Field Pea *(Pisum sativum L.)*

French: Pois proteagineux; Spanish: Guisante; Italian: Pisello; German: Futtererbse

Crop data

Annual. Harvested part: grain.
Sown autumn or early spring.
Flowers 7-8 months (winter variety) or 3-4 months (spring variety) after sowing.
Harvested 8-9 months (winter variety) or 5-6 months (spring variety) after sowing.
Target plant density about 60-80 plants/m2.
Preferably grown on well drained, deep soil, without large stones, pH >6 (optimum pH 7).
Very sensitive to lack of water at flowering time.

Nutrient demand/uptake/removal

The crop needs about 50 kg N per metric ton of peas; generally, N in the soil or fixed by the plant is sufficient, and no fertilizer N is required. Field peas are, however, demanding in P and K; the total uptake of these two nutrients reaches a maximum at flowering (about 80 days after a spring sowing), after harvest a substantial amount returns to the soil. Maximum uptake for a crop yielding 5-6 t/ha is about 70-80 kg/ha P2O5 and 250-300 kg/ha K2O.

Nutrient demand/removal - Macronutrients								
Yield/ha	**Source**	**kg/ha**						
		N	**P2O5**	**K2O**	**MgO**	**CaO**	**Na2O**	**SO3**
6 t grain	Poulain et al,	-	63	115	13	7	0.4	-
3 t haulm	1989	-	4	80	9	90	4	-
6 t grain	TCF, 1984	-	60	90	15	-	-	30
3 t haulm		-	15	100	5	-	-	9
Maximum uptake								
Total plant	Poulain et al,	280	80	290	36	150	6	-
6 t Grain	1989	187	66	90	13	10	5	-
6 t Grain	Taureau, 1984	-	80	300	30	-	-	50

Nutrient demand/removal - Micronutrients				
Yield/ha	**Source**	**g/ha**		
		Cu	**Zn**	**Mn**
6 t grain	Poulain et al,	54	250	66
3 t haulm	1989	15	69	90
6 t grain	ITCF, 1984	84	-	90
3 t haulm		38	-	120
Maximum uptake				
Total plant	Poulain et al,	111	659	311
6 t Grain	1989	62	303	75
6 t Grain	Taureau, 1984	161	160	325

Plant analysis data

Nutritional disorders may be diagnosed by soil testing, by visual deficiency symptoms (which, unfortunately, can easily be confused with pathological and physiological disorders) or by plant tissue analysis. Critical concentrations in the plant dry matter are summarized below.

Peas mineral composition - Macronutrients								
Part	**Source**	**% of dry matter**						
		N	**P**	**K**	**Mg**	**Ca**	**Na**	**S**
Dry peas	Poulain et al, 1989	4.2	0.5	1.6	0.14	0.01	0.01	-
	Paul et al, 1978	3.5	0.3	1.0	0.12	0.06	0.04	0.13
Dry haulm	Poulain et al, 1989	1.1	0.12	2.3	0.22	1.7	0.11	-
	Coppenet, 1984	0.8	0.07	2.5	0.15	1.7	0.10	-
Mature leaves	Several authors (N)	0.2-0.3	0.02-0.05	0.06-0.14	0.01-0.03	0.08-0.22	- -	0.01-0.03
	ADAS (N)	-	>0.04	>0.2	>0.02	-	-	>0.02
Third leave at 4-8 node stage	Muehlbauer et al, 1989 (N)	0.5	0.04	0.25	0.04	0.1-0.3	-	0.06
	(D)	0.2	0.01	0.15	0.01	0.07	-	0.03
N = Normal; D = Deficiency								

Peas mineral composition - Micronutrients							
Part	**Source**	**ppm dry matter**					
		Cu	**Zn**	**Mn**	**Fe**	**B**	**Co**
Dry peas	Poulain et al, 1989	8.6	37	12	-	-	-
	Paul et al, 1978	5.0	35	-	-	-	-
Dry haulm	Poulain et al, 1989	7.0	50	42	-	-	-
	Coppenet, 1984	4.9	17	24	-	-	-
Mature leaves	Several authors						
	N	6-20	25-80	20-350	50 -	20-85	0.2-0.5
	D	-	<20	<20	-	<15	-
	E	-	>400	>500	-	>100	-
	ADAS N	>5	-	>20	>50	>20	-
Third leave at 4-8 node stage	Muehlbauer et al, 1989						
	N	33	75	110	0.05	-	-
	D	20	15	50	-	-	-
N = Normal; D = Deficiency; E = Excess							

Soil analysis

Critical soil levels of pH and mineral nutrients for acceptable yields are not absolute and can vary with soil type, moisture level and method of nutrient extraction. N-fixation in root nodules is sensitive to extremes of pH: nodulation and N-fixation are reduced where pH < 5.5 or with excessive salinity. As with field beans, soil P (Olsen extractant) should be at least about 20 ppm (Haddock & Luiton) and K (ammonium acetate) 66 ppm (Cutcliffe & Mantro) or 75 ppm (sodium acetate, McDole & Mahler).

Deficiency symptoms

See chapter 4.2 Field Bean.

Fertilizer recommendations

N: Many studies have shown that no fertilizer N is needed where Rhizobium leguminosarum is present in the soil. Where Rhizobium leguminosarum is absent, inoculation of the seed with bacterium is an alternative used in some countries.
P and K: Responses are dependent on residual levels in the soil. K is one of the most important nutrients; although average responses are small, they are much larger where the soil is poor in readily available K. General recommendations are 80-120 kg/ha P2O5 and 100-200 kg/ha K2O, broadcast before ploughing or cultivation before sowing, part being considered as an advance for the benefit of the next crop.

S deficiency seems to occur widely throughout the world in non-industrial areas; for optimum production, soils should contain at least 10 ppm sulphate S and, below that level, 15-20 kg/ha S should be applied (generally, superphosphate with 18-25 % P2O5 brings enough S for crop maintenance).
The other deficiencies of secondary and miconutrients occuring in Western Europe are those of: Mg, rare (application recommended when soils contain less than 0.5 meq Mg/100 g); Mn, frequent; Fe, temporary in some seasons. The occurrence and correction of micronutrient deficiencies are generally similar to those of field beans.

Present fertilizer practices

United Kingdom.

The rates of application recommended by the Ministry of Agriculture, Fisheries and Food in relation to residual fertility (soil index) are given below.

United Kingdom - Recommended rates of application								
Soil index N, P or K	**Soil analysis values ppm**			**Application rates - kg/ha**				
				Broadcast			**Combine-drilled**	
	NO3-N	**P**	**K**	**N**	**P2O5**	**K2O**	**P2O5**	**K2O**
0 very low	0- 25	0- 9	0- 60	0	50	50	50	150*
1 low	26- 50	10-15	61-120	0	25	40	25	50
2 medium	51-100	16-25	121-240	0	0	0	0	40
3 high	> 100	>25	>240	0	0	0	0	0
* Only 50 kg/ha K2O should be combine-drilled and the rest broadcast								

Most fertilizer is at present broadcast; with narrow row-spacing there is less advantage in combine-drilling. Fertilizers with enough P and K to correct deficiencies are worked into the soil in early spring.

France

France - Recommended rates of application on chalk soils (Crop rotation: Sugar beet-peas-wheat)						
	kg/ha					
	P2O5*			**K2O****		
Soil/status/ppm	<120	180-200	>250	<100	180-200	>250
Sugar beet	200	180	100	400	200-250	180-200
Peas	100-150	0	0	0	0	0
Wheat	0	80	0	80	80	0***
* method Joret Liebat (oxalate) ** NH4-acetate method *** or 80 kg/ha K2O as maintenance application						

Further reading

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