Sweet Potato *(Ipomoea batatas Lam.)*

French: Patate douce; Spanish: Batata, Boniato, Camote; Italian: Patata dolce; German: Suesskartoffel

Crop data

Perennial root crop, belonging to the Convolvulaceae. Hexaploid (2n = 6x = 90) improved from Ipomoea trifida complex in Central America and northern S. America.

Used for food, animal feed and industrial materials.

Usually propagated from vine cuttings or sprouts from tubers, very rarely from seed.

Favourable growth temperature 20-30 °C (no growth below 15 °C or above 30 °C). Requires 4-6 months to produce economic yield. Growth period comprises two stages: the first, a period of extensive growth of fibrous roots, vines and leaves, and initiation of tuberous roots; the second, swelling of the tubers. In the former, a higher temperature favours vine and leaf growth; in the latter, a lower temperature favours swelling of the tubers.

The crop can be grown throughout the year in the tropics and sub-tropics but in warmer temperate regions it is grown as an annual.

Planting time in temperate regions: usually May/June for September/November harvest.

Plant density: 45 000-55 000/ha.

Relatively tolerant to drought but cannot withstand waterlogging. Preferred soil moisture content 60-75 % of maximum water-holding capacity.

Grows best on sandy loam soil and does poorly on clay soil.

Preferred soil pH 5.5-6.5. Sensitive to alkaline and saline soils.

Now grown in more than 100 countries worldwide but China accounts for 80 % of production.

Nutrient demand/uptake/removal

The following figures indicate the particular importance of both K2O (especially in the tubers) and N (in the leaves).

Nutrient demand/uptake - Macronutrients								
Part and yield	**Source**	**kg/ha**						
		N	**P2O5**	**K2O**	**MgO**	**CaO**	**S**	**Na**
Leaf, 4 t/ha	Wenkam, 1983	25.6	8.7	25.4	4.2	2.1	-	-
Tuber, 10 t/ha		26.0	8.5	45.6	2.0	4.2	-	-
Leaf + tuber, 14 t/ha		51.6	17.2	71.0	6.1	6.3	-	-
Tuber, 10 t/ha	Bradburg, 1990	23.0	11.7	31.2	4.3	4.1	1.3	5.2
Leaf + tuber, 20 t/ha	Tsuno, 1972	83.6	17.4	130.8	-	-	-	-

Nutrient demand/uptake - Micronutrients							
Part and yield	**Source**	**kg/ha**					
		Fe	**Cu**	**Zn**	**Mn**	**Al**	**B**
Leaf, 4 t/ha	Wenkam, 1983	0.40	-	-	-	-	-
Tuber, 10 t/ha		0.40	-	-	-	-	-
Leaf + tuber, 14 t/ha		0.80	-	-	-	-	-
Tuber, 10 t/ha	Bradburg, 1990	0.49	0.17	0.59	0.11	0.82	0.11

Plant analysis data

Deficiency symptoms develop when the nutrient levels in the tissue (oven dry basis) fall respectively below 0.12 % P, 0.75 % K, 0.16 % Mg, 0.2 % Ca, 0.08 % S, 30 ppm Fe.

Fertilizer recommendations

Organic manure may be used to increase the soil fertility and the yield and quality of the tubers; this is a common practice in the traditional agriculture of many countries. In normal cultivation, however, mineral fertilizer is applied. Potash is especially important, and the ratio K_2O:N should be kept fairly high (about 3:1) in order to promote swelling of the tubers.

A common recommendation in most countries is 35-65 kg N, 50-100 kg P_2O_5 and 85-170 kg K_2O per hectare, which is usually applied in the form of NPK compound fertilizers with a high K content.

It has recently been suggested that part could be applied to the soil before planting and part as a topdressing, the relative proportions depending on the expected yield level as shown below:

Low yield level
Before planting - All N, all P_2O_5, one-half K_2O.
40 days after planting - One-half K_2O.

High yield-level
Before planting - Two-thirds N, all P_2O_5, one-half K_2O.
40 days after planting - One-third N, one-half K_2O.

Preferred nutrient forms

N: urea or ammonium nitrate/ammonium sulphate, preferable on alkaline soil.

P: water-soluble/citric acid-soluble form, such as superphosphate.

K: as sulphate.

Fertilizer practice in various countries - Nutrient rates							
Country/ region/ Season	**Source**	**Yield t/ha**	**Planting time (growth period in months)**	**a) Basal application b) Top dressing**			**Organic fertil.**
				kg/ha			
				N	**P2O5**	**K2O**	
China/ Jiangsu Japan Taiwan	Tsuno, 1972 Tsuno, 1972 Tsuno, 1972	20-30 20-30 16	May-June (4-5)* June (4-5) November (4-5)	a)100-110 b) 30- 50 a) 40- 80 b) - a) 70 b) -	100-120 30- 40 40-60 - 85 -	100-120 30- 40 50-100 50-100 100 50	Manure Manure -
Bangladesh	CIP 1989 Mackay, Palo- mar, Santico, 1989	10-15	October-November (4-5)	* a)**60 b) -	40 -	90 -	Manure
India/ Kharif	CIP, 1989 Mackay, Palo- mar, Santico, 1989	8,2	January -July (4)	a)** 35 b) 40	50 -	75 -	-
Malaysia	CIP, 1989	7-15	(4-5)	a)* 12 b) 15	12 15	17 15	-
Vietnam	CIP, 1989	5-10	(4-5)	* a)** 25 b) 15	20 -	40 20	Manure
USA/ Georgia	Granberry, Coldits, McClaurin, 1986	10-30	May-June (3-5)	a) 17- 42 b) 17- 42	38-84 38-84	50-126 50-126	-
Costa Rica/ Turrialba	Moreno, 1981	10.7	November	a) ** 65 b) -	10 -	30 -	-
South Africa	Jackson, 1974	20-30	Nov.-Dec. (4-5)	a) 40-50 b) 50	500 -	150 -	-
Papua New Guinea - Lowland - Highland	CIP, 1989 Villareal, 1982	 5-10 5-10	 (5-6) (8-12)	*			Compos t and ash
Micronesia	Mackay, Palomazr, Santico, 1989	16.6	-	a) ** 50 b) -	50 -	50 -	Manure
* Most farmers do not apply mineral fertilizers							
** Recommended rates of nutrients							

Further reading

GRANBERRY, D.M.; COLDITS, P.; McCLAURIN, W.J.: Sweet potato - commercial vegetable product. Horticulture 3, Bull. 677, Cooperative Extension Service, The University of Georgia, College of Agriculture (1986)

INTERNATIONAL POTATO CENTER (CIP): Improvement of sweet potato (Ipomoea batatas) in Asia. Report of the Workshop on Sweet Potato Improvement in Asia, ISAR, India (1989)

MORENO, M.R.A.: Intercropping with sweet potato (Ipomoea batatas) in Central America. Report Centro Agronomico Tropical de Investigacion y Ensenanza, Costa Rica (1981)

SPENCE, T.A.; AHMAD, I.N.: Plant nutrient deficiencies and related tissue composition of sweet potato. Agro. Journ. 59, 59-62 (1967)

TSUNO, Y.: Sweet potato - Nutrient physiology and cultivation. International Potash Institute, Berne, Switzerland (1972)

VILLAREAL, R.L; GRIGGS, T.D.: Sweet potato. AVRDC publication 82-172 (1982)

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