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PEAS AND BEANS IN EUROPEAN AGRICULTURE

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INTRODUCTION

The European agricultural scene

Surpluses of cereals and dairy produce are now the dominant influence on European agriculture. There is increasing public concern about the cost of supporting such surpluses, together with a greater public awareness of the environmental and social aspects of agriculture.

The production of milk has been restricted by quota arrangements. Despite individual cases of hardship or apparent unfairness, this system generally maintained producer prices, but it is hoped that the desired constraint on cereal output will be achieved through price reductions and greater support for crops which are in deficit within the community.

Arable farming in the United Kingdom

Within the UK arable sector dramatic improvements in wheat output (Fig. 1) have resulted from both new varieties and high inputs of fertiliser and pesticides for the crop. Oil-seed rape has been successfully introduced as a major crop, and plant breeding in the UK and in France has given a number of successful autumn sown single-low (low erucic acid) varieties. Currently, the field performance of the double low (low erucic and low glucosinolate) and spring sown varieties is relatively poor, and any enforced change to these would reduce crop output. However, trade estimates are that the UK production of about 240,000 ha should meet likely demand for the product, so there is little prospect of further substantial expansion. The crop has resulted in a number of agronomic problems in the following wheat crop such as the development of the diseases caused by *Alternaria* spp. and *Sclerotinia* spp., and slugs (*Arion* spp). Volunteer oil seed rape is also a persistent and troublesome weed. Potatoes and sugar beet are the other major break crops but both require specialised machinery and the controlled output gives few opportunities for new growers.

Attention is now being turned to the protein deficit for animal feed with the community, and over the past three years there has been marked increase in the area of peas and field beans grown in the UK, France and Denmark. Current UK trade estimates are that the compounding industry could use 1 million tonnes of peas or beans, so allowing a trebling of the current 90,000 ha of pulse crops (50,000 ha of peas for compounding and 40,000 ha of field beans). Lupins are also now being considered as a protein crop but to-date varieties are low yielding and late-maturing, and there are uncertainties about some agronomic aspects of production such as inoculation and post-emergence weed control.

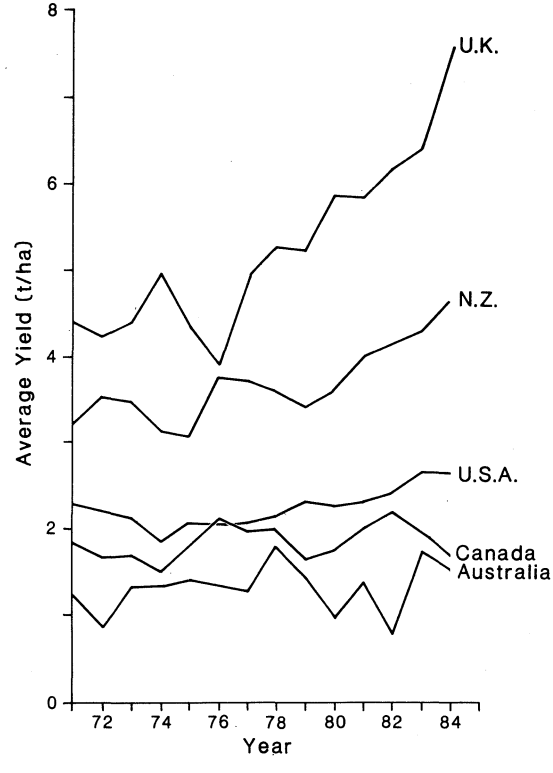

Figure 1: Average wheat yields in UK, USA, Canada, Australia and New Zealand.

Interest is now also being shown in the possibility of growing crops for the pharmaceutical industry, such as borage (*Borogo officinalis*), evening primrose (*Oenothera biennis*), fenugreek (*Trigonella foenum-graecum*) and ribgrass (*Plantago lanceolata*), and enthusiasts occasionally discuss the possibility of growing cold-sensitive crops such as soya beans and sunflower in the UK.

There is also every need to fully exploit field scale vegetable growing and there may be opportunities to develop export markets for peas, broad beans and brassicas, particularly brussel sprouts.

Social and management trends

In the UK, the predominantly urban population has little sympathy for the economic or management problems of the agricultural industry, and farmers are having to accept a reduction in commodity prices, greater discipline in some environmental issues, particularly straw burning and the use of pesticides, and greater self-help through funding their own research and development services.

This relatively harsh business and economic environment has made farmers more aware of the need for prudent husbandry and for a reduction in dependence upon winter-wheat. Many will therefore find that producing an acceptable level of profit will be far more demanding over the next five years than has been the case from 1980-85.

PEAS AND BEANS IN THE UK

Internationally, the names peas and beans are used for different species often with contrasting uses and climatic requirements. The botanical relationship between the peas and beans discussed here and common names for each crop are given in Figure 2.

PROTEIN CROPS

This is the one area where expansion is both desirable and practicable. Peas and beans both receive EEC aid to encourage production to replace the 15 million tonnes of plant protein that the community imports each year. Of the two crops, peas have proved far more rewarding from both the plant breeding and crop production points of view.

Combining peas

Combining peas have been grown on a large scale for human consumption in the drier parts of England (East

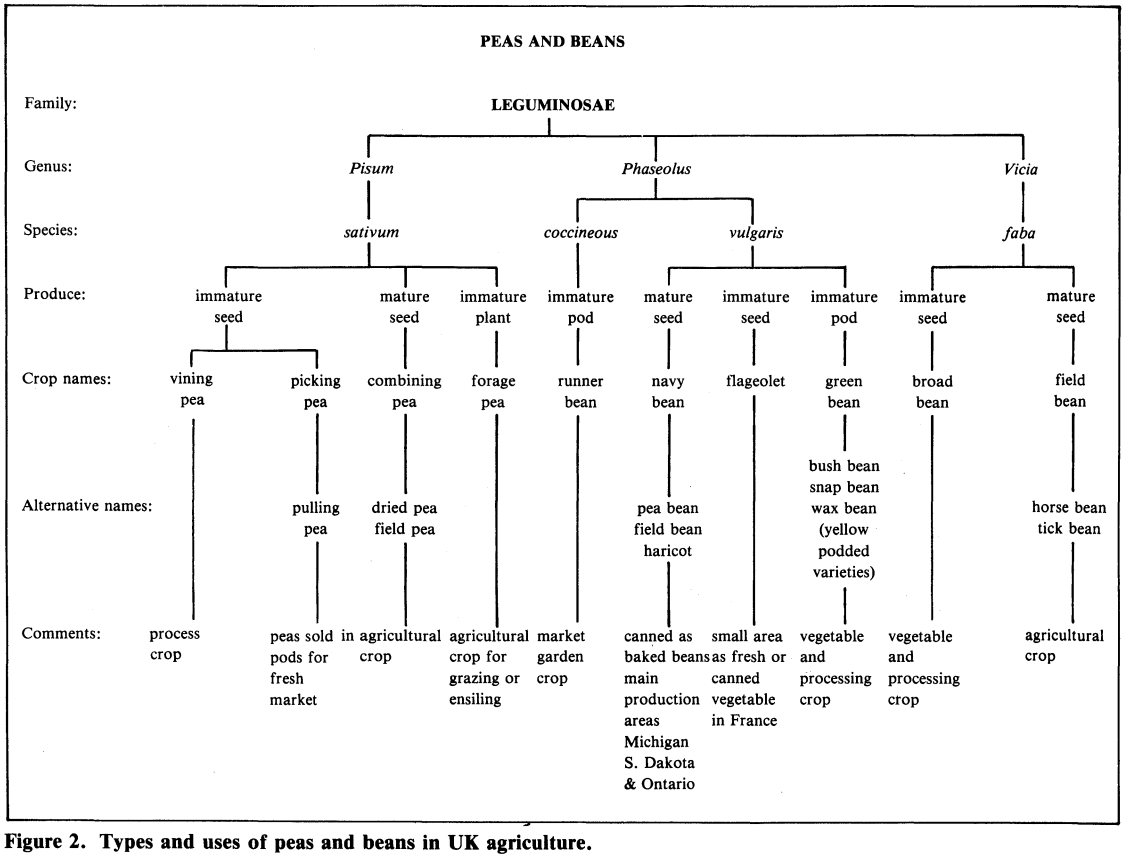

Figure 2. Types and uses of peas and beans in UK agriculture.

Anglia and the South East) since World War II. The emphasis was initially on the production of high quality produce of varieties that had intrinsically good cooking properties. While this market for about 70,000 tonnes of peas per annum remains, since the US embargo on soya exports in 1974, increasing emphasis has been placed on the development and use of the crop for protein.

The protein use is much less demanding of quality and has given plant breeders a major market for varieties that have high yield potential, wide adaptability and are easy to harvest.

The extension of the types and varieties that are available commenced in the early 1970s, with the evaluation by the Processors and Growers Research Organisation (PGRO) of the new plant types produced by the John Innes Institute; winter peas produced mostly in France; and the tare leaf type that ultimately was developed to give the variety Progreta.

Progreta was developed by PGRO but all Rights and Title to the variety were purchased by five members of the UK trade in 1978. Compared to older varieties, Progreta had higher yield potential, a more sturdy and erect plant habit, a considerable ability to produce simultaneously maturing basal branches, and finer foliage that expedited the drying of the crop.

The field performance of Progreta and other UK Recommended Varieties is summarised in Table 1. Progreta is now the dominant variety in the UK; it occupies about 20% of pea area in France and is being developed rapidly in Denmark, Germany, Hungary and Italy.

There is now increasing interest in semi-leafless peas; the best ones share the superior plant habit and ease of drying of Progreta but have an improved plant type achieved by leaflet modification to form tendrils. This gives the plants the ability to intertwine with their neighbours, so obtaining additional standing ability and producing an open, well ventilated crop that expedites drying. A considerable range of semi-leafless varieties have been produced in the UK, New Zealand, Holland, Sweden, Denmark and Finland, and there is a tendency to discuss them as a group. However, characteristics vary between individual varieties with some that are excellent and others that are very poor. Currently it appears that the most promising semi-leafless varieties are Countess, Solara, and Dryden.

In contrast, winter-hardy peas have not proved successful, for although they have good cold tolerance they have proved vulnerable to wind damage and agronomic problems such as weed control and water-logged soil.

Basic husbandry recommendations for peas were established by PGRO from 1945-55 and since then a full range of broad-leaf and grass weed killers has been introduced. The evaluation of chemical and mechanical aids to harvesting commenced in the mid 1960s with crude

Table 1. Recommended list of field peas for combining 1986. The control for yield comparisons is the mean of Birte, Maro and Progreta. Differences in yield of less than 5% among fully recommended varieties and less than 7% for comparisons involving provisionally recommended varieties should be treated with reserve.

	Fully recommended								Provisionally recommended				
Varieties classified for: General use G Special use S Provisional recommendation P	Birte	Progreta	Stehgolt	Imposant	Maro	Maxi	Finale	Bunting	Miranda	Belinda	Countess	Consort	Bohatyr
	G	G	G	G	G	S	S	S	PG	PG	PG	PG	PG
Agricultural characters:													
Yield as % of control (4.55 t/ha)	102	102	102	101	96	97	96	91	102	101	111	102	108
Maturity - days earlier (-) or later (+) than Maro	-8	-1	-6	+1	0	-6	-7	0	-5	-6	-1	-6	-3
Straw length (cm)	63	74	56	74	67	53	50	71	54	51	81	77	82
Ease of combining†	4	7	5	5	5	4	4	5	4	4	8	7	8
Standing ability†	3	6	4	4	4	3	3	4	3	3			
Resistance to:													
Pea wilt	S	R	S	R	R	R	R	R	R	R			
Downy mildew*	GFR	MS	MS	GFR	GFR	SS	SS	GFR	GFR	GFR			
Grain quality:													
Crude protein % (DM)	22	25	22	23	25	22	23	25	22	24			
Thousand seed weight (g)	266	323	285	390	363	327	330	365	346	298			

Diseases: Pea wilt *(Fusarium oxysporum* f.sp. pisi (race 1)*)* R = risistant; S = susceptible.
Downy mildew *(Peronospora viciae)* GFR = good field resistance; SS = slightly susceptible; MS = moderately susceptible; S = susceptible.

* Information supplied by PGRO.

† 1 = least, to 10 = most, desirable expression of trait.

sulphuric acid and diquat as desiccants and continues now with new materials and telescopic lifting fingers. A significant advance in disease control was achieved in the early 1980s with the introduction of seed protectants containing metalaxyl and fosetyl-aluminium to control seedling downy mildew (*Peronospora vicieae*). For the 1985 season these were combined with thiabendazole (Apron 69T and Aliette Extra) to also control seed borne diseases of the Ascochyta complex. Further progress in this area is expected with the addition of insecticides to control adult and larval stages of pea weevil (*Sitona lineatus*) and field thrip (*Thrips angusticeps*). The evaluation and introduction of these broad-spectrum seed and crop protectants is an important development for they offer effective, economical and environmentally safe ways of controlling pests and diseases.

For the future, it is hoped that further progress with crop protection can be achieved with systemic fungicides and that the continuing efforts of plant breeders will bring the sustained progress seen with cereals.

Field beans

In contrast there have been relatively few noteworthy developments with field beans. One item, however, has received much comment from the press and perhaps raised hopes of genetic progress to match that of peas. This is the development of types with a terminal inflorescence to give botanical determinacy. Traditionally, field bean crops suffer from plants that are too tall and therefore lodge and are difficult to dry. The development of the determinate variety Ticol is aimed at producing plants that are more consistent in their field performance, while another new variety, Alfred, retains the conventional plant type but achieves higher yields through a combination of disease resistance and adaptability. Traditional problems with the crop, however, are late maturity, vulnerability to chocolate spot and the reluctance of compounders to use the relatively large, deeply pigmented seeds.

VEGETABLE CROPS

Field-scale vegetables, grown for canning or quick-freezing are important cash crops on many farms in eastern England and eastern Scotland. Currently about 40,000 ha of vining peas, 3,000 ha of broad beans and 8,000 ha of green beans are grown annually for processing, while a substantial proportion of the UK crop of brussel sprouts, carrots and cauliflowers are purchased by canning and freezing companies.

Such crops are grown without direct EEC support and are important both to the farmer and to the processing companies as they contribute to the throughput and the length of season necessary for efficient factory operation.

Vining peas are by far the most important specialist crop and, like combining peas, they have benefitted from the introduction of new seed and crop protectants, semi-leafless varieties and new complete-crop harvesters.

The crop is produced very efficiently in the UK and Scandinavian countries, and further expansion has to be linked with exports to southern Europe.

With frozen produce this is comparatively straightforward for similar varieties are used; but for canning, many continental countries require a product that is quite different to that currently produced in the UK. Typical continental products use smooth-seeded (starchy) peas that are much smaller than those used for freezing. They are size graded and canned without colour additives, so a special range of varieties has to be used.

For the UK domestic market, the varieties Avola (spring), Banff, Sprite, Scout, Small Sieve Freezer, Dark Skinned Perfection and Puget are used for both canning and freezing, and only small acreages of the special canning peas Legend and Dunstan are grown. On the Continent, the major varieties include Aldot, Mini, Polarette, Danielle and Primaroy; both the field peformance and quality of produce of these has been evaluated by PGRO in the UK.

Broad beans are a popular vegetable in the UK and, to a lesser extent, in Holland but little grown elsewhere. They give excellent canned and frozen products but their harvest time clashes with vining peas and in the past yields have been depressed by artificially delayed sowings so that they can be harvested after peas. Recently, plant breeders in Holland have produced a range of much-improved broad bean varieties, but the full potential of these new types can only be realised by efficient production in fertile conditions.

FORAGE PEAS

Peas are also grown for silage or grazing, usually in mixtures with oats or barley. After a rapid expansion in the late 1970s, the area has now stabilised at around 12,000 ha. The cultivars used are mostly long strawed, purple flowered field peas such as Minerva, Krupp, Rosakrone, Nadja, and Whero. Forage peas are spring sown and grazed or ensiled at about 12 weeks.

SUMMARY

Peas and beans have always been important crops in European agriculture. Traditionally, peas have been grown for human consumption, while most beans have been used for animal feeds. The EEC's demand for home-produced protein has revived interest in both crops, and with peas, new varieties and agronomic techniques are improving the yield, security and adaptability of the crop.

Peas and beans are also important vegetable crops, particularly for the canning and quick-freezing industries, and considerable efforts have been made to ensure that these crops can be fully developed to the benefit of growers and processors.