Vegetables Grown Under Temperate Conditions *and* Vegetables Grown Under Tropical/Subtropical Conditions

7.1 Vegetables Grown Under Temperate Conditions

It is hardly practicable to cover in detail the wide range of vegetables grown in temperate climates, especially in view of the varying nutrient requirements of individual cultivars and hybrids, grown under specialized conditions for the fresh vegetable market or for processing, in the open or wholly or partly under glass, with different techniques of mulching, irrigation, soil sterilization, etc., and bearing in mind potential effects of fertilizer use on nutritional, culinary or marketing qualities of the produce or on the environment in general. Only a few of the more important crops have been selected for individual discussion.

General crop data

Most vegetables are annuals, their root systems are rather shallow, and growth is generally rapid, without any rest period, so that the uptake of nutrients is continuous. Averaged over some 40 different crops which are widely grown in temperate regions, the uptake per metric ton of yield may be estimated to be around (kg): N = 5.1, P_2O_5 = 2.2 and K_2O = 6.1, i.e. with a nutrient ratio N:P_2O_5:K_2O of 2.3:1.0:2.8.

As regards the individual nutrients, the crops taking up 2-4 kg/t N include beetroot, carrot, cucumber, lettuce, onion, parsley, peppers, tomatoes, melons and watermelons, while those taking up more than 4 kg/t N include globe artichokes, asparagus, aubergines or eggplants, cabbage, cauliflower, celery, garlic, radish, spinach and turnips.

Similarly, crops taking up 1-2 kg/t P_2O_5 include aubergines, beetroot, carrot, cauliflower, cucumber, garlic, lettuce, onion, peppers, parsley, spinach, tomatoes, melon and watermelon, and those taking up more than 2 kg/t P_2O_5 include globe artichokes, asparagus, cabbage, celery, radish and turnip.

Few crops, on the other hand, take up less than 4 kg/t K_2O, among them cucumber, garlic, outdoor tomatoes and watermelons.

In general, nutrient uptake per ton of yield is greater in plants with a lower harvest index (e.g. asparagus, globe artichokes, peas and beans), and in high-yielding F1 hybrids than in normal cultivars, though it can also be greater where yields are low (e.g. due to poor climatic and growing conditions). Nutrient uptake per unit of expected yield is, however, a useful basic parameter for estimating a crop's needs and for planning fertilizer use, for which the available soil supply and likely losses must also be taken into account.

Allowing for the fact that most vegetable crops are irrigated, a rough estimate for the latter would be (kg/ha): N = 20-100, P_2O_5 = around 5, K_2O = at least 70, CaO = 100-600 and MgO = 20-60 (losses are obviously higher in soils poorer in clay content and organic matter).

The following is a very broad classification for soil supply in available nutrients:

Soil class	ppm		
	N	P2O5	K2O
Very poor	40	<10	<100
Normal	60	10	100-150
High	80	17	150-200
Very high	120	>20	>200

For total N the classes can be stated as follows: poor, <1 %o; medium, 1.0-1.5 %o; well supplied, 1.5-2.0 %o; high, 2.0-3.0 %o; very high, >3 %o.

The optimum organic matter content in soils for vegetable growing is considered to be 2.5-3.0 % for outdoor crops and 6-8 % under glass, the lower values relating to sandy soils and the higher to clay soils.

The C/N ratio, pH, cation exchange capacity and salinity are other factors which should be taken into account.

The following very generalized rates of application of fertilizer nutrients P2O5 and K2O have been suggested, based solely on the soil's nutrient status for these two nutrients:

Recommended rates of nutrients		
Status	kg/ha	
	P2O5	K2O
Very poor	140-290	190-250
Poor	60-230	140-200
Medium	40-150	120-140
High	40- 80	80-100

Further reading

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7.2 Vegetables Grown Under Tropical/Subtropical Conditions

Fertilizer recommendations for most of the vegetables grown in the tropics currently follow a recipe approach, based on research conducted in temperate areas of the world. Little is thus still known concerning the true fertilizer requirements of vegetables in tropical areas. Proper recommendations should be based on soil test values which are adequately calibrated to the local soils, ambient conditions, and crop growth responses.

Information obtained from multiple sources should therefore be used with caution, based on a systematic analysis of several relevant biophysical factors. The recommendations given here relate to intensive monoculture production systems, with potential for high marketable yields.

Further reading (General)

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