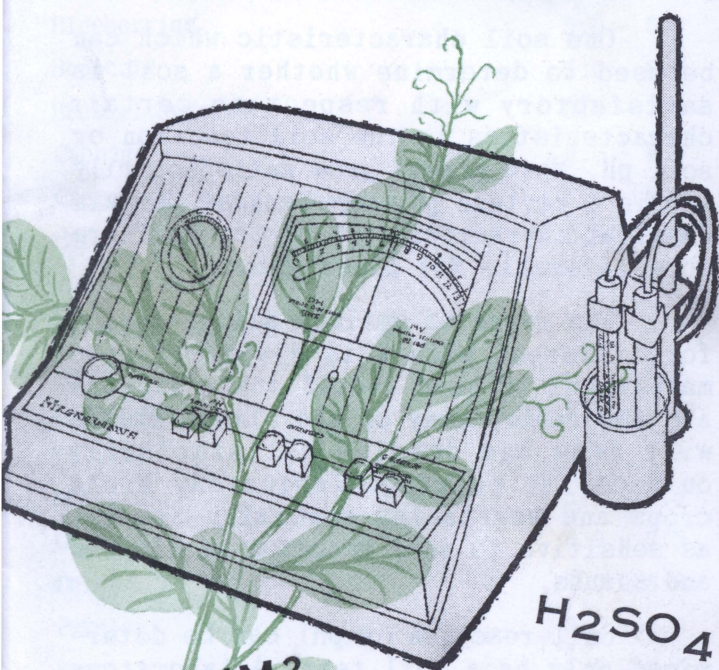
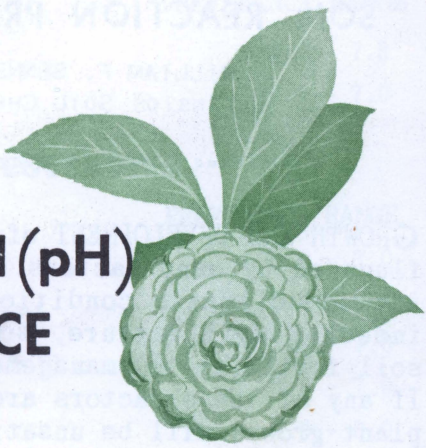


SOIL REACTION (pH) PREFERENCE



CALCIUM?

LIMESTONE?

SULFUR?

H_2SO_4 ?

SOIL REACTION PREFERENCE

WILLIAM F. BENNETT
EXTENSION SOIL CHEMIST

The Texas A. & M. College System

GROWTH AND DEVELOPMENT of plants are influenced by many factors. These factors include climatic conditions, diseases, insects, soil texture, soil structure, soil fertility, and management practices. If any of these factors are unfavorable, plant growth will be unsatisfactory.

One soil characteristic which can be used to determine whether a soil is satisfactory with respect to certain characteristics is the soil reaction or soil pH. Most plants grow satisfactorily within a certain pH range because certain chemical characteristics of the soil are more favorable for plant growth.

The range of optimum soil reaction for different plants is given. If good management is used and if other factors are favorable, many of the plants listed will grow and develop satisfactorily outside the pH range indicated. Field crops and vegetables generally are not as sensitive to soil reaction as flowers and shrubs.

Soil reaction (or pH) can be determined only by a soil test. A laboratory test with a pH meter gives most accurate results. Soil test kits containing color indicators can be used but are less accurate.

Certain soil amendments can be used to change the soil reaction. Ground agricultural limestone can be used to increase soil pH (make it less acid). Other liming materials, such as quicklime, ground marl or wood ashes also can be used.

To decrease soil pH (make it more acid) use elemental sulfur, sulfuric acid, iron sulfate (copperas) or aluminum sulfate. These soil amendments should be applied and worked into the soil at least 3 months ahead of planting for best results. Application of organic material, such as barnyard manure or compost, also reduces soil pH. Certain fertilizers, such as ammonium sulfate, make a soil more acid, whereas others, such as sodium nitrate, make the soil more alkaline.

The quantity of these amendments to be used depends not only on the present soil pH but also on soil texture, organic matter content and exchange capacity of the soil. In view of this, no general recommendations for using soil amendments can be given. The rate to be used should be based on a soil test.

Soil pH and its meaning in relation to lime requirements and fertility conditions is given in the following table.

FIELD AND FORAGE CROPS

| CROP | PREFERENCE RANGE |
|---|------------------|
| Alfalfa, sweetclover | 6.5 - 8.0 |
| Alsike clover, white clover | 6.0 - 7.0 |
| Bermudagrass, sudangrass, sorgrass | 5.5 - 7.5 |
| Corn | 5.5 - 7.5 |
| Cotton | 6.0 - 8.0 |
| Cowpeas, vetch | 5.5 - 7.5 |
| Crimson clover | 6.0 - 7.5 |
| Dallisgrass | 6.0 - 7.0 |
| Flax | 6.0 - 7.0 |
| Lawn grasses (Bermuda, San Augustine, carpet) | 5.5 - 7.5 |
| Lespedeza | 5.0 - 6.5 |
| Millet | 5.5 - 7.5 |
| Red top | 6.0 - 7.5 |
| Sorghum (For syrup only) | 5.5 - 6.5 |
| (For forage or grain) | 5.5 - 7.5 |
| Small grains (oats, wheat, barley, rye) | 5.5 - 7.5 |

TABLE I. SUMMARY OF SOIL REACTION, LIME REQUIREMENTS AND PLANT-NUTRIENT RELATIONSHIPS.*

| pH | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 | 10.0 | | | |
|----------------------|---|--------------------|--|---|---------------------------|---|--|---|-------------------|------------------------|
| Acidity | Extremely acid | Very strongly acid | Strongly acid | Medium acid | Slightly acid | Neutral | Mildly alkaline | Moderately alkaline | Strongly alkaline | Very strongly alkaline |
| Lime Requirements | Lime needed except for crops requiring acid soil | | Lime needed for all but acid-tolerant crops | Lime needed on some crops | Lime generally not needed | No lime needed | | No lime needed. Sodium usually present. Gypsum, sulfur, etc. needed for replacing sodium. | | |
| Occurrence | Few East Texas soils | | Very common in East Texas soils | Few East Texas soils, common on Coast Prairie, few in West, Central and South Texas | | Common in Coast Prairie, and all areas west of East Texas | | Common in areas where irrigation water contains sodium | | |
| Fertility Conditions | Phosphates fixed Calcium and potassium leach Iron, aluminum and manganese soluble Bacterial activity limited Fungi thrive | | Phosphates soluble Calcium generally present in adequate quantities Desirable bacterial activity | | | | Phosphates fixed Iron, manganese, zinc and other minor elements unavailable | | | |

*Adapted from "Fundamentals of Soil Science", Millar and Turk, 1943

| CROP | PREFERENCE RANGE |
|--------------|------------------|
| Soybeans | 5.5 - 7.5 |
| Velvet beans | 6.0 - 7.0 |

VEGETABLES

| CROP | PREFERENCE RANGE |
|---|------------------|
| Asparagus | 6.0 - 7.0 |
| Beans | 5.0 - 6.5 |
| Beans, Lima | 5.5 - 7.0 |
| Beets | 6.0 - 7.0 |
| Blackberries (most var.) | 6.0 - 8.0 |
| Blueberries | 5.0 - 6.0 |
| Broccoli | 6.0 - 8.0 |
| Brussel sprouts | 6.0 - 7.5 |
| Cabbage | 6.0 - 8.0 |
| Cantaloupe | 6.0 - 8.0 |
| Carrot | 6.0 - 7.5 |
| Cauliflower | 5.5 - 7.5 |
| Cucumber | 5.5 - 8.0 |
| Dewberry | 5.0 - 6.5 |
| Eggplant | 5.5 - 7.0 |
| Lettuce | 6.0 - 7.5 |
| Mustard | 5.5 - 6.5 |
| Okra | 6.0 - 7.5 |
| Onion | 6.0 - 8.0 |
| Parsley | 6.0 - 8.0 |
| Peas | 6.0 - 8.0 |
| Pepper | 5.5 - 7.0 |
| Pumpkin | 5.5 - 7.0 |
| Irish potato (For control of scab) | 4.8 - 5.4 |
| Irish potato (For plant growth and yield) | 5.5 - 7.5 |
| Sweet potato | 5.0 - 7.0 |
| Radish | 6.0 - 8.0 |
| Spinach | 6.0 - 8.0 |
| Strawberries | 5.0 - 6.5 |

| CROP | PREFERENCE RANGE |
|------------|------------------|
| Sweet corn | 5.5 - 7.5 |
| Tomato | 6.0 - 7.5 |
| Turnip | 5.5 - 7.0 |
| Watermelon | 5.5 - 7.5 |

TREES-SHRUBS-FRUITS

| PLANT | PREFERENCE RANGE |
|------------------|------------------|
| Abelia | 6.0 - 8.0 |
| Althea | 6.0 - 8.0 |
| Apple | 6.0 - 8.0 |
| Apricots | 6.0 - 8.0 |
| Azalea Formosa | 5.0 - 6.0 |
| Butterflybush | 6.0 - 8.0 |
| Camellia | 4.0 - 6.0 |
| Cape jasmine | 5.0 - 7.0 |
| Cherry | 6.0 - 8.0 |
| Elm (American) | 6.0 - 8.0 |
| Elm (Chinese) | 6.0 - 8.0 |
| Grape | 6.0 - 8.0 |
| Grapefruit | 6.0 - 8.0 |
| Holly (American) | 5.0 - 6.0 |
| Holly (Chinese) | 6.0 - 7.5 |
| Lemon | 6.0 - 8.0 |
| Locust | 6.0 - 8.0 |
| Magnolia | 5.0 - 7.0 |
| Oak, chestnut | 6.0 - 7.0 |
| Oak, pin | 6.0 - 7.0 |
| Oak, red | 6.0 - 7.0 |
| Oak, white | 6.0 - 8.0 |
| Orange | 6.0 - 8.0 |
| Peach | 6.0 - 7.0 |
| Pear | 5.8 - 7.5 |
| Pine (Southern) | 5.0 - 6.0 |
| Plum | 6.0 - 7.5 |
| Privet | 6.0 - 7.5 |

| PLANT | PREFERENCE RANGE |
|--------|------------------|
| Tung | 5.0 - 6.0 |
| Yaupon | 5.5 - 7.5 |

FLOWERS

| PLANT | PREFERENCE RANGE |
|-----------------------|------------------|
| Alyssum | 6.0 - 8.0 |
| Aster (flowering) | 5.5 - 6.5 |
| Aster (many species) | 6.0 - 8.0 |
| Begonia | 6.0 - 7.0 |
| Calendula | 6.0 - 8.0 |
| Candytuft | 6.0 - 7.0 |
| Cannas | 6.0 - 8.0 |
| Chrysanthemum | 6.0 - 8.0 |
| Clematis | 6.0 - 7.5 |
| Clematis Crispa | 5.0 - 6.5 |
| Dahlia | 6.0 - 8.0 |
| Gaillardia | 6.0 - 8.0 |
| Gladiolus | 6.0 - 8.0 |
| Geranium | 6.0 - 8.0 |
| Heliotrope | 6.0 - 8.0 |
| Iris (water flags) | 5.0 - 6.0 |
| Iris (common bearded) | 6.0 - 8.0 |
| Iris (swamp) | 5.0 - 6.0 |
| Larkspur | 6.0 - 8.0 |
| Lily | 5.0 - 6.5 |
| Lily (hemerocallis) | 6.0 - 8.0 |
| Narcissus | 5.0 - 7.0 |
| Pansy | 6.0 - 7.5 |
| Petunia | 6.0 - 8.0 |
| Phlox annual | 6.0 - 8.0 |
| Rose | 5.5 - 7.0 |
| Stock | 6.0 - 7.0 |
| Snapdragon | 6.0 - 7.0 |
| Zinnia | 6.0 - 8.0 |

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