since cover is too valuable to waste. On areas only mildly affected, grass can cause serious competition to young bluebush and saltbush seedlings and some thinning of the grass may be beneficial. If it is not possible to fit in a second working or it is considered unnecessary, the seed of any of the three plants may be spread on the surface by hand. Very shallow sowing is required and the seed is usually buried sufficiently by rain washing. If a second working is given, the seed should be spread on the surface of the ground after this second working. The actual spreading should not take place before the area has received about an inch of rain, and should be no earlier than mid-May.

Superphosphate should be applied at about half a bag to the acre on mildly salt-affected country but on worse areas the rate should be less to avoid waste. It is not now considered advisable to mix the seed with the super for sowing.

A cover crop is valuable in areas affected by wind-blow. Cereal rye sown at about 40 lb. to the acre will give good protection.

Unfortunately, red-legged earth mites, lucerne fleas, and grubs of some types attack bluebush and saltbush seedlings. If these pests are present in large numbers they can easily wipe out all the seedlings. Details of spray control methods are set out in two departmental leaflets on mite and flea control.

Both bluebush and saltbush seedlings are delicate in the early stages of growth, but once the true leaves have begun to appear, hardiness increases rapidly. Young bluebush seedlings only an inch high are extremely drought-resistant. However, young plants of all three species can be quickly killed by grazing animals.

When large bushes have been established they will provide seed supplies for colonising areas in between. Roughening between the older bushes will encourage seed trapping and help thicken the stand. Bluebush will spread its own seed. Creeping saltbush spreads slowly, but old man saltbush seed must be picked in summer or autumn and spread at sowing time, since it does not spread of its own accord.

Persistence is perhaps the greatest asset in colonising salt areas, because it takes time to repair soil damage which has usually taken a number of years to develop.

### THE USE OF LIME IN MARKET GARDENS

**The term “lime” when used in relation to agriculture means any calcium-containing material that is capable of correcting soil acidity. While generally used for this purpose, lime has many other equally important functions in the soil.**

The element calcium occurs in a large variety of minerals, and may be quite abundant in soils derived from limestone rocks. However, it is readily soluble, and can be leached out very easily; more easily from light sandy than from heavy soils.

In low rainfall regions there is little need for liming because the lime reserves have not been leached away or removed by crops to any great extent.

With heavy rains, or continuous heavy irrigation, frequent dressings with lime or limestone may be necessary, especially if this the case with older soils, after most of the calcium had been washed out or removed by the crops.

The removal of calcium from the soil will result in two things. Firstly, there will be a shortage of calcium for healthy plant growth; and secondly, soil acidity will increase. Increased acidity, in turn, will have several undesirable effects. It has an important effect on the solubility, availability and sometimes toxicity of a number of elements. Many of these elements are essential for normal plant growth.

As acidity increases, the solubility of aluminium, copper, iron, manganese and zinc also increases. Sometimes toxic concentrations of these elements may occur in highly acid soils. Acidity and liming also indirectly affect the availability of the three major plant nutrients, nitrogen, phosphorus and potassium.

Generally, an increase in soil acidity adversely affects nitrogen-fixing bacteria associated with the roots of legumes and
those living free in the soil. As a result, the availability of nitrogen declines. Soils contain a variety of micro-organisms, such as bacteria, fungi, and other kinds. These are very active in decomposing organic matter in the soil, and thereby releasing plant nutrients. The numbers and kinds of micro-organisms present in the soil may vary according to the degree of acidity, moisture content, amount and composition of organic matter. Acid conditions may reach a point where the activity of these organisms in decomposing organic matter declines or even ceases.

Crops differ as to the degree of acidity at which they grow and produce best. They also differ in the amount of calcium required for their nutrition. Potatoes, rhubarb and water-melons can grow and produce satisfactory crops in highly acid soils. Least tolerant to acidity are the legumes and leafy vegetables. These also require considerable amount of calcium for their growth.

The application of lime then, first of all supplies readily available calcium for healthy plant growth. Gypsum, or land plaster as it is often called, is an excellent source of calcium and sulphur for plants, and may have a favourable effect on soil structure. But it does not correct soil acidity, and therefore it is not a liming material. Gypsum is often used as a soil conditioner for excessively alkaline soils. The second important effect of liming is the correction of soil acidity, and through this, its indirect effect on the availability of major plant nutrients, activity of soil micro-organisms, and other important effects.

There is a wide variety of liming materials. The most commonly used ones are ground limestone, burnt or quicklime, and hydrated lime. The last two are derived from limestone; they are very active chemically, rather unpleasant to handle and difficult to store. Foliage may be damaged through contact with quicklime. In spite of these drawbacks, it may be advantageous to use quicklime or hydrated lime when a rapid decrease in soil acidity is desired, as, for instance, when we want to grow vegetables that have a high lime requirement, or where a lime-requiring crop follows potatoes. When limestone is used, the small particles react immediately, but the larger-sized ones will give a reaction over an extended period. The appearance of some diseases may sometimes be taken as an indication of a particular acidity status of the soil. For example, clubroot of cole crops only occurs in rather strongly acid soils, whereas potatoes are likely to become scabby as the soil acidity is reduced from strong to medium.

The amount of lime to be used depends on the kind of liming material and the degree of acidity. About 1,000 lb. of quicklime or 12,000 to 14,000 lb. of hydrated lime are equivalent to one ton of ground limestone. The degree of acidity can only be ascertained by laboratory tests, and here, of course, the help of your local adviser will be needed. To correct acidity, light sandy soils react quicker and require less liming material than do clayey soils.

Most forms of lime may be applied at any time of the year. However, when limestone is used it is a good practice to apply it as long as possible before planting to enable it to react with the soil.

The use of excessive quantities of lime may have serious consequences. It may be accompanied by a reduction in the availability of such nutrients as boron, magnesium, manganese, copper and zinc. This is especially probable where the supply of these elements in the soil is low. On some soils, excessive use of lime seems to interfere with the absorption of phosphorus and potassium. The use of very active limes, such as quicklime or hydrated lime, is more likely to cause over-liming, especially in sandy soils, low in organic matter.

To determine whether or not lime should be used, and especially, what quantities to apply, one has to take a number of factors into account. The type and acidity of the soil, kind of vegetables to be grown, previous fertilising, manuring and cropping history of the ground, availability and comparative costs of liming materials are some of these factors.

Considering the possible dangers associated with improper use of lime, it might be advisable to contact your local adviser before lime is applied. He will be in the position to give you detailed advice.