

from the bottom up until the spray just begins to run off the foliage. Keep the spray nozzle moving. The sprayer, unless it has a mechanical agitator, should be shaken often to prevent settling of the chemical.

Dusts should be forced through the foliage to give an even, light coating to both leaf surfaces. Apply them when the air is still, preferably early in the morning or at dusk.

Either dusts or sprays can be used satisfactorily in the flower garden.

Dusts are usually more expensive, but the dusters cost less than comparable sprayers and are more convenient and easier to use.

Sprays are less difficult to handle in windy weather.

Plunger-type dusters are the smallest kind and can do a fair job for a few plants. A small bellows or rotary fan duster will give better coverage for a small garden. Larger rotary dusters and power dusters can be used on larger gardens for better distribution.

Household sprayers that hold up to 4 quarts can do a reasonably good job of spraying if they deliver a continuous fine spray or mist.

Compressed-air sprayers that hold 1 to 5 gallons are satisfactory for garden use. Larger sprayers with a continuously operated hand or motor pump are needed in larger gardens.

Clean sprayers thoroughly after use and allow them to dry.

Ready-to-use sprays in pressurized cans are useful on house plants or a few plants in a garden. They may be expensive.

You may like the hose-proportioner sprayers, in which the chemical is placed in a jar and mixed with the water at the hose nozzle. They are convenient, but more chemical is used than with a conventional sprayer, and the proportioners vary in distribution of spray material.

AVAILABLE general-purpose sprays or dusts will eliminate the need for mixing several control materials. Better, cheaper results can usually be had by

using a material specifically recommended for a particular disease or pest. Recommendations should be followed closely in all cases.

CHOOSE, whenever possible, varieties that withstand a disease. Examples are rust-resistant snapdragons, wilt-resistant asters, and wilt-resistant mimosas.

Resistance does not always mean that the disease will not develop. Sometimes it does develop, frequently because the disease organisms also have many varieties or strains, and a plant resistant to one disease strain may fall prey to another. (D. L. GILL)

For Shade; for Sun

GARDENS may be sunny or shady, but even the sunniest will have a few places where taller plants or the house cast shade for part of the day. The shadiest usually has some sunny corners or clearings.

Showy and attractive gardens can be developed in either situation, but the more interesting gardens are likely to be those in which shade and shade-loving plants are used as a restful foil to the heat and brilliance of the sun-drenched places.

The attainable balance between sun and shade is regulated by the garden site and the owner's needs and wishes: He can cut trees and shrubbery when they are overly crowded. He also can plant them. Seldom does an owner have a situation (for example, where land slopes are such that shade cannot be avoided or where planting soil is lacking) in which he cannot achieve a balance.

The adaptability of plants in their many kinds to conditions of full sun, full shade, or part shade, is remarkable. In their wild state they have come from the high light conditions of the desert, from the prairie and open meadows, from the partial shade of the ravine or open woodland, and from the denser shade of the thick-canopy forest.

Moreover, their liking for the conditions of their wild state to a large extent are inherited and persistent.

Most trees and shrubs of the garden are sunlovers. So are most vegetables and most of the showier annuals and herbaceous perennials, such as marigolds, zinnias, herbaceous peonies, and daylilies. Although a lesser number require or tolerate shade for at least part of the day, fewer still may require or tolerate conditions of relatively constant shade. Few indeed will succeed under the difficult conditions of constant, dense shade.

Conditions of partial or light shade may be found near the house, beneath such sparsely leaved trees as the honeylocust, or in woodlands where the trees are scattered and high branched.

Many shade-tolerant shrubs and smaller plants can be grown in such places.

A denser tree pattern and lower branching excludes more sunlight and permits the growth of fewer kinds of plants.

An extreme situation is the constant, dense shade of low-branching evergreen trees. There, plantings have to be limited to the most shade-tolerant kinds of all—the delicate woodsorrel, wintergreen, English ivy, Canada mayflower, partridge-berry, and a few of the ferns.

Remember, however, that shade usually is not constant throughout the year. The angle of the sun varies, and many wildflowers and such bulbs as scillas, grape hyacinths, and daffodils will grow in deciduous woodland and virtually complete their flowering cycle before the overhead shade canopy becomes dense.

Each plant has its particular preference for full sun or for part or denser shade and will remain true to this preference. In too dense shade, sun-loving plants fail to grow normally. Their foliage becomes thin and susceptible to disease. Their branches become spindly. Their flowers are sparse or offcolor.

Set in full sun, a shade-loving plant may become poor and stunted, if indeed it succeeds at all.

A second factor, soil moisture, bears close relationship to the shady and sunny situation. Certain soils or sites may be inherently dry. Dryness in shade usually is the result of the root competition of the trees.

A shady, root-infested soil may be difficult to cope with unless the plants used are drought-tolerant as well as shade-tolerant (pachysandra and periwinkle are among the best) or unless the worst of the surface tree roots are removed with a spade and ax before planting. Under oaks and tulip poplars, such efforts may provide root freedom for some time, but under maples and elms the roots will return within a few months.

By the nature of their origins, most shade-tolerant plants thrive on an abundance of soil organic matter. The incorporation of peat moss, decayed leaves, pine needles, and the like fills this need and also provides a desirable increase in both the air- and water-holding capacity of the soil.

Just as root competition and soil moisture are complicating factors in shady gardening, so may the driest situations in full sun be the most difficult.

In climates of normal rainfall, soil dryness in open areas may be a product either of the soil or the site. Shallow coverings over rock and open, sandy soils tend to warm and dry rapidly, but a clay bank facing full south or west can also suffer from summer drought.

Because so many plants either need sun or tolerate it, we concentrate our attention on plants that are especially

useful for covering and decorating dry banks, shallow soils, and other tough, dry, sunny situations.

IN LIGHT or partial shade, in the shade of scattered, high-branched trees, against buildings where the sun penetrates for at least part of the day, or in similar situations, a comparatively wide variety of plants can be grown satisfactorily.

Among evergreen trees, the hemlock is perhaps the best. *Arborvitae* can be satisfactory with fair sunlight if the soil is not too dry. Suitable smaller trees include dogwood, both eastern and western, shadbush, sorrel tree, sweetbay magnolia, American and English hollies, and the Florida *Illicium anisatum* and the species of *Podocarpus* in warmer areas.

Adaptable shrubs for shade include such natives as spicebush, the maple-leaved and arrow-wood viburnums, sweet pepper bush, oak-leaved hydrangea, inkberry (*Ilex glabra*), and native andromeda (*Pieris floribunda*). Good also are Japanese andromeda, Japanese holly, the boxwoods, the Oregon grapes (*Mahonia aquifolium*, *repens*, and *nervosa*), kerria, Morrow honeysuckle, and many of the privets, the deciduous ones in the North, and the more evergreen forms in the Southern States. For the milder sections, the Indian hawthorn (*Raphiolepis*), banana-shrub, pittosporum, and the Turks-cap (*Malva viscus*) can be added.

Where soils are acid, as in the coastal States of the East and the Pacific Northwest, some of the showiest of all shrubs—the azaleas, rhododendrons, mountain laurel, and camellias—are admirably adapted to conditions of light or high shade. Such plants will grow in relatively heavy shade.

We like them for their flowers, however, and for flower production, an hour or two of sunlight a day is essential for most kinds.

Many varieties of leaf-shedding azaleas are adapted to northern cultivation, both in native species and in garden hybrids. Evergreen Kurume,

Kaempferi, and Glenn Dale forms do well south of Philadelphia. The Indian hybrids are suited to the Gulf States and California.

Hybrid rhododendrons will need to be selected for recommended climatic performance, as also will camellias. Some varieties of both the Japanese and sasanqua camellias perform well in Washington, D.C., and the State of Washington, but others need the milder climates of the South.

Some of the most famous display gardens of this country are the shady azalea-camellia gardens of the South-eastern States and California.

Shrubs and trees may form the upper story, but no part-shady garden can be complete without an interesting ground pattern.

To provide that pattern of flower and foliage, a long list of plants can be suggested. The following are perhaps among the best:

For taller effect, the white spikes of snakeroot (*Cimicifuga*), the multi-colored lilies and columbine;

For lower flowering, bleedingheart, wild hepatica, blue phlox (*Phlox divaricata*), trillium, violets, Virginia bluebell, foamflower, wild cranesbill (*Geranium maculatum*), beebalm, lily-of-the-valley, Aarons-beard (*Hypericum calycinum*), forget-me-nots, and bugleweed (*Ajuga*);

For foliage effects, meadowrue (*Thalictrum*), wintergreen, wildginger, barrenwort (*Epimedium*), wintercreeper (*Euonymus fortunei radicans*), mayapple, many ferns, and, in warmer areas, lily turf, *Begonia evansiana*, selaginella, and aspidistra.

But bulbs, besides lilies, should not be forgotten. Many daffodils and narcissi will do well with sufficient early-season sunlight, as also the Spanish and Scotch bluebells, the small chionodoxas, grape hyacinths, crocus, snowdrops, and snowflakes, which are so well adapted for quantity planting in drifts and clusters.

Should vines be needed as wall cover or for smothering old stumps or trees, English ivy, climbing euony-

mus, Dutchmans-pipe, Virginia-creeper, and several of the clematis are all shade tolerant.

Clematis jackmani and other large-flowered hybrids are capable of good performance on a north-facing wall.

The heavier shade of closely spaced buildings or of a lower or denser tree canopy quite rapidly reduces the inventory of potentially useful plants. Many of those I mentioned will still grow, but not quite so thriftily, and the flowering kinds will not be so showy. Among woody plants, mountain laurel will still provide good foliage, whether or not its flowers become rather sparse. Rosebay rhododendron (*Rhododendron maximum*) must substitute for the showier hybrids. Ground hemlock (*Taxus canadensis*) is good for dense, deep green cover, as well as *Leucothoe catesbaei*, which is actually tolerant of a broad range of sunlight and deep shade conditions.

Japanese spurge (*Pachysandra*), periwinkle (*Vinca*), and English ivy will continue to perform as ground covers.

Ferns come very much into their own, especially the maidenhair, sensitive, ostrich, cinnamon, New York, and beech ferns for moister situations, and Christmas, hayscented, polypody, and the spleenworts where the soil may be relatively dry.

More conspicuous for their flowers or berries are a number of small plants that come largely from our own woodlands. Trillium should still give returns, and the wood anemones, as well as dwarf iris (*Iris cristata*), goldthread (*Coptis*), Solomons-seal, galax, bunchberry (*Cornus canadensis*), Canada mayflower, herb Robert (*Geranium robertianum*), partridge-berry, pipsissewa, and wintergreen.

ON SOUTH-FACING banks or in any situation conspicuously hot or well drained and dry, the depth and kind of soil will serve as part determiner of the adaptable plant cover.

Sedums and ground phlox can grow in shallow soils on rocks, but most

woody plants will need a deeper root run. Whatever plants are chosen, the soil should be pre dug and improved as much as possible. Poor and untreated soil adds to the drought problem.

Where a shrubby effect is desirable, coralberry is a hardy plant for tough situations. For midsouthern to southern climatic areas, the firethorns are useful for plantings of 2 to 8 feet in height, according to variety.

In similar regions the brooms (*Cytisus*) succeed in sandier soils, and in California the species of sun roses or *Cistus*. Hardy dwarf rockspray (*Cotoneaster horizontalis*) withstands much drought when established, as also does yellow-flowered, shrubby cinquefoil (*Potentilla fruticosa*).

For lower and different effect, yuccas and many kinds of cacti and other succulents may be suitable in the warmer States. However, *Yucca filamentosa* (= *Y. smalliana*) and *Opuntia compressa* and *polyacantha* are hardy in all but the coldest parts of the country. Surrounded by stone chips or sand, and with a scattered undercover of stonecrops (*Sedum*) and houseleeks (*Sempervivum*), such plants as these will add interesting accentuation to the feeling of desert dryness.

An orderly evergreen bank cover may be obtained with periwinkle (*Vinca minor*) in cooler areas, if moisture conditions are not too extreme, or with the several excellent, low-growing junipers. The trailing, gray-leaved, disease-resistant Waukegan juniper (*Juniperus horizontalis douglasi*) is one of the best. Both the glossy green bearberry (*Arctostaphylos*) and feathery green or gray lavender-cotton (*Santolina*) are effective in sandy or other well-drained soils.

Where flower color is important, some suitable choices may be found among the color forms of moss pink (*Phlox subulata*), the rockroses (*Helianthemum*), evening primroses, butterfly-weed (*Asclepias tuberosa*), snow-in-summer (*Cerastium tomentosum*), or the dwarf catmint (*Nepeta mussini*). All these are persistent.

If a showy but temporary effect is needed, some of the most sun-loving and drought-tolerant annuals include the mesembryanthemum (*Cryophytum*, *Dorotheanthus*), portulaca, California-poppy, Cape-marigold (*Dimorphotheca*), annual phlox, and snow-on-the-mountain (*Euphorbia marginata*).

Such plants as these should all be available from specializing commercial sources.

In learning their habits and in discovering their particular niches in relation to plant neighbors and to the terrain, lie the pleasures of gardening. (HENRY T. SKINNER)

Fruit Trees

GROWERS OF FRUIT ON small properties should realize that they must face most of the problems that confront large commercial growers, plus a few more.

Among them are choice of varieties, planting, fertilizing, control of pests, pruning, pollination, and irrigation. The small growers do not have problems of labor, storage, and marketing, but they must get along with less efficient sprayers. Often they have to cope with unsuitable soils and sites. They may have to find means to prevent pillage by birds and rodents.

Furthermore, because the small grower may be a weekend grower, he cannot always time properly the application of sprays to control pests.

His trees also may have to be adapted to yard and garden culture rather than standard orchard practices. He may tend to overwater, overfertilize, and sometimes underdo.

All this is negative, I know. Purposely so; I raise the question whether gardeners should undertake to grow tree fruits on small properties.

For those, however, who believe the end is worth the effort, I give some do's and don'ts with the hope they will succeed.

CLIMATE, especially temperature and rainfall, limits the kind of fruits that can be grown anyplace.

We can classify fruit trees on the basis of their temperature requirements, particularly the lowest temperatures they can stand.

The truly tropical fruits that require long, warm seasons with minimums of 50° F. include bananas, mangos, papayas, coconuts, cocoa, durians, sugar apples, and mangosteens.

The subtropical fruits like long, warm growing seasons but will stand short, cold seasons. Some will even stand small amounts of frost. They include oranges, grapefruit, lemons, limes, guava, avocados, litchi, dates, and macadamia nuts.

Hardier subtropicals, including olives, figs, pomegranates, and Oriental persimmons, stand down to 10° to 15°.

The temperate or hardy fruits include apples, pears, sweet and sour cherries, plums, peaches, nectarines, apricots, almonds, pecans, walnuts, and some other tree nuts.

Growers should not try to grow fruit trees in climates not suited to them. The pecan, for example, endures winter temperatures of the Northern States, but the growing season is too short for it to set and mature nuts.

Figs prefer long growing seasons; they may survive zero temperatures in the Coastal States, but often they are killed back. New growth is erratic in production there and does not mature crops some years.

Apples and pears are hardy and when fully dormant will stand temperatures far below zero, but they cannot be grown in the far South, where temperatures may not be low enough to break their dormancy.

Peaches and sweet cherries are moderately hardy when fully dormant, but their fruit buds generally are killed at —10° and wood injury occurs at —20°.