FIELD PEA BREEDING IN POLAND

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The significance of the field pea for Polish agriculture (around 280,060 ha) depends on several features: its use in crop rotation (N-fixation, cultivation of so called "anthocyanin" types which are less demanding forms on light soils) , use of the seeds as a source of protein for human and animal consumption, and use of the green mass as fodder for animals and as green manure.

In Poland light soils make up around two-thirds of the cultivated area which was the main reason why in the past, long stem, anthocyanin types were the main forms cultivated for green mass (so called "peluschka"). However, the importance of species cultivated for seeds as a source of protein has strongly increased in the past two decades. In particular, pea, lupin, and field bean have been used to replace the import of soyabean.

In the breeding programme, the following characters constitute the accepted ideotype.

Green mass varieties (mainly with anthocyanin):

– high yield of green and dry mass,
– earlyness,
– maturity term adapted to accompanying crops in mixtures,
– small soil requirements,
– high seed yield (for seed production, as well as for cultivation for fodder seeds on light soils), resistance to viruses (BYMV, PEMV, PSbMV).

Seed varieties (mainly without anthocyanin).

– high yield of seeds,
– lodging resistance (e.g. le and af genes),
– protein content in seeds,
– seed quality (cooking ability, appearance, carotenoid content, e.g. the gene Orc) .
– disease resistance (PSbMV, BYMV, BEMV, Ascochyta, Fusarium)
– high yield of seeds in genotypes with short stem and anthocyanin for cultivation on light soils.

Significant progress has been made in the last 10-15 years toward meeting these objectives. In the first half of the seventies Polish pea varieties yielded about 10 q/ha less than the best foreign varieties. At the end of the seventies the difference was smaller. In state trials in 1984-87 for the first time a Polish variety yielded better than the best foreign variety (Fig. 1). Comparing the seed yield of cv Kujawski Wczesny (the best in the middle of the seventies) with the yield of successively registered, new varieties we obtained an increase of about 40% in the period 1977-89 (Fig. 2). In particular, stem length has been reduced (optimum 75-90 cm) and varieties with the gene afila have been registered.

Progress has also been made with the breeding of fodder varieties. In particular, a negative correlation between green mass yield and earlyness, as well as seed yield, has been broken (Fig. 3). It is likely that varieties for seeds with anthocyanin but short stemmed (in the type of Gomik and Pegro) will, in the near future, yield on the same level as dwarf, white-flowered varieties. Many new varieties have been registered leading to the removal of old, less valuable ones (Table 1 - compare with the list in PNL 1982).

In Poland pea breeding is carried out by state institutions like breeding enterprises, the Institute of Plant Breeding and Acclimatization and, on a small scale, by departments of genetics in agricultural academies. An Association of Pea Breeders was created to coordinate the breeding programme, field trials in different locations, laboratory tests and exchange of gene resources. This group also cooperates with breeders in Germany and Czechoslovakia. The Polish Gene Bank is situated in the main pea breeding station at Wiatrowo which cooperates with the Department of National Gene Resources at Radzikow. Twice a year meetings are organized: in winter, trial results are discussed, new trials planned, and lectures are presented; in summer, field excursions are organized. Fig. 4 shows institutions for field pea breeding in Poland. Garden varieties are bred by some other stations in a separate program.

The Poland registration of cultivars is conducted under state control and is based on assessment of distinctness, homogeneity, stability and agricultural value. Very briefly, breeders have to present results of preliminary trials at not less than two locations and for two years before potential varieties can be entered in state trials. Registration of new varieties is based on estimation of three years trials from about 10 locations.

Table 1. The register of Polish field pea cultivars (1989)

Name of variety	Breeding firm	Year of registration
Dry seed varieties (genotype aa)		
Karat	Sobotka	1981
Opal	Wiatrowo	1982
Aster	Lipie	1984
Koral	Sobotka	1984
Legenda (af)	Prusinowo	1984
Ramir (af)	Przebedowo	1985
Elektron	Wiatrowo	1986
Perkun	Wiatrowo	1986
Ikar	Wiatrowo	1987
Ergo	Lagiewniki	1988
Gniewko	Lipie	1988
Hermes	Wiatrowo	1988
Szafir	Sobotka	1988
Bosman (af)	Prusinowo	1989
Diament	Sobotka	1989
Miko (af)	Przebedowo	1989
Rodan	Lagiewniki	1989
Dry seed/fodder varieties		
Mige (a)	Przebedowo	1983
Jaran (a)	Pasterzowice	1986
Kama (a)	Kosieczyn	1989
Gomik (A)	Przebedowo	1986
Pegro (A)	Wiatrowo	1988
Green mass varieties (genotype AA)		
Fioletowa	Przebedowo	1974
Mazurska	Szyldak	1975
Fidelia	Wiatrowo	1980
Helia	Marchwacz	1982
Mewa	Przebedowo	1982
Kormoran	Szyldak	1988

Fig. 1

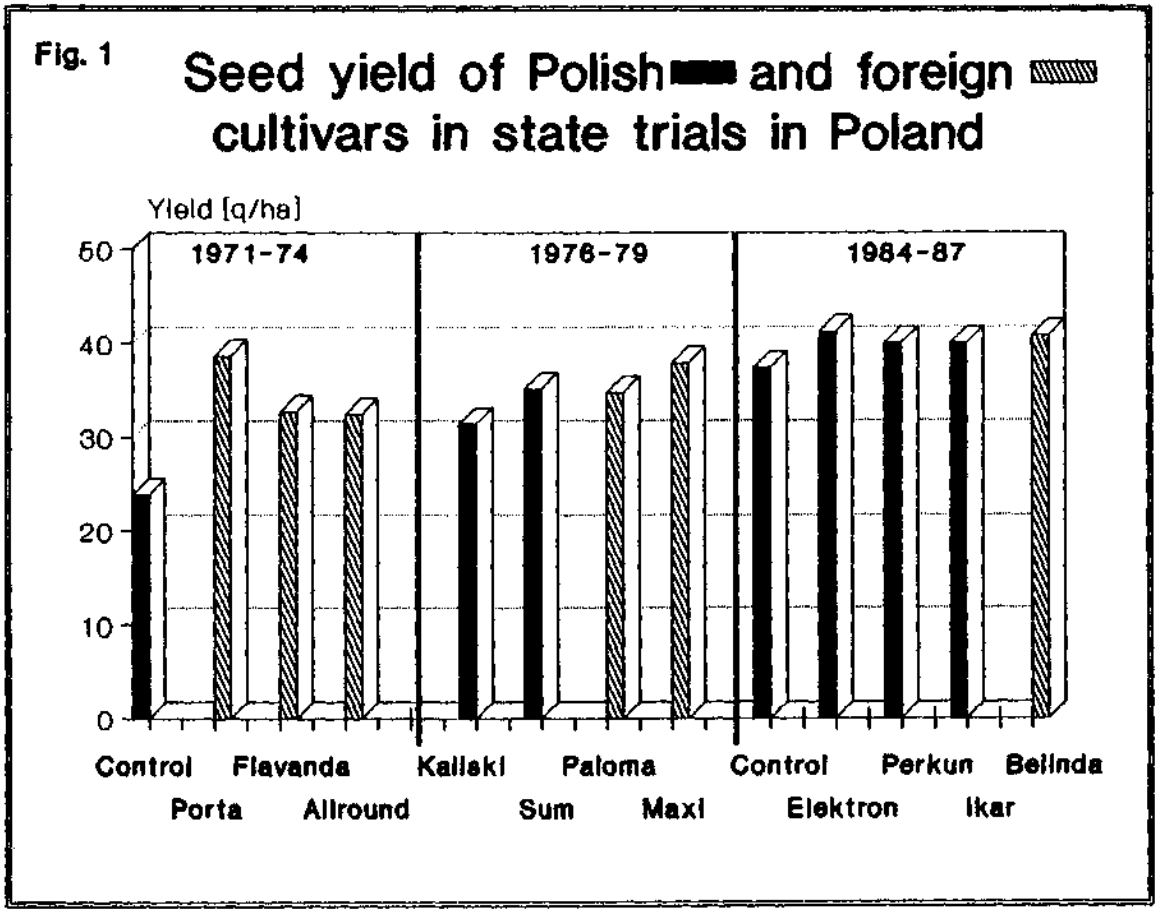

Seed yield of Polish and foreign cultivars in state trials in Poland
Yield [q/ha]
1971-74
1976-79
1984-87
60
40
30
20
10
0
Control
Flavanda
Porta
Allround
Kaliski
Paloma
Sum
Maxi
Control
Perkun
Elektron
Ikar
Belinda

Fig. 2

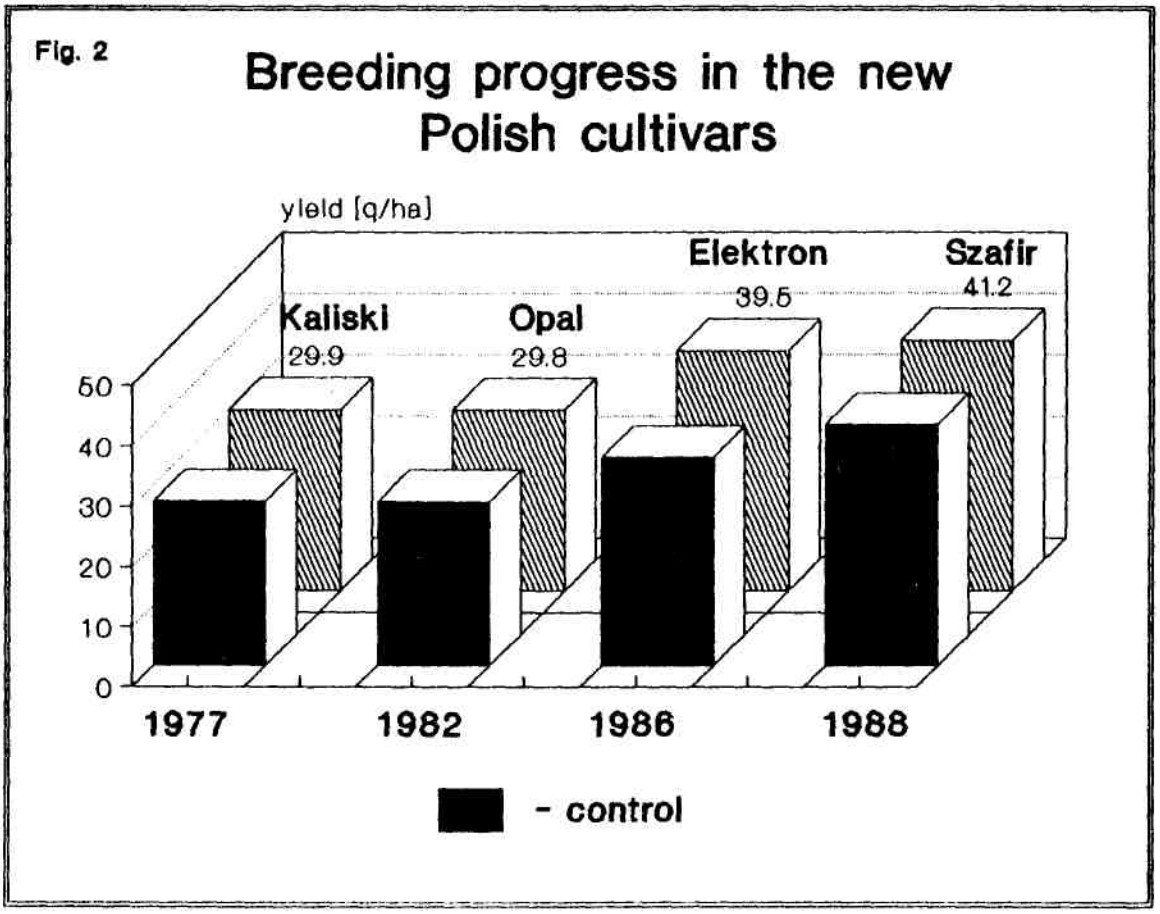

Breeding progress in the new Polish cultivars
yield [q/ha]
Kaliski
29.9
Opal
29.8
Elektron
39.5
Szafir
41.2
60
40
30
20
10
0
1977
1982
1986
1988
- control

Fig. 3

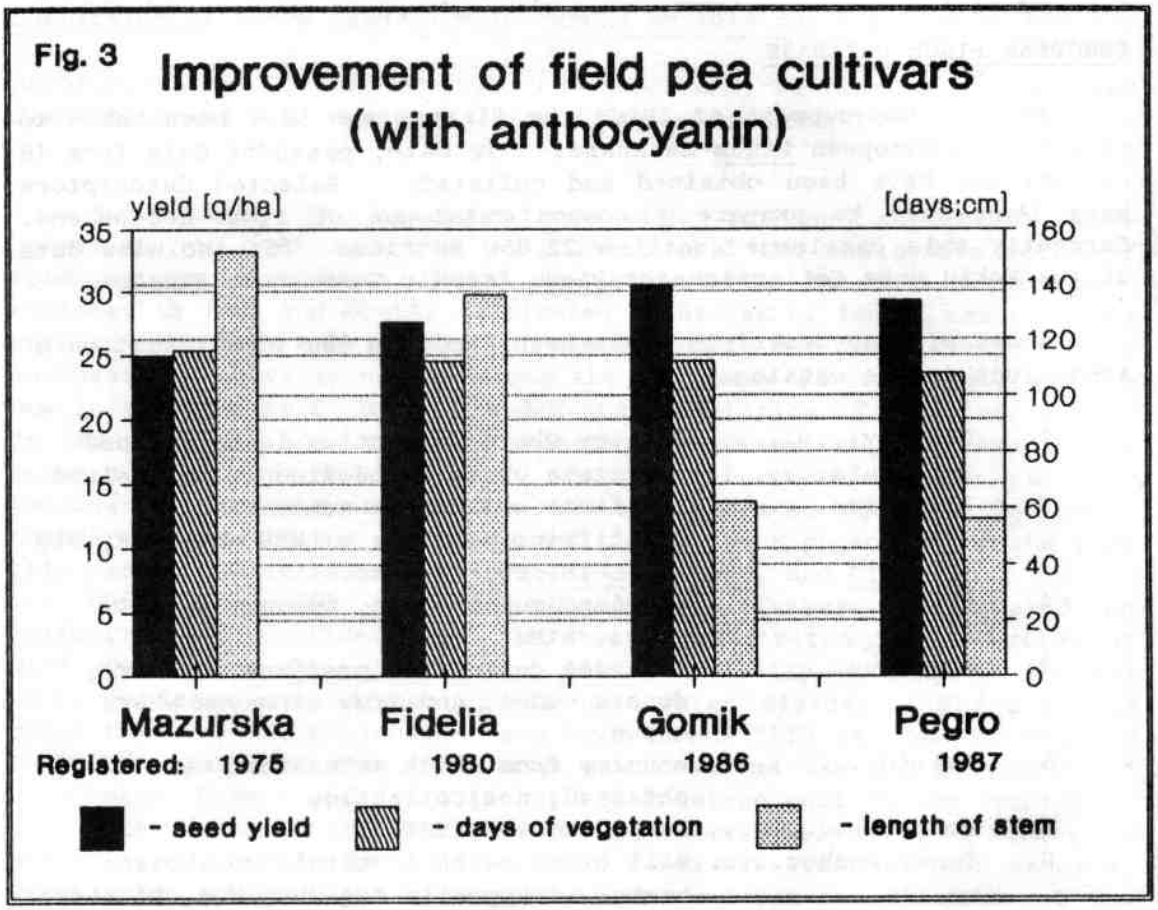
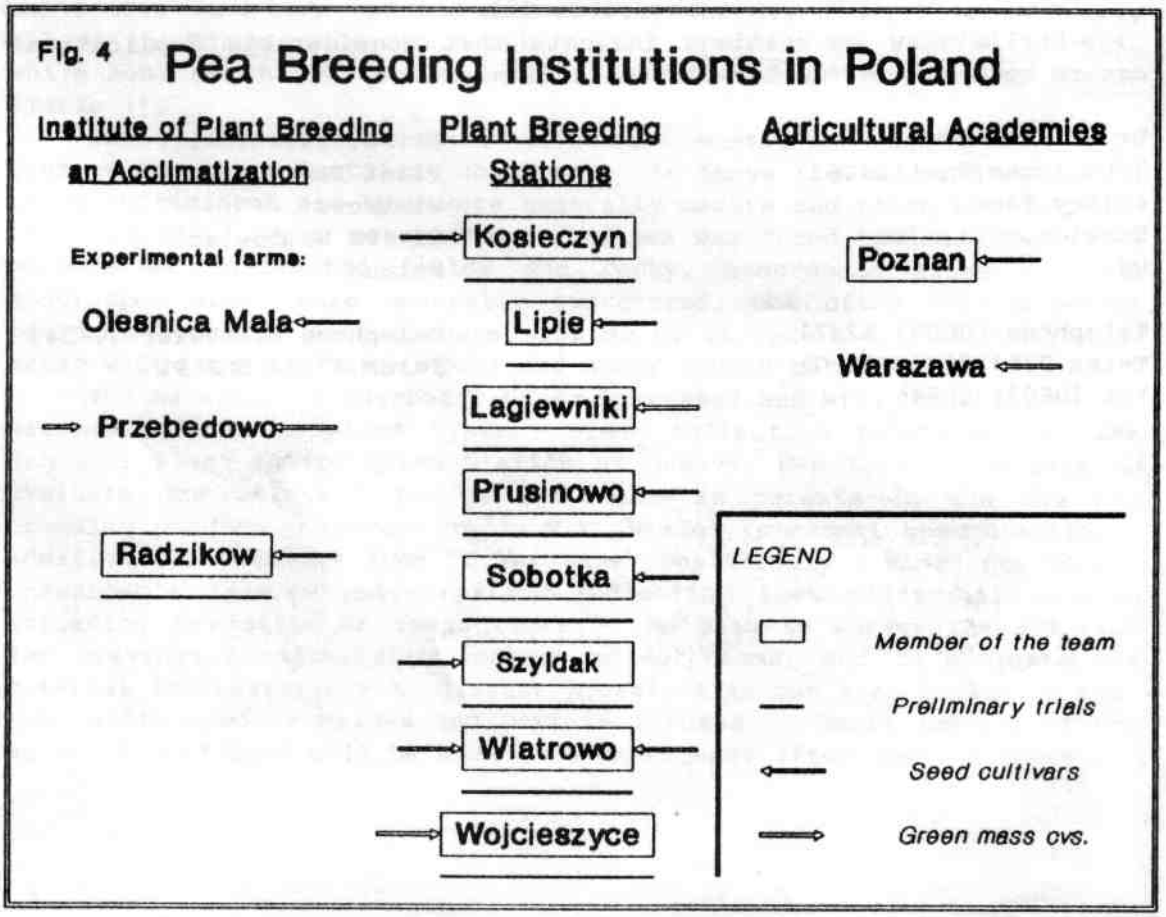

Improvement of field pea cultivars
(with anthocyanin)
yield [q/ha]
[days;cm]
35
30
25
20
15
10
5
0
160
140
120
100
80
60
40
20
0
Mazurska
Fidelia
Gomik
Pegro
Registered: 1975
1980
1986
1987
- seed yield
- days of vegetation
- length of stem

Fig. 4


Pea Breeding Institutions in Poland
Institute of Plant Breeding an Acclimatization
Plant Breeding Stations
Agricultural Academies
Experimental farms:
Olesnica Mala
Przebedowo
Radzikow
Kosieczyn
Lipie
Lagiewniki
Prusinowo
Sobotka
Szyldak
Wiatrowo
Wojcieszyce
Poznan
Warszawa
LEGEND
Member of the team
Preliminary trials
Seed cultivars
Green mass cvs.