
Trends in Dry Pea (*Pisum sativum* L.) Production

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SUMMARY

Dry pea is an important, cool-season grain legume, which is grown worldwide on over 6 million hectares. The major producing countries outside Europe are China and Canada, followed by India, Australia, and the United States. France, Canada and Australia produce over 2 million hectares and are major exporters of peas. During the 1980's, in developed countries of the European Union, pea production rose yearly by 6-10%, which represents a significant increase in both area and yield. Europe accounts for 50-75% of world pea production. In the 1990's, the European Union produced 4-5 million tonnes of dry pea, of which 3-4 million tonnes were used for feed and 1 million tonnes for export. At the end of the 20th century, the growth in production was low, mainly because of the absence of support measures, and the better returns offered by other crops. In the countries of the former Soviet Union, dry pea was primarily used as feed and pea production dropped, due to a trend in livestock raising.

Food consumption of dry pea is concentrated in developing countries, where grain legumes represent a useful complement to cereal-based diets as a relatively inexpensive source of high quality protein. As a result, human consumption of grain legumes fell from 2,2 kg/capita in 1961 to 0,5 kg/capita in 1999. The importance of grain legumes in food protein supply decreased, while that of cereal products increased. Shortage of grain legumes has adverse effects on the nutritional standard of poor people in developing countries.

World dry pea production reached 16,7 million tonnes in 1990, with 3,7 million tonnes used as food, 11,4 million tonnes used as feed, and 1,0 million tonnes used as seed. Dry pea production was 10,9 million tonnes in 1999, and 3,5, 5,8 and 0,8 million tonnes was used as food, feed and seed, respectively. In the coming decades, world grain legume production and utilization as feed are expected to expand at a slower rate than in the 1980's. Most of the increase is expected to occur in Eastern European countries, Canada and Australia, where production is anticipated to grow at 2% annually. The projection for the new millennium was derived from adjusted trends in area and yield over the period 1961-2000, based on FAO statistical data.

INTRODUCTION

Dry pea is primarily used for human consumption and livestock feed. Dry pea contains approximately 21-25 percent protein and high levels of carbohydrates. Being a grain legume, it has high levels of amino acids, lysine and tryptophan, which are relatively low in cereals. It is low in fiber and contains 86-87% total digestible nutrients, which makes it an excellent livestock feed. Dry pea is often cracked or ground and added to cereal grain feed as it

contains less trypsin inhibitors than soybean. This allows pea to be directly fed to livestock without having to go through the extrusion heating process. Research has shown that pea is an excellent source of protein supplement in swine, cow, feeder calf, dairy and poultry feed (Yaceniuk, 2001). Dry pea also may be grown as a green manure or green fallow crop. Use of field pea for green fallow protects the soil from erosion, improves soil quality, substitutes water loss by evaporation or leaching from black fallow with transpiration through plant growth, and exploits rotational benefits. Costs of tillage in black fallow are also substituted with costs of pea establishment and termination in green fallow (Lazányi, 1998, 2002).

Flowering usually begins 40 to 50 days after planting. Flowering is normally two to four weeks, depending on the flowering habit and weather during flowering. Indeterminate flowering varieties will flower for long periods and ripening can be prolonged into drought under Hungarian conditions (Kurnik, 1970; Iszállyné and Lazányi, 1993; Iszállyné, 2002). Indeterminate varieties reach maturity later, ranging from 90 to 100 days. Determinate varieties will flower for a set period and ripen with earlier maturity of 80 to 90 days (Ács, 1980; Lazányi, 1999).

Field pea is very sensitive to heat stress at flowering, which can drastically reduce pod and seed set. There are two main types of dry pea (Duke, 1981; Bocz, 1992). One type has normal leaves and vine lengths of 80 to 120 cm; the second type is the semi-leafless type, which has modified leaflets and shorter vine lengths. Pea normally has a single stem, but can branch from nodes below the first flower. Indeterminate varieties are more likely to compensate for dry weather and are more adapted to arid regions. Determinate, semi-leafless varieties have good standing ability and are more adapted to humid regions (Aykroyd and Doughty, 1972).

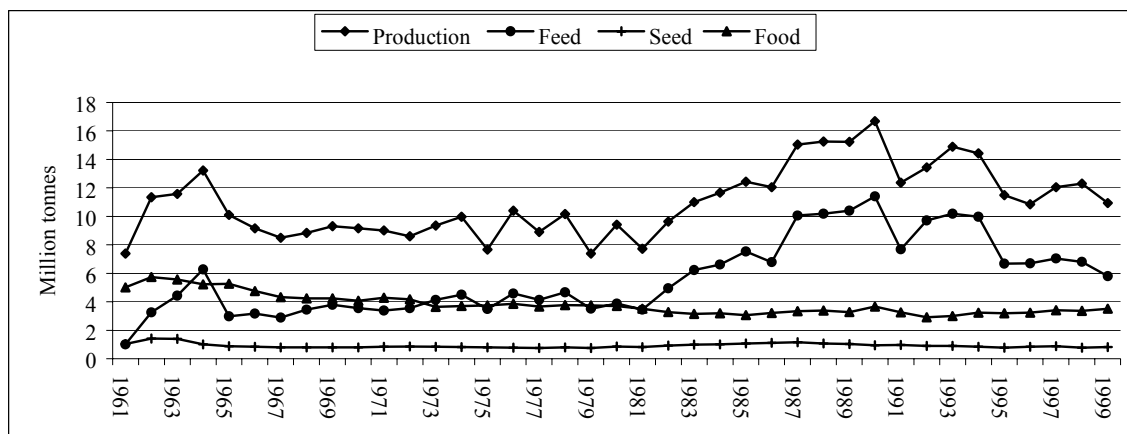
Dry pea seed will germinate at a soil temperature of 4 °C. Emergence normally takes 10 to 14 days. Dry pea has hypogeal emergence in which the cotyledons remain below the soil surface. Pea roots can grow to a depth of 80 to 120 cm; however, over 75% of the root biomass is within 40 cm of the soil surface. A relatively shallow root system and high water use efficiency make field pea an excellent rotational crop with cereals, especially in arid years, when soil moisture conservation is critical (Mándy et al., 1980; McKay et al., 1999).

RESULTS AND DISCUSSION

Dry pea is adapted to different ecological conditions, grows on marginal land, plays an important role in crop rotation and provides an important source of vegetable protein. After beans and lentil, pea is the third most important legume produced for poorer consumers, particularly in

developing countries, similar to chickpeas and cowpeas. Important production areas include France, Russia, Ukraine, Denmark and the United Kingdom in Europe; China and India in Asia; Canada and the USA in North America; Chile in South America; Ethiopia in Africa and Australia. World total dry pea production rose from 8-9 million tonnes in the 1970's to 16,7 million tonnes in 1990 (*Figure 1*).

Figure 1: World production and utilization of dry pea between 1961-1999

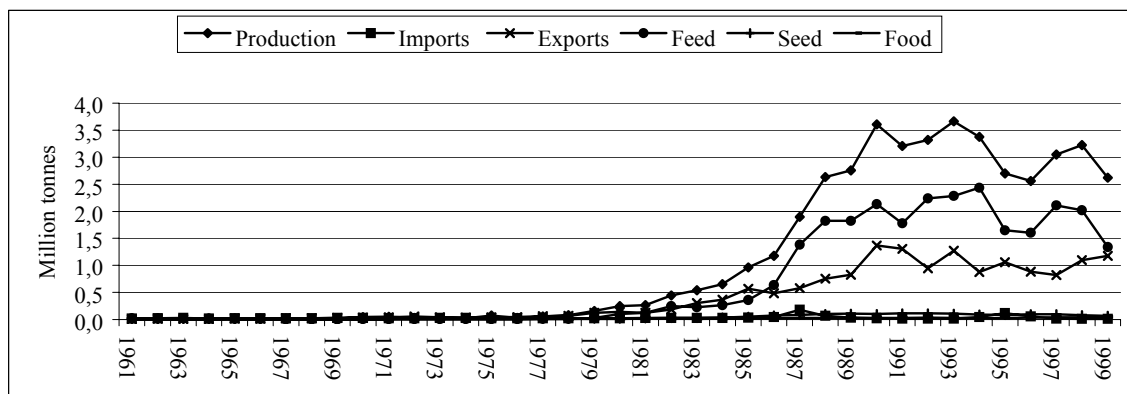


The increase in the production of dry pea does not reflect any rise in utilization for food by developing countries. At the beginning of the 1960's, the consumption of dry pea was 2,2 kg/capita, which reduced to 0,5 kg/capita by the end of the 1990's. The level of human consumption of dry pea has decreased steadily, while growth occurred in feeding livestock. World production grew by 100% in the 1980's, following a large increase in demand for feed by developed countries. In the middle of the 1990's, some 75% of world production was used as feed, 2-3 times higher than in the 1970's.

During the 1980's and the first half of the 1990's, dry pea production increased in the developed

countries in both area and yield. Feed use also became increasingly important (Kralovánszky, 1975; Bódis, 1983). Environmental concerns also contributed to the increase in dry pea production. The trend in production has been maintained in Canada, Australia and many other countries, but, as a result of changes in CAP, dry pea production have been reduced in France. The new reforms in CAP include mandatory set-aside of arable land and a modified support system for grain legumes, which replaced the farmer minimum guaranteed prices applied with fixed area payments. A reduction in the support of area prices also reduced the demand for grain legumes as animal feed (*Figure 2*).

Figure 2: Dry pea production and utilization in the countries of the European Union



Production area varied from 7,763 hectares in 1994 to 5,872 million hectares in 2000. Dry pea production in Europe was 10,926 million tonnes in 1993, which was reduced to 5,727 million tonnes by 2000 (*Table 1*). The highest productivity for pea was reported in France, at 5512 kg/ha in 1999, which is

five times higher than the average yield in the Russian Federation (1094 kg/ha). Pea is the predominant export crop in world trade and represents about 40% of the total trade in grain legumes. The major exporting countries are France, Australia and Canada.

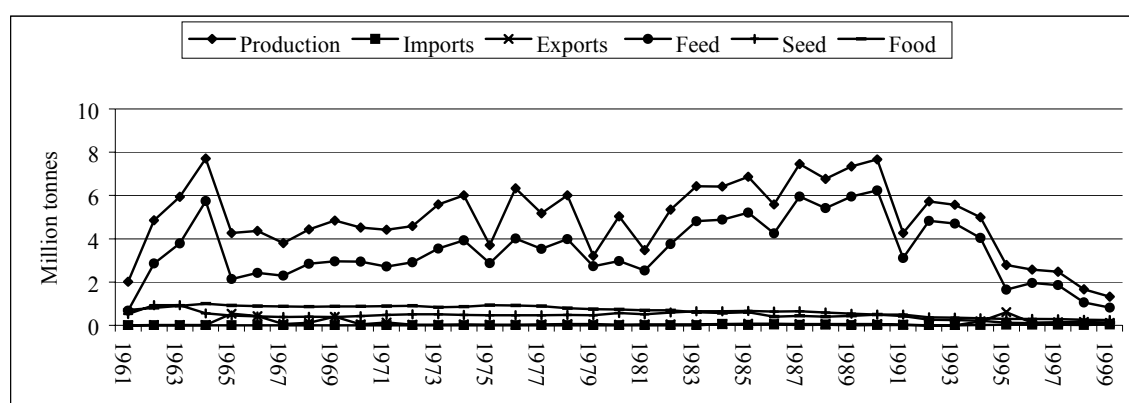
Table 1: Trends in dry pea production (FAO Production Yearbook, 1000 tonnes)

	1992	1993	1994	1995	1996	1997	1998	1999
World	13.431	14.899	14.423	11.494	10.841	12.044	12.309	10.945
Europe	10.501	10.926	10.073	6.969	6.653	7.352	6.882	5.727
France	3.318	3.664	3.378	2.701	2.562	3.052	3.225	2.622
Germany	74	134	151	216	301	400	589	610
Russia	2.607	2.526	2.287	1.212	1.323	1.196	660	598
Ukraine	2.776	2.731	2.470	1.376	985	903	652	498
United Kingdom	261	332	370	286	240	371	324	355
Denmark	301	451	377	282	257	384	386	193
Belarus	113	129	104	112	181	287	190	130
Hungary	242	140	134	143	101	111	131	108
Czech Republic		206	149	130	120	93	122	105
Sweden	10	10	10	28	68	114	88	85
Austria	83	107	134	60	93	80	84	62
Slovakia		123	160	108	89	58	64	57
Poland	60	64	53	57	66	55	63	55
Spain	8	12	73	55	84	58	63	48
Lithuania	14	18	20	4	19	19	73	47
Moldova	104	93	52	40	16	35	47	34
Romania	33	36	38	54	34	27	24	27
Italy	35	29	23	20	12	10	11	22

Dry pea was widely used as animal feed in the Soviet Union. Dry pea was grown on 7-8 million hectares in 1963 and 1964. There was a decrease in production area from the mid-1960's, which lasted until 1972. In the 1970's, dry pea was produced on 4 million hectares and there was an increase in the 1980's, but it did not reach the means of the 1960's. The overall yield was 1,0 t/ha in the 1960's and 1,2

t/ha in the 1970's. Yield started to increase in the second part of the 1980's, and reached 2 t/ha in 1990. As a result of political changes, a strong reduction was recorded in the second half of the 1990's in the states of the former Soviet Union, where large quantities of dry pea was used for feeding livestock (*Figure 3*). Dry pea is expected to attract increased investment in these countries.

Figure 3: Dry pea production and utilization in the territory of the former Soviet Union



Dry pea production has also dropped in China. In contrast, in Australia and Canada dry pea production expanded due to improved export opportunities (*Figure 4*). Results indicate that Canada's share of the total export market is 40%; making it the largest exporter of peas in the world (*Table 2*). Significant importing regions for Canadian peas are Western Europe and Asia. In Western Europe, where peas are

destined mainly for livestock feed, the countries of Belgium, Spain and the Netherlands import the most, followed by Germany and Italy (*Table 3*). In Asia, where pea usage is mostly for human consumption, India is an increasingly significant importer. Approximately 35% of total Canadian pea production is used in Canada, especially for pig feed, with the remaining 65% exported (*Table 4*).

Figure 4: Dry pea production in selected countries

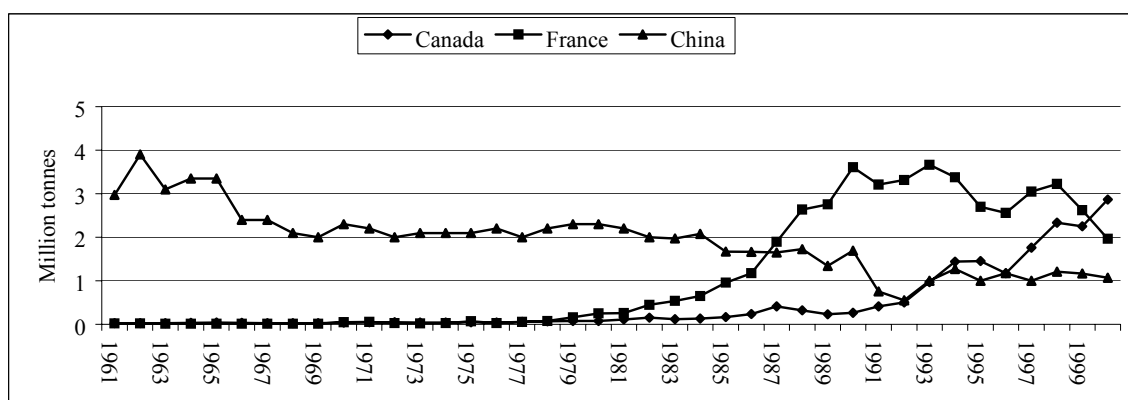


Table 2: Major dry pea exporting countries (FAO Production Yearbook, 1000 tonnes)

	1992	1993	1994	1995	1996	1997	1998	1999	Mean
France	945	1,272	878	1,059	885	824	1,098	1,177	1,017
Canada	298	504	686	1,054	856	873	1,138	1,437	856
Australia	187	355	341	128	292	274	197	260	254
Ukraine	1	5	120	462	97	132	145	91	132
Denmark	126	201	178	64	46	131	80	86	114
USA	96	103	122	112	117	100	127	101	110
Belgium*	30	34	95	174	168	102	86	51	92
Czech Republic		112	153	108	72	68	30	75	88
Hungary	196	90	64	54	26	16	20	22	61
United Kingdom	116	47	55	48	40	54	52	31	55
Netherlands	50	100	72	33	22	32	66	58	54
Slovakia	0	38	69	61	44	24	24	31	42

* Belgium+Luxembourg

Table 3: Major dry pea importing countries (FAO Production Yearbook, 1000 tonnes)

	1992	1993	1994	1995	1996	1997	1998	1999	Mean
Netherlands	710	630	628	706	559	365	513	524	579
Belgium*	390	410	485	642	636	513	579	569	528
Spain	258	393	436	556	332	425	561	527	436
Germany	556	507	468	425	223	141	131	164	327
India	106	199	145	173	155	282	257	366	210
Italy	32	23	31	193	89	86	99	108	82
China	19	23	23	26	149	134	101	69	68
Colombia	49	37	39	38	38	39	50	37	41
Bangladesh	4	4	34	11	2	49	70	118	37
Pakistan	6	5	17	89	88	3	30	44	35
USA	19	24	24	37	34	39	35	31	31
Ireland	42	28	25	20	22	55	14	20	28
Brazil	18	21	28	24	27	27	26	30	25
Japan	29	19	22	24	24	26	20	21	23
Peru	10	14	22	17	21	25	43	28	22

* Belgium+Luxembourg

Table 4: Feeding dry pea in Europe (data from FAO Production Yearbook, 1000 tonnes)

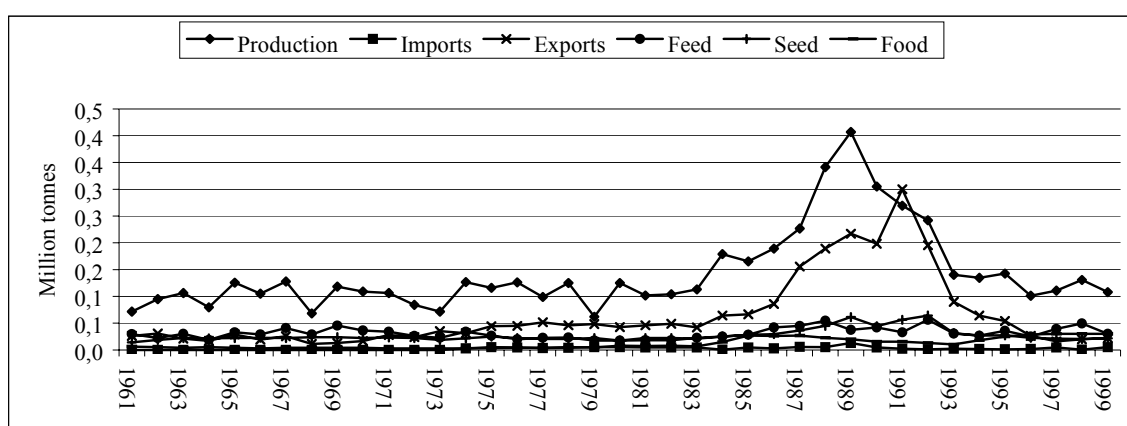
	1992	1993	1994	1995	1996	1997	1998	1999	Mean
World	9.720	10.193	9.973	6.683	6.693	7.052	6.805	5.806	7.866
Canada	122	472	550	374	305	450	493	510	410
Europe	9.325	9.317	8.916	6.018	5.842	5.998	5.614	4.646	6.960
France	2.241	2.282	2.433	1.649	1.604	2.109	2.022	1.339	1.960
Ukraine	2.296	2.257	1.908	652	661	554	295	215	1.105
Russian Federation	2.272	2.201	1.930	850	1.081	965	452	418	1.271
Germany	553	555	535	518	391	357	524	547	498
Netherlands	654	516	538	650	516	309	421	442	506
Belgium*	361	390	391	462	461	407	488	514	434
Spain	247	380	478	575	390	455	588	541	457
Denmark	149	195	241	182	167	195	225	180	192
Belarus	100	115	91	95	152	255	169	114	136
Sweden	4	4	5	18	56	92	66	71	40
Austria	73	95	122	58	92	71	73	44	79
Moldova	89	79	43	33	11	31	40	15	43
Slovakia		66	55	39	22	17	19	17	34
Czech Republic		46	13	6	34	9	36	23	24
Hungary	56	31	27	36	25	39	49	30	37
Romania	26	29	29	43	18	9	12	12	22
Ireland	35	22	20	15	17	50	10	16	23

* Belgium+Luxembourg

During the last decade, Canadian pea production increased by 450%, with most of the increase attributable to expanded seeded acreage. Because of this surge in production, Canada is expected to become the world's largest producer of dry peas in 2000-2001, with a 23% share of world production. France is forecasted to be a close second, with 21% of total production. In Canada and Australia, exports are likely to grow more slowly than in the past, partly because of weaker import demand for feed. Feed

demand in developing countries will continue to grow at a considerably faster rate than in developed countries. However, the gap between the two groups of countries will remain wide. Compared with the development in the 1980's, the growth in feed demand is projected to be significantly slower in both groups of countries. Hungary produced 0,4 million tonnes dry pea in 1989, and about 0,1 million tonnes since 1995. Export was highest in 1991 and lowest in 1999 (Figure 5).

Figure 5: Dry pea production and utilization in Hungary



Word demand for dry pea for feed increased from 4 million tonnes in the 1970's to 10 million tonnes by the end of 1980's. In the coming decades, world dry pea production and utilization as feed are expected to

expand at a lower rate than in the 1980's. Most of this increase is expected to occur in Eastern European countries, Canada and Australia, where production is anticipated to grow at 2% annually.

Europe, which accounts for 80-90% of world total feed use, is likely to recover and expected to grow. In the countries of the former Soviet Union, feed utilization is also expected to grow, but until 2010, it does not reach the production level of the 1980's. In aggregate, the Eastern European countries are likely to improve their production in the new millennium. Export from Eastern Europe will also expand, with a possible increase in the market share of the EU. Research will be focused on new production technologies, more productive varieties, and on breeding for drought and disease resistance. An

improved extension service and capital investments will help this process (Iszályné, 2002; Lazányi, 2002).

The impact of yield increase will also be strong in North America and in Far Eastern countries. The rise in yield and production in these countries will result in research into new production technologies and more productive varieties, and improved extension services. Research will be focused on the development of high yielding, short duration varieties and on breeding for drought and disease resistance.

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