposited in the region of calms and eddies leeward. As a result, snow that would otherwise have been distributed over a much greater space will be concentrated in a relatively narrow belt, adjacent to the windbreak. If, however, the shelterbelt is wide, composed of several rows of trees and shrubs, most of the snow will fall within the belt. The trees will profit at the expense of the adjacent planting area.

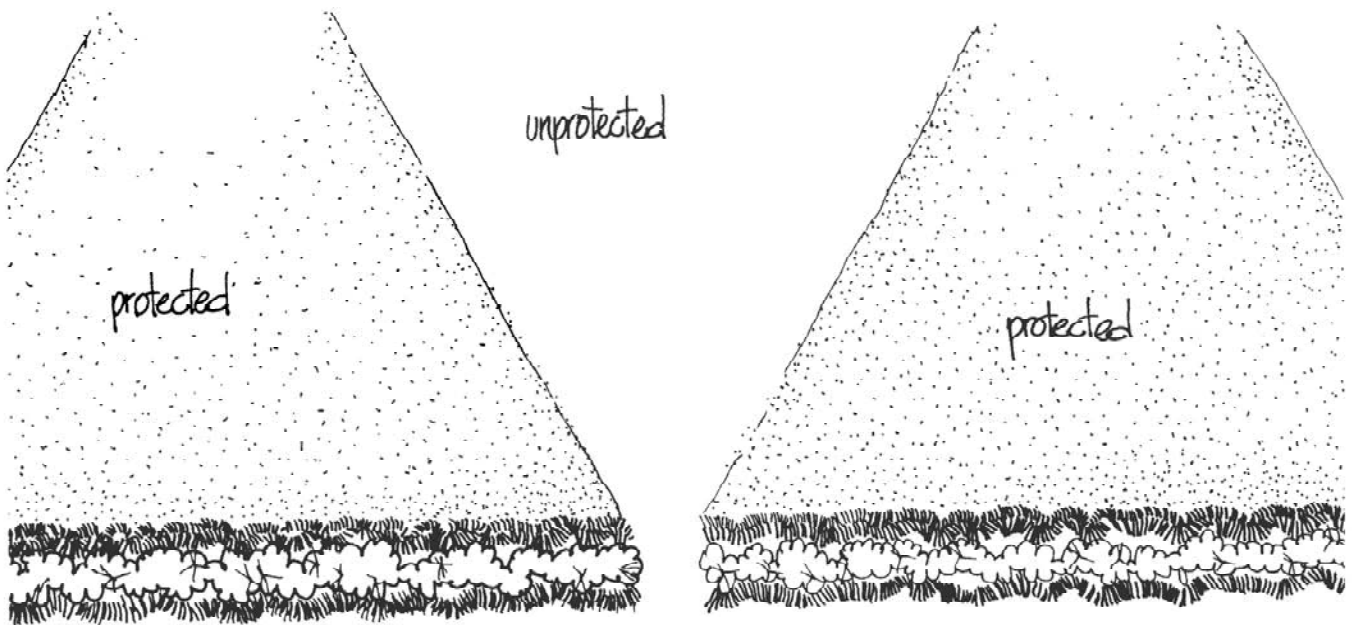
If the objective is to prevent snow from lodging where it is not wanted, place the belt far enough away to windward to permit snow to accumulate in a broad drift



Old agricultural landscape in McPherson lowlands with shelterbelts every one-eighth mile.



When cutting an opening through a windbreak, go on an angle to eliminate loss of wind protection.



Wind protection is lost when swath is cut straight through existing windbreak.

between the shelterbelt and the highway, for instance. Although the most satisfactory distance will depend in part upon the terrain and the expected wind velocity during snowstorms, the trees usually should be about 10 to 15 times their height from the roadway. (Minimum distance 100 to 150 feet.) This will provide a good drift area and yet permit the wind to regain enough velocity to sweep the road before it gathers another load of falling snow. Planting a narrow, dense belt of trees some distance windward of the main windbreak can help trap snow effectively in the space between. This way gardens are assured a better moisture supply, and at the same time are given some protection from hot, summer winds by the same windbreaks.

Modifying temperatures

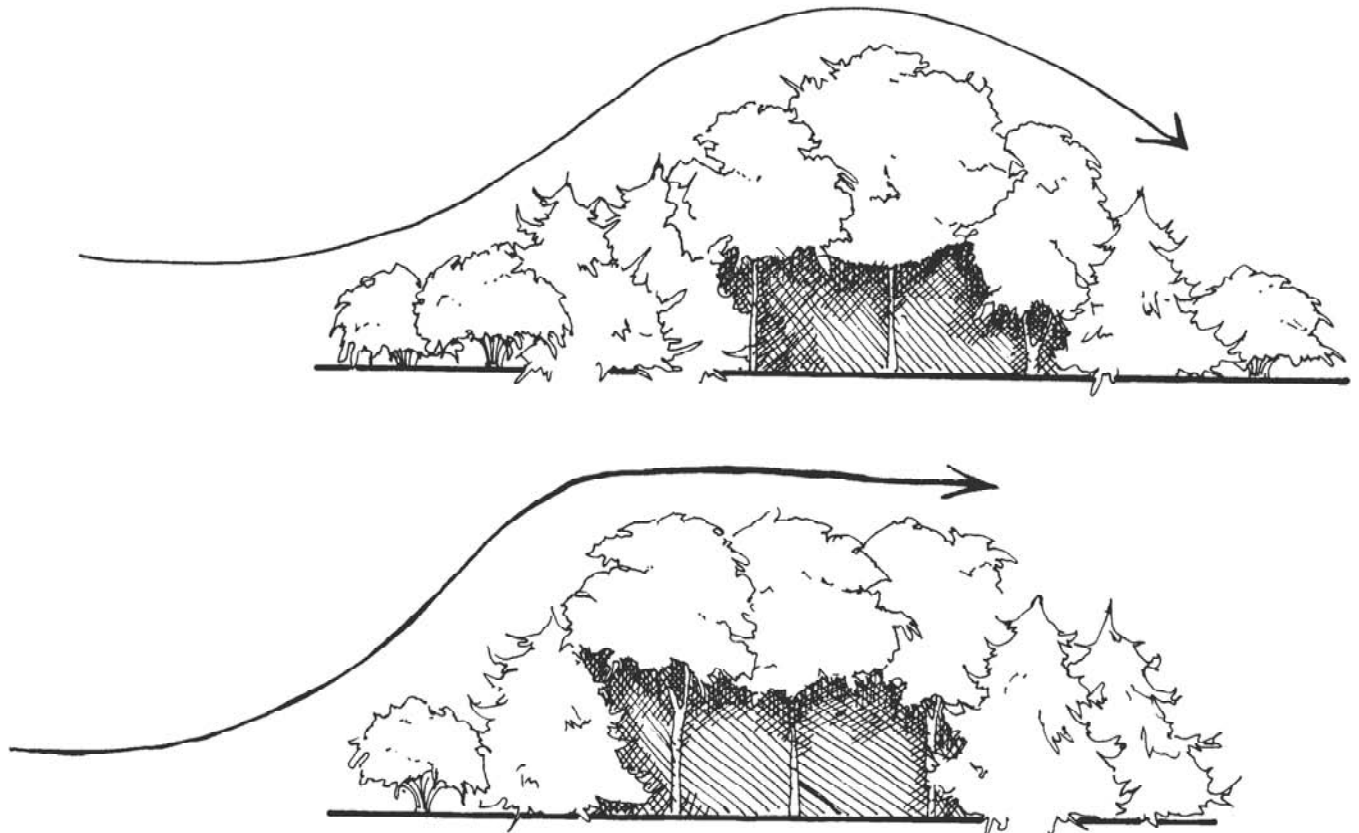
Reflected light and radiation from windbreak shrubs and trees—as well as the protection from the cooler north, northwest winds—exert a considerable warming effect on the south side of tree rows, and, to a lesser degree, on the west side. This influence is less on the east side, and on the north the warming trend is

slowed down. Temperatures are highest on the south side of an east-west planting and on the west side of a north-south windbreak. Consequently, gardens on the south or west side of a belt begin to grow earlier in the season and those on the north side later in the season.

Competition between windbreaks and crops may be lessened by:

- thoroughly cultivating the soil adjacent to the tree.
- subsoiling before planting trees to facilitate root penetration and upward movement of moisture.
- planting tap-rooted species like oaks, hickories, walnuts and locust along the edge of the belt.
- plowing deeply each year along the side of shallow-rooted species, such as osage orange and mulberry, to prune the roots.
- leaving a grass strip next to the trees and using it for hay.

Field crops right next to a shelterbelt have lower yields, but the yields increase away from the shelterbelt and will be higher than the average. Still further out, yields decrease again until they reach a level consistent with the rest of the field.



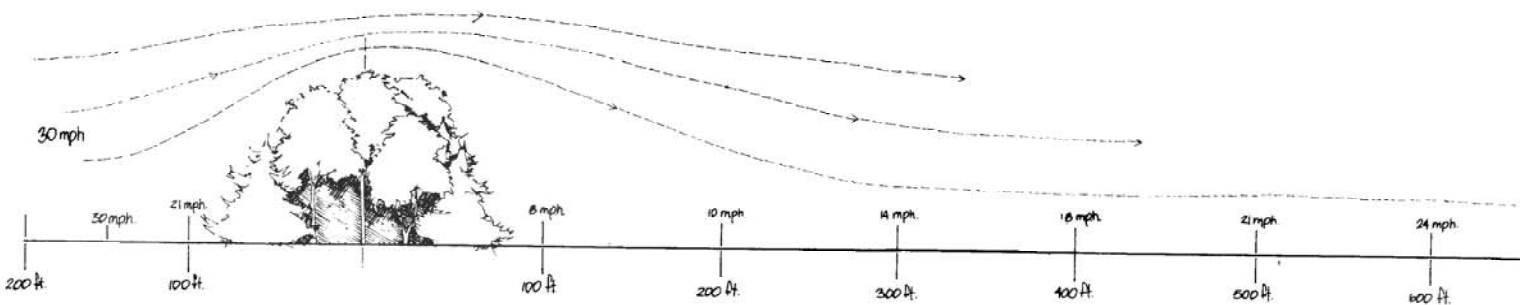
Windbreaks with more or less vertical edges are more effective than those with extended "pitched roof" outline.

Your county extension agent can assist you with more information on windbreak and shelterbelt planting. Through the office, your area forester can assist you in planning the shelterbelts and windbreaks. Also, the forestry department makes plant material available

through the county extension office for shelterbelt and windbreak planting.

Plant material selected will depend on availability of species and varieties, site, and geographic location.

Effective distance of a windbreak with a 30 mile-per-hour wind on level land.



Planting Trees and Shrubs

Optimum spacing depends upon growth rates of trees and shrubs. Fast-growing trees on good sites need fairly wide planting distances. Slow growers on poor sites will do better under closer planting conditions.

The spacing of rows will vary with tree and shrub species selected and the type of cultivator available. The spacing should be at least four feet wider than the implement which allows only two feet clearance on each side. Remember that a limited turn on the steering wheel in front will produce a major sway near the end of the cultivator, capable of destroying several trees. Row spacing is generally from 20 to 25 feet or more. Use the wider spacing for tall-growing species. Row spacing will vary with the type of plant selected. Closer spacing is recommended for windbreaks with only one or two rows.

Recommended spacing between plants (in feet):

shrubs	3-6 ft.
red cedar	10-12
rocky mountain juniper	8-10
pine	10-16
small deciduous trees	8-12
large deciduous trees	12-18

Preparing the planting site

Adequate drainage and good maintenance insure against windbreak failures. Wet spots in the windbreak need attention, and drainage should be improved before planting. Select species which can stand some “wet feet.” Fallowing the ground the season before planting increases the moisture reserve in the soil. Plowing reduces competition from grass and keeps weeds to a minimum. It allows for better rooting. Make sure at planting that soil is firmly packed around roots and that air pockets are eliminated. Don’t plant trees when a heavy clay soil is wet. This will “cement” the roots in and surely cause a failure.

Plowing only a ridge or furrow for tree planting lines may confine roots to the ridge or furrow, so plow a wider

strip. Use a subsoiler on heavy clay soils to encourage rapid deep root growth.

When to plant

The best time for planting is while plants are dormant from late October to early April. Trees planted in the fall are likely to suffer from winter winds and frost. Spring planting generally yields best results. It is the time when plants want to grow. Depending on the growing seasons, planting time may continue into May with plants which have been kept dormant in cold storage.

For best results, plant early in the spring when the ground is free of frost.



Row 1	Row 2	Row 3	Row 4	Row 5	Row 6
<i>Tartarian Honeysuckle</i>	<i>Eastern Redcedar</i>	<i>Austrian Pine</i>	<i>Black Locust</i>	<i>Cottonwood</i>	<i>Russian Olive</i>
<i>Common Lilac</i>	<i>Rocky Mountain Juniper</i>	<i>Scotch Pine</i>	<i>Catalpa</i>	<i>Silver Maple</i>	<i>Redbud</i>
<i>Tamarik</i>	<i>Austrian Pine</i>	<i>Ponderosa Pine</i>	<i>Mulberry</i>	<i>Hackberry</i>	
<i>Nanking Cherry</i>	<i>Ponderosa Pine</i>		<i>Osage Orange</i>	<i>Walnut</i>	
<i>American Plum</i>	<i>Scotch Pine</i>		<i>Green Ash</i>	<i>Honeylocust</i>	
<i>Peking Cotoneaster</i>			<i>Honeylocust</i>	<i>Siberian Elm</i>	
<i>Autumn Olive</i>			<i>Chinese Elm</i>	<i>Chinese Elm</i>	
<i>Winterberry</i>			<i>Siberian Elm</i>	<i>Oak Species</i>	
<i>Fragrant Sumac</i>			<i>Oak Species</i>		

Remember, it is a good silviculture practice to mix species within the row, keeping ‘forest’ ecosystems in mind.

Near the home the windbreak can be enhanced with extensive plantings of flowering shrubs and trees. These plants have to be purchased from a nursery.

Ordering plants

Buy young plants with **well-developed root systems**. Select plants adapted to your site. Although small plants tend to be overcome by weed growth and require prolonged weeding, they are a better start on windy and poor sites. Order trees well in advance. Even if you don't get them earlier, you are mentally prepared and can plan your work program well ahead. Order plants grown at nurseries in a rigorous area rather than from a mild district. The risk of losses due to environmental changes are generally less.

When plants arrive, check them immediately. Keep roots damp. If planting must be delayed for a few days, place trees in a cool, frost-proof cellar. If planting is delayed over an extended period, plants should be heeled in on a protected site. Place them in a trench and cover roots with moist soil. If bundles are going to be kept in the trench for more than a few days, open bundles and spread plants out. Tree and shrub roots should **never** be exposed to drying winds or hot sun, **not even for a very short time**. Therefore, at planting time do not open up a furrow, drop the trees into it, and then return to the beginning of the row to start planting. The prolonged root exposure to sun and wind will kill trees.

At planting time

Be sure that roots are kept moist at planting time. Keep trees in a damp medium and quickly take one out and place in planting hole, making sure that the hole is large enough and roots are spread out. Carry a pair of sharp pruning shears in your pocket. Prune off damaged and excessively long roots and broken branches. Do not fold roots to make plant fit the hole. Shape the little tree quickly and prune rank growth of the newly planted shrub or tree.

You can plant with a tree-planting spade or tractor-drawn planting machine. Seedlings should be planted the same depth or slightly deeper than they were in the nursery. Generally, you can see a discoloration on the trunk to indicate depth of planting. Pack soil firmly around the roots to exclude air pockets and prevent the fine root hairs from drying out. If soil is dry, apply water immediately after planting. Build a little earth saucer around the plant to hold water when applied with a bucket or hose. Do not tamp wet soil.

Fertilizing

Fertilizers seldom are needed to encourage growth in the first year, except perhaps on poor soil. Use only slow-release fertilizer. After the first year, don't over-fertilize; it may cause trees to grow willowy.

Mulching

Mulching has advantages and disadvantages. It prevents light rain from reaching the soil. It encourages rodents, especially mice which may damage young trees.

It causes a fire hazard and may induce shallow rooting, altogether detrimental to establishing good windbreak trees and shrubs.

On the positive side, it conserves moisture to prevent soil from drying and cracking; it safeguards light soils from blowing; it suppresses weed growth; and, as it decomposes, it adds organic matter to topsoil. Most farms have old straw and ensilage; both of these make excellent mulches when applied four inches deep. Do not pack mulch against the tree; keep mulch a few inches away from trunk. A five-foot diameter circle is adequate. Do not use plastic near livestock. Pieces may blow to them, and they may choke when chewing it.

Because controlling weeds is important, the benefits of a mulch outweigh the disadvantages. Weeds can be controlled through cultivation, but cultivation may damage tree roots.

Herbicides and pre-emergent herbicides can be used to control weeds. Be sure to read the label. Careless use can kill many trees—seedlings as well as older trees. Allowing weeds and grass to grow away from the trees in the middle of the row helps control hot, desiccating winds.

Replacing dead trees

It is especially important to replace dead trees in narrow belts in the first or second year after planting. In wider rows, this is less essential unless losses amount to more than 10 percent or are localized to one area of the young windbreak. Order enough trees to replace anticipated losses. Extra trees can be held in nursery rows.

Once the windbreak is established, little attention normally is required for some years beyond insuring that fences are maintained to keep livestock out, and that no avoidable disaster—such as a fire or the spread of farm crop weed killers—reaches the young trees and shrubs in the new windbreak.

Normal maintenance, such as pest control, is best coordinated through a periodic, if not regular, walk through the windbreak. Taking time for such a walk could become a family affair. Watching the small trees and shrubs grow from one year to the next is something everyone could enjoy.

Planting idle acres

Unproductive small acreages of land on the farm can be made productive for timber and wildlife habitat and can become aesthetically interesting themes in the landscape. Such areas can be found near small drainages which offer a naturally high fertility. Good trees to plant are cottonwood, walnut, pecan, green ash, hackberry and oak. Other areas are field corners. Land cultivation leaves corner problems where machinery has to turn. Even with well-planned machinery circulation, there can

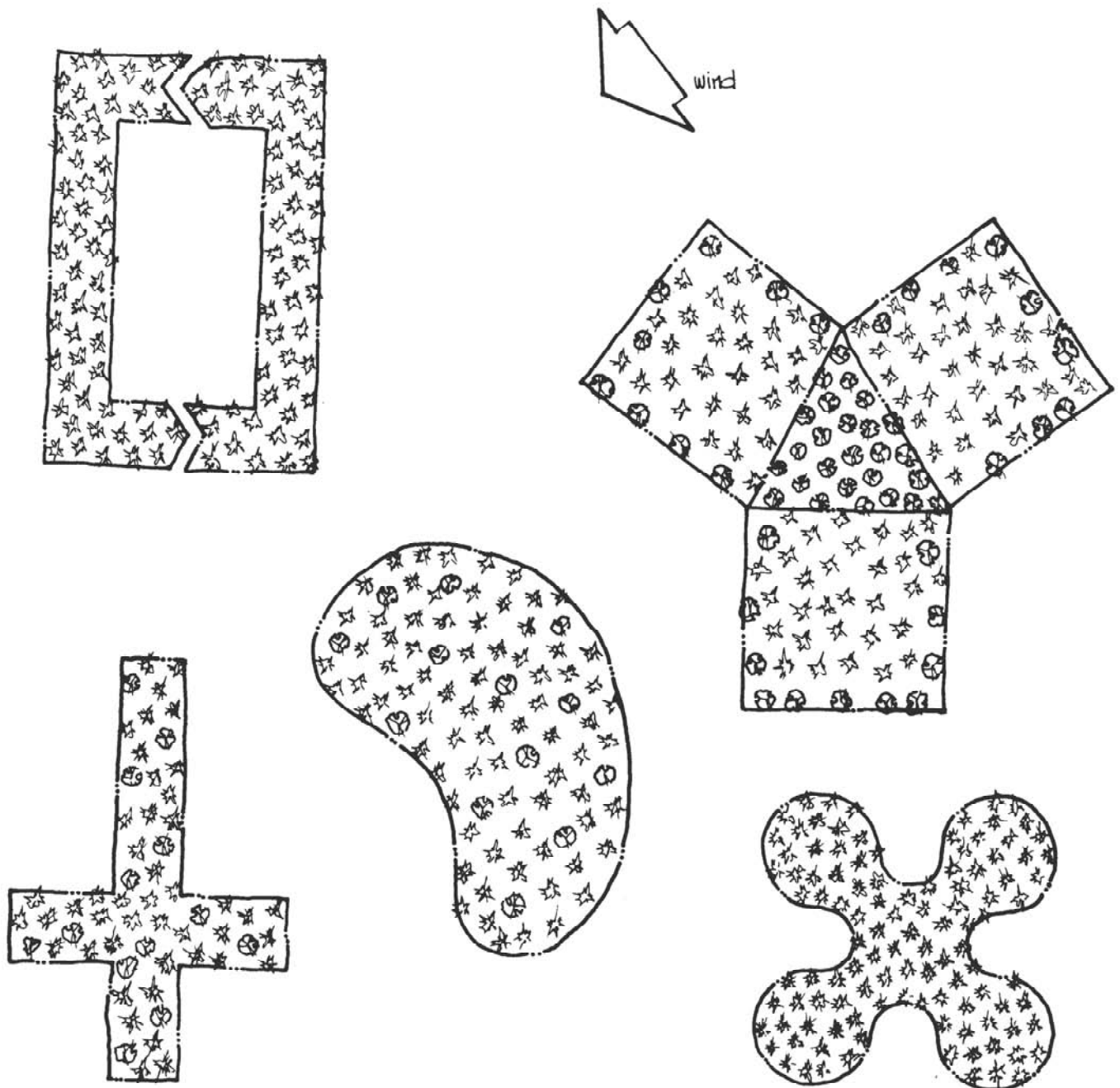
be waste. This is why rectangular fields are preferable. The waste corners can be valuable assets for amenity and wildlife. In such corners many shrubs could be planted besides trees. For wildlife, the aim should be to provide mixed cover, and the small planting should be formed as a pyramid with the taller species planted near the center. Select species depending on locality. In some situations, two or more corners may come together. These areas can provide wildlife habitats and help create a varied and interesting landscape. If field shapes must be restructured,

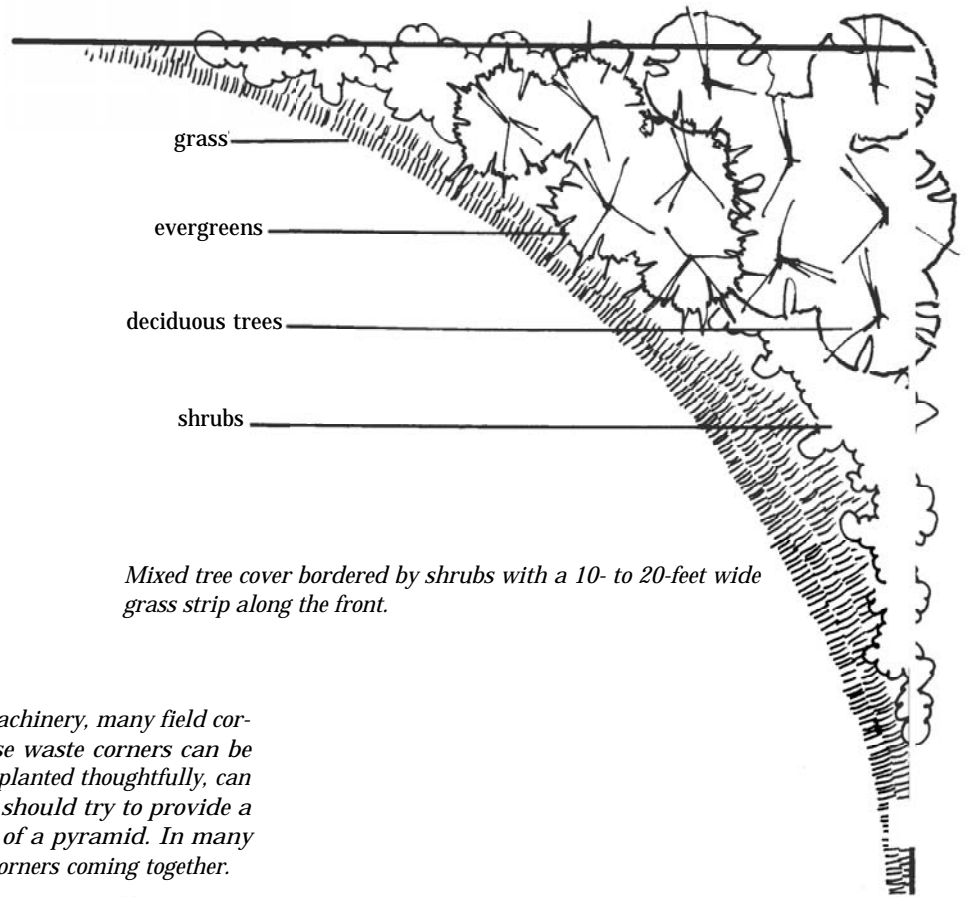
then new wildlife habitats also must be created, and beauty should not be forgotten in creating them.

When providing wildlife habitat, some key concepts to remember are protection and nesting cover, food and water, as well as minimizing disturbances.

Fencing off an area to allow regrowth of native plants is an easy way to establish wildlife habitat and restore indigenous plant material whose form, texture, and color fit the ecology of the particular region.

Shelter planting designs for livestock do not necessarily have to be straight rows. Whenever possible, shelterbelt or windbreak plantings should be designed in relation to land forms.





With modern and often large farm machinery, many field corners are no longer cultivated. These waste corners can be valuable assets for wildlife and when planted thoughtfully, can be aesthetically very pleasing. One should try to provide a mixed cover and plant in the form of a pyramid. In many situations, there will be two or more corners coming together.

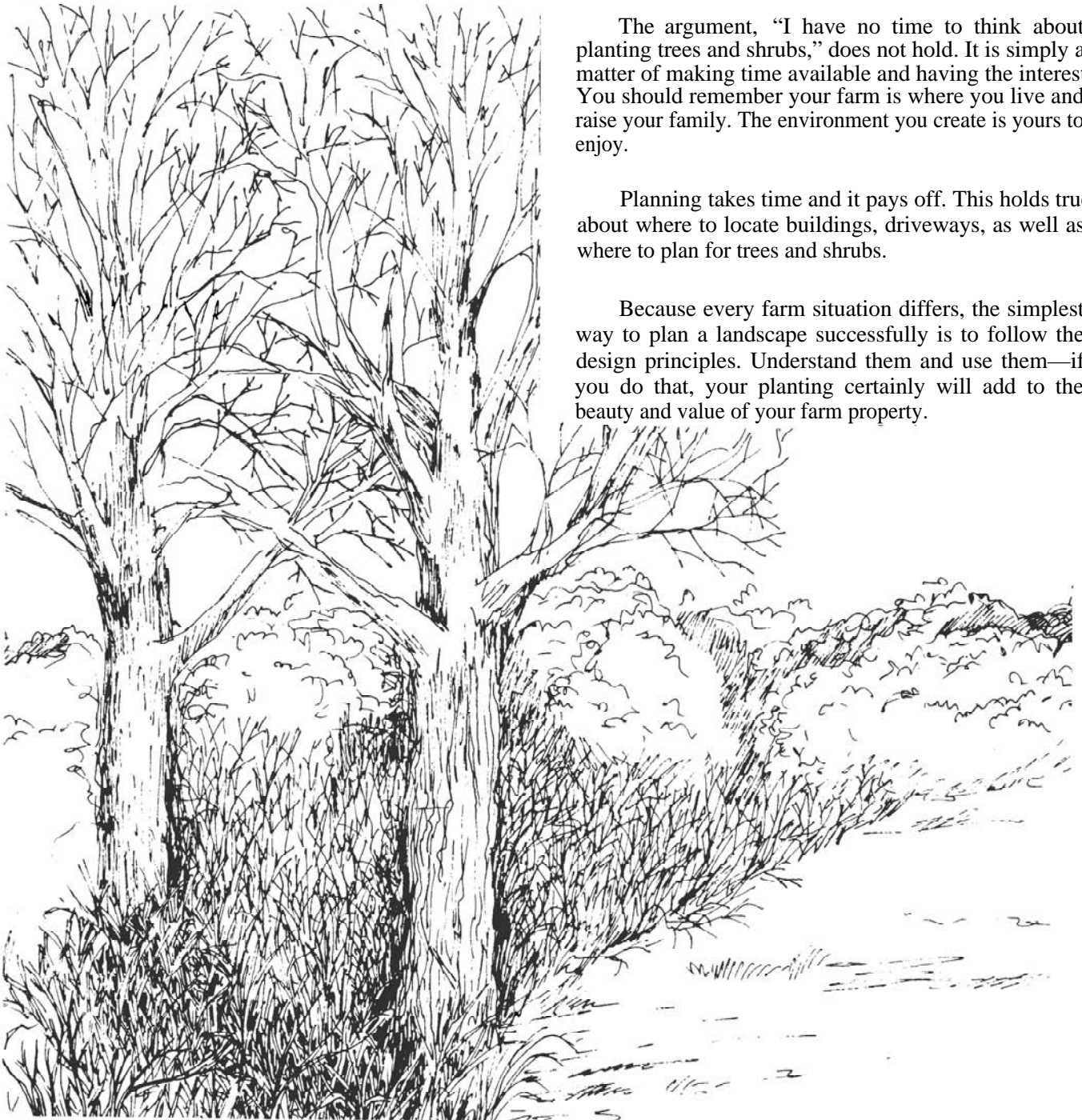


Conclusion

The argument, “I have no time to think about planting trees and shrubs,” does not hold. It is simply a matter of making time available and having the interest. You should remember your farm is where you live and raise your family. The environment you create is yours to enjoy.

Planning takes time and it pays off. This holds true about where to locate buildings, driveways, as well as where to plan for trees and shrubs.

Because every farm situation differs, the simplest way to plan a landscape successfully is to follow the design principles. Understand them and use them—if you do that, your planting certainly will add to the beauty and value of your farm property.



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