

## WATER REQUIREMENTS AND IRRIGATION

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Vegetable crops are normally grown intensively and need high managerial and other inputs. They are comparatively high-risk crops, with a proportionally higher cost and higher return than many others. It is usually false economy to skimp on inputs which can detrimentally affect yields and/or product quality, both of which play such a large role in determining good financial returns from the enterprise.

The availability of water in the soil is one of **the** most important requirements for successful vegetable production. Adequate moisture is necessary for good crop establishment, good growth, good yields and good quality.

There are few places in this country, even in the comparatively well-watered province of KwaZulu -Natal, where the rainfall is sufficiently reliable and well-distributed for vegetable crops to be economically and successfully produced season after season under dryland conditions. It is accepted, therefore, that the serious grower will need to make provision for at least some supplementary, if not total, irrigation.

Total irrigation in an intensive vegetable enterprise requires about 8 000 000 l ( 8 000 m<sup>3</sup>) of water per annum for each hectare worked. This quantity will be lower in cool, moist areas, especially under drip irrigation, and appreciably higher in hot, dry areas, where less efficient flood irrigation is practised. Note: 1 mm water per 1 m<sup>2</sup> soil surface = 1 litre.

As a rule of thumb for most vegetable crops, 10 to 15 mm per week for the first third to half of the growing season, and about 25 mm per week thereafter, would be the winter requirement. Corresponding figures during summer would be 20 to 25 mm and 40 to 50 mm, respectively. Plant condition, e.g. drooping or wilting leaves, may indicate that earlier or greater water applications are needed. In KwaZulu-Natal drip irrigation is sometimes used on tomatoes. However, most commercial growers resort to sprinkler irrigation, usually draglines, for irrigation of all crops.

The water should be applied no quicker than it can penetrate the particular soil. If water collects on the surface it causes crusting and, where it starts running off, erosion. Ideally, irrigation which wets the leaves of the crop should start after the plants have dried after overnight dew, and should stop in time for leaves to dry before nightfall. This would reduce disease incidence. Note that raised beds or ridges dry out faster than flat land, and are used only for certain crops, e.g. potato and sweet potato, or where waterlogging is a problem.

In order to reduce wasteful over-watering and leaching of nutrients, the soil should not be wet any deeper than the roots penetrate. This implies that young seedlings should be watered two or even three times a week with small amounts of water at each application, and one should gradually reduce the irrigation frequency to about once a week, giving heavier applications as the plants grow and the roots develop. Over-irrigation will tend to encourage a shallower root system, which will later be more prone to drought stress, while a measure of under-irrigation will have the opposite effect. The amount of water supplied during irrigation should never exceed that used during evapo-transpiration, after due allowance has been made for rain that has fallen.

The depth of rooting will differ from crop to crop. The potential rooting depth in soils with ideal chemical and physical properties is shown in Table 7. However, in practice, rooting is seldom this deep, and in any event irrigating to wet only about half this depth, where most of the feeder roots develop, is generally adequate.

Crops differ in their water requirements, and have certain stages of growth when an adequate water supply is critical. Adequate water is essential for good germination of all crops. For flowering crops, such as beans, tomatoes, cucurbits and maize, another critical period is at flowering, and then also during the development of fruit and/or seed. For heading crops, such as lettuce and cabbage, the most critical period for water is at heading stage. An adequate supply of water is essential for root crops once the roots start enlarging. The suitability and the quality of water available for irrigation should be tested. This can be done at Cedara.