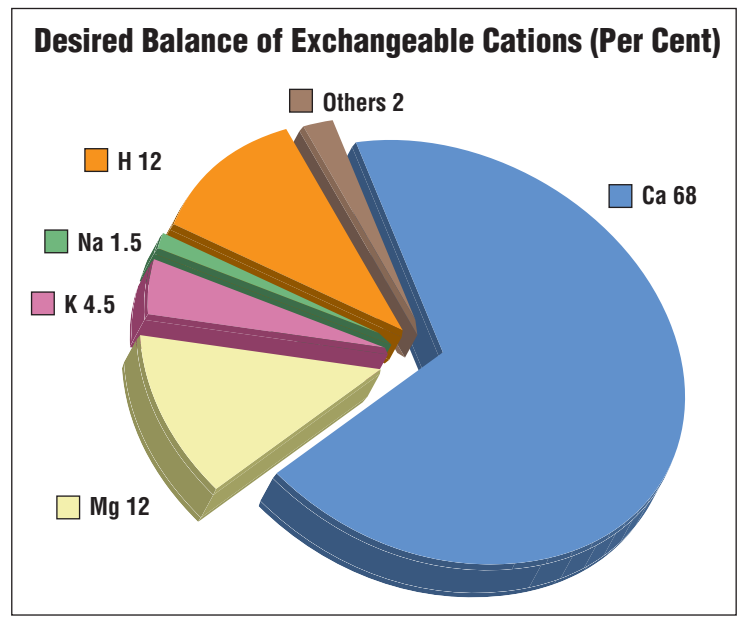
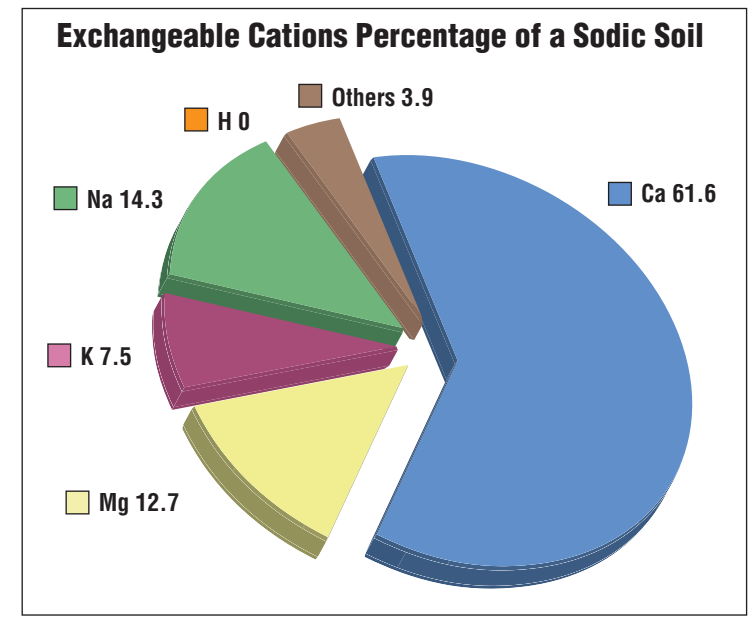
▲ **Figure 3:** Cavity spot in carrots aggravated by low calcium and high sodic soils





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cause more damage.

Crops with poorer root systems have to spend more energy to access the soil water, energy that would otherwise go into growth. Limited movement of soil water to the roots may result in plants suffering water stress earlier even though the soil may appear moist.

Plants are more likely to wilt during heat waves because they cannot take up the soil water rapidly enough to replace amounts lost through the leaves and stems.

Stronger, compacted soil can cause deformation of carrots, parsnips and other root crops making the product unsuitable for human consumption, with considerable loss of profit.

Plants need to continually develop feeder roots throughout the growing season to take up nutrients with limited mobility in soil such as phosphorus, potassium, calcium, and magnesium.

Root development can be severely restricted in stronger (compacted), poorly aerated soil, leading to nutrient imbalances. Adequate phosphorus is needed to aid cell division of the developing root tip while calcium strengthens the cell walls to assist penetration of the root tip in soil.

Calcium is associated with the surfaces of clay in soil, along with magnesium, sodium and potassium.

The relative balance of these exchangeable cations is important for crop nutrition. In a well balanced soil cations are present within a defined ratio.

When the exchangeable sodium percentage is greater than 6 per cent then the availability of exchangeable potassium, calcium and magnesium is restricted, the plants will take up sodium instead of potassium. This weakens cell walls and the ability of the plants to control moisture loss from their leaves. As a result plants will be susceptible to wilting in warm weather.

The pi chart of optimal percentages to the left shows that in healthy soils, calcium (Ca) is the dominant exchangeable cation whereas sodium (Na) is relatively minor. Hydrogen is also important in helping to buffer the soil against pH changes.

Continual irrigation with water high in sodium promotes displacement of exchangeable calcium by sodium.

The example to the right is from a soil that is affected by sodicity. Calcium levels have dropped to the low 60pc, and hydrogen has been lost. Soils that are low in hydrogen ions are alkaline.

Sodic soil has a highly alkaline pH, which adds to nutritional problems.

As pH becomes more alkaline phosphorus and trace elements including iron, manganese, copper and zinc become less available to plants even when there is an adequate reserve.

Do you have a salinity or sodicity problem?

SODIUM chloride is a common component of salty water sources. It is therefore important to test both the soil and plant tissue to determine whether you have either a salinity or sodium problem, or both.

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