

TREE HOLES

For Caliche Soil

Caliche is a true hardpan underlying some desert areas of the Southwest. The word is of Latin origin; *calyx*, meaning lime, was used originally in Spain. The early Spanish settlers in the Southwest applied this term to the calcareous hardpan and "caliche" is now used almost exclusively to designate such formations.

The formation of caliche and other hardpans is brought about by the solution, transportation and precipitation of a cementing material. Rain water charged with carbon dioxide will penetrate the soil, dissolving calcium carbonate in the soil and carrying it downward until a moisture equilibrium is reached. The water either will be used by plants or evaporated, depositing the salt in place. This process, repeated year after year and century after century, has formed the caliche strata of Arizona.

Shallow or Deep

The formation may be shallow or 10 feet in thickness. It may occur at the soil surface or at varying depths. The formation may vary from a soft water-permeable type to that which consists of hard cemented impermeable strata. The hard,

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thick caliche covers many acres of the Tucson area, the outlying Phoenix areas, and other sections of the desert. If caliche is five or more feet below the soil surface, the problem is less serious and in most plantings may be ignored.

Where caliche is present, one should excavate an area large enough to accommodate a reasonable growth of plant roots, particularly in the case of trees. Roots will not penetrate the hard layer and if room is not provided the plant will become, in effect, root-bound. The tree will cease growing and will go into a gradual decline, a condition often referred to as "caliche blight."

Room for Roots

A hole large enough in diameter to permit a normal root system to develop must be provided. The depth of the hole itself is governed by the thickness of the impermeable layer. This must be penetrated to permit drainage of excess water. Otherwise the same situation exists as trying to grow a plant in a pot without a drainage hole. The soil becomes waterlogged, stopping the free exchange of gas. The roots rot, resulting in ultimate death of the plant.

A tree hole five to 10 feet in diameter is necessary for proper growth and development. The depth will vary but always extends through the caliche layer.

The home owner may dig his tree hole by the tried and proven crowbar and shovel method, chipping away at the limestone formation. Excavate to a depth of five to six feet, and if the caliche has not been penetrated, dig a drainage chimney in the center of the hole only, rather than excavating the entire diameter. (See drawing).

A rented air compressor and jackhammer for breaking up the formation for easy removal is advisable. Mechanical augers of varying types are coming into usage for tree hole preparation. Tractor and truck mounted augers are available on a rental or contract basis.

Can Use Trench

Other mechanical means include the use of a trenching machine, excavating a continuous trench which may be widened at intervals for a tree hole. The continuous trench aids in solving the drainage problem and provides more area for root growth. A variation, using the ditching machine, employs two short trenches at right angles to each other. The remaining caliche is excavated to provide either a square or round hole.

Shrub beds may be prepared using any of the above means. A bed or hole three feet wide and three feet deep usually is sufficient but varies with the size of the plant and the root system it will develop. Usually the top few inches of caliche are the hardest; the softer, underlying caliche will permit drainage. After the hole has been opened, fill with water. If the water level drops six inches in two to four hours, drainage is probably sufficient. Where hedges or beds are to be used, a continuous trench is most satisfactory and is easily dug with a trenching machine.

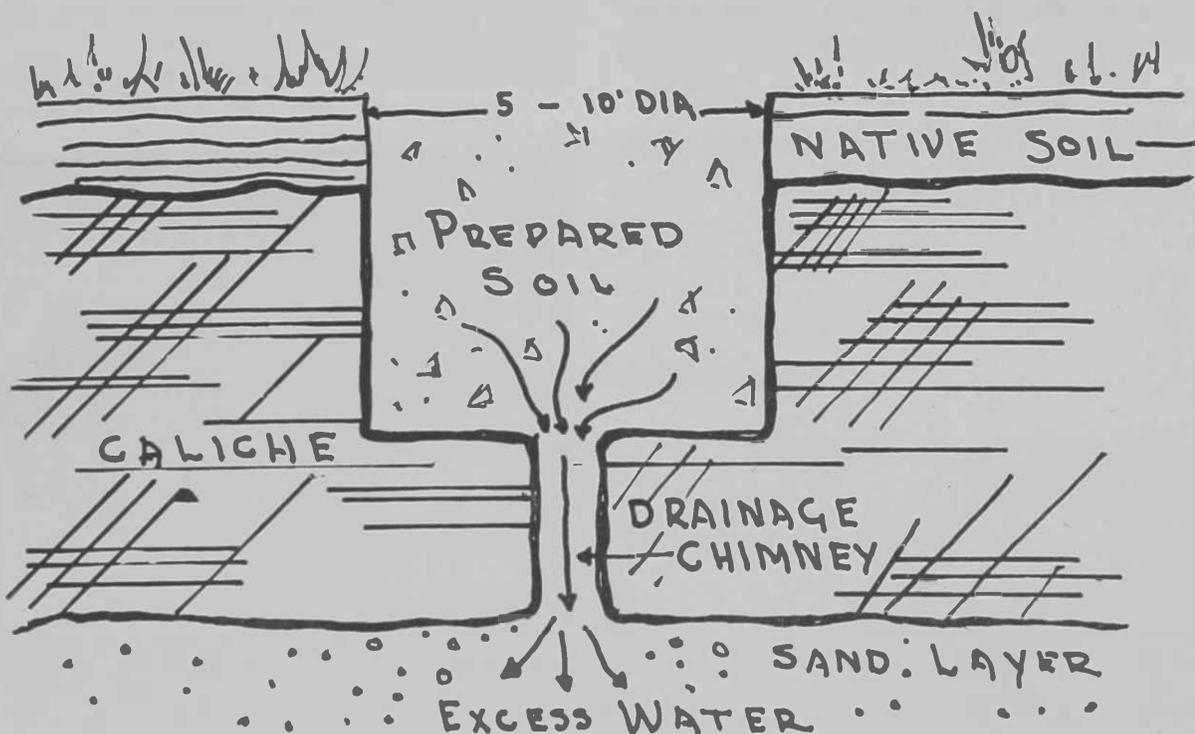
The excavated caliche, whether hard or of the softer type, should be disposed of and the hole or bed refilled with the best soil obtainable.

A suitable soil may be prepared that will provide for several conditions and possibilities. Since the caliche must be disposed of and replaced with soil, add fertilizer, soil conditioners, micro-elements and acidifying agents to this soil. The extra effort and expense will pay many dividends in healthy, luxurious growth.

Loam Soil Best

Start with a soil of good texture. A loam is preferred. A soil test is advisable to determine alkalinity and the total soluble soil content of the soil. To this soil add 20 to 25 per cent of coarse organic matter, such as manure, peat moss or leaf mold. Add to each cubic yard of the mixture three pounds of 16-20-0 ammonium phosphate fertilizer, and a chelated iron compound. All should be thoroughly mixed before placing in the tree hole or shrub bed. If possible, it is advisable to fill the holes with this mixture several weeks in advance of the actual planting date and settle the soil with several irrigations.

The manure, along with bacterial action, will help reduce the alkalinity of the soil. Reducing the alkalinity creates a
(Cont'd on next column)



Preparing Tree Holes for ROOT-ROT Control

R. B. Streets

Plant Pathologist

A large number of shade trees die each summer in southern Arizona from Texas root rot caused by a fungus native to our desert soils. In most cases the owners wish to replant to regain the lost shade but to do so without adequate treatment invites the loss of the replants. Tree holes prepared in the fall months will be in the best condition for spring planting.

The following method of preparing tree holes has been used successfully for many years in replanting in sites where trees have been killed by the Texas root-rot fungus. As the materials used are fertilizers (with the exception of the sulfur which acts as a fungicide and also to some extent reduces the alkalinity of the soil) the rate of growth on replant trees has been more than doubled in many cases. For this reason, the method has also been widely used to produce the most favorable growing

conditions in the absence of known infestations of root rot, and to guard against its possible presence. This is the best method known of protecting trees against root rot.

The method consists of digging a broad and comparatively shallow hole and distributing in the soil the following materials:

- (1) A generous amount of manure (up to one-fifth by volume)
- (2) Soil sulfur at the rate of one-quarter pound per cubic foot of tree hole
- (3) Ammonium sulfate (20% N) or equivalent at the rate of one ounce per cubic foot.

In order to get good distribution of the materials without the extra labor of mixing them, they are placed in thin layers alternating with layers of soil.

Irrigated Pastures

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7. Clip the pasture once before grazing.

Use Good Management

1. Provide four or more fenced areas of such size the herd will graze each one off in less than a week. Move to the soil environment more favorable to plant growth.

Ammonium phosphate, to be fully utilized, must be placed in the root zone. In alkaline soils the phosphate is not leached down to the roots by water as nitrogen fertilizers are.

Placing iron in the mix provides a supply of available iron to overcome the iron deficiency resulting from lime induced chlorosis. Such chlorosis is indicated by a yellowing of the leaves.

Often leaching of the soil will remove any excess soluble salts. Some of the soil conditioners on the market also will aid the soil structure.

next pasture when there is not less than six inches of stubble left on erect grasses to allow for quick regrowth. Sod grasses should have 3" to 4" stubble left. Allow three to five weeks, as necessary, before regrowing.

2. Irrigate as soon as cattle are moved to the next pasture and again before plants show stress. Let soil dry before turning livestock on the pasture after an irrigation.

3. Apply nitrogen as necessary to maintain a deep green or blue green color in the regrowth. You waste water on pale yellow green pasture. Productive grass uses 20 to 30 units of nitrogen per grazing. It must either come from the soil or you must supply it. If you have a legume in the mixture you must still fertilize your grass. It will still need nitrogen though about a third less.

4. During peak production make hay or ensilage from the pastures when growth begins to get ahead of the stock and the plants start to head. You will need this extra food in mid-winter when there is little or no pasture.



Cochise County

Wed., 6:55 a.m.—KAWT, Douglas

Coconino County

Tues. and Thurs., 8:10 a.m.—
KCLS, Flagstaff

Graham County

Sat., 10:00 a.m.—KGLU, Safford

Greenlee County

Sat., 11:15 a.m.—KCLF, Clifton

Maricopa County

Mon. through Sat., 5:55 a.m.—
KRUX, Phoenix

Sun., 8:45 a.m.—KOY, Phoenix

Pinal County

Mon. thru Fri., 12 Noon—
KCKY, Coolidge - Casa Grande

Yuma County

Mon. through Fri., 7:20 a.m.—
KYUM, Yuma

University of Arizona

Saturday, 12:30 to 1:00 p.m. (Arizona Farm and Ranch Hour)—KOY, Phoenix; KTUC, Tucson; KSUN, Bisbee; KYMA, Yuma; KCLS, Flagstaff; KVNC, Winslow; KAWT, Douglas.

There Is Still a Challenge For American Agriculture

Two people out of three of the world's population are today actively engaged in farming. Tonight approximately two people out of three will go to bed hungry.

This startling comparison is at once a condemnation of modern science for its failure to solve the age-old problem of hunger and pestilence, and at the same time a stirring challenge to scientists of vision and good will.

The American farmer has effectively combined science, imagination and ambition to become the most efficient food producer the world has ever known. Under the exigencies of two wars in the last decade and a half he produced "food for war" in record volume. His product was consumed by the insatiable maws of disaster and destruction. Food for ourselves and our friends was a powerful weapon of defense.

We must relentlessly battle to use "food for peace." If we would remain a free nation and promote international peace and brotherhood, we must foster such measures as will enable the tremendously productive American farmer to unleash his initiative and his ingenuity in a full and expanding output, so that a year from now fewer than two people out of three will go to bed hungry.

—Earl L. Butz, Assistant Secretary of Agriculture.