A forage grass and small grain legume plant collecting expedition in South East Poland, 1990

K.H. Chorlton¹, I.D. Thomas¹, D.W. Bowen¹, Z. Bulínska-Radmoska² & M. Gorski²
¹AFRC Institute of Grassland and Environmental Research, Plas Gogerddan, Aberystwyth, Dyfed SY23 3EB, Wales, UK; ²Plant Breeding and Acclimatization Institute, Plant Genetic Resources Section, Radzików N/Warsaw, 05-870 Błonie, Poland

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Summary

The Plant Genetic Resources Unit (PGRU) of the Institute of Grassland and Environmental Research, Welsh Plant Breeding Station (IGER, WPBS), UK, and the Plant Genetic Resources Section of the Plant Breeding and Acclimatization Institute (PBAI), Poland, carried out a joint collecting expedition in Poland between 25 August and 7 September 1990. The expedition was unique in that it was the first time that vegetative sampling had been applied to the perennial forage grass and legume populations of south east Poland. The expedition focused on semi-natural vegetation in agriculturally managed situations and detailed collection site data on management systems was obtained from landowners.

Samples were collected from 62 sites. Vegetative collections of Lolium spp. (37 populations) and Trifolium spp. (56 populations), and seed collections of Festuca spp. (32 populations) were made by the IGER team (Table 2). The PBAI team made 59 separate seed collections, mainly of Leguminosae.

The expedition covered four geographical subregions of south east Poland. (See Fig. 1). These were the Nizina Mazowiecka south of Warszawa, the Wyzyna Malopolska with the town of Kielce at its centre and the Beskidy Zachodnie and Beskidy Wschodnie regions of the Carpathian mountains.

A diverse range of habitats was sampled covering a broad range of altitude agricultural management systems and ecological conditions. Polish agriculture is faced with the problems of a rapid orientation to a market economy and it is likely that the diverse range of habitats encountered will be reduced as agricultural practices change. This will lead to genetic erosion of the unique forage grass and legume populations to be found in Poland.

Abbreviations: ECP/GR – European Co-operative Programme on Crop Genetic Resources, IGER – Institute of Grassland and Environmental Research, PBAI – Plant Breeding and Acclimatization Institute, PGRU – Plant Genetic Resources Unit, WPBS – Welsh Plant Breeding Station

Introduction

Collection, characterisation, evaluation, conservation and documentation of genetic resources of temperature forage grasses and clovers form the main objectives of both the Plant Genetic Resources Unit (PGRU) of the Institute of Grassland and Environmental Research (IGER), UK and the National Department of Plant Genetic Resources (at PBAI), Poland. Collection of genetic variation is basic to the research and breeding activities of IGER and PBAI.

The National Department of Plant Genetic Resources (at PBAI) is the co-ordinator for the programme of collecting and conserving plant genetic resources in Poland.
"The collection consists of 57 genera of agricultural, horticultural, industrial and medicinal plants. Total number of accessions stored and studied is 60,000 at present. The main groups of this collection are cereals and ecotypes of pasture grasses.” (Goral, 1989).

A collection programme was started by PBAI in 1971 when 244 ecotypes of 20 grass species were collected in various districts of Poland. This was the beginning of the biggest grass collection in Poland and one of the biggest collections in the world. Annual expeditions to different regions of Poland and seed exchange have led to the collection of 23,255 grass ecotypes including 4170 *Lolium perenne* and 5631 *Festuca* species ecotypes. The ecotypes are kept under uniform soil and climate conditions in the form of a living collection for four years of evaluation. At the end of these observations seed is harvested for the gene bank (Majtkowski, 1992).

At IGER, the PGRU has built up a collection of over 10,000 documented populations of forage grasses and legumes and their associated rhizobia on expeditions throughout Europe and North Africa.

The sampling strategy of the PGRU is to collect populations of perennial forage grasses and legumes as vegetative units. Each population is kept separate and regenerated in glasshouse isolation chambers on return to IGER. Seed is harvested from the vegetative units and used for evaluation and characterisation experiments. Surplus seed is stored in the gene bank where it is available for international exchange to legitimate users.

Plant Genetic Resources programmes in both IGER and PBAI are carried out in close cooperation with the International Board for Plant Genetic Resources and the UK and Poland both participate in the ECP/GR programme.

The expedition was organised to fulfil a range of objectives. These were to collect populations of *Lolium perenne* L. and *Trifolium repens* L. exhibiting high mid-season growth, populations of *Festuca gigantea* (L.) Vill. for possible use in hybrid breeding programmes designed to increase the adaptability of rye-grasses and ripe seed of legume species wherever possible.

Populations of forage grasses and clovers with high mid-season growth are considered likely to evolve under the continental climate of eastern Europe such as occurs in Poland. Small private farms in Poland are mainly low input systems often on low fertility soils. Forages that have evolved under such conditions were of additional interest to IGER plant breeders and research workers.

Poland is mainly an arable farming country. Cultivation is concentrated on the central plains away from the industrialised belts of the north (near the Baltic coast) and the south (east of Katowice to the border with Germany). There is an area to the north east of Warszawa, largely covered by lakes and forest, where cultivation is limited. Most of the agricultural land consists of small, private farms with many owners being past retirement age. Farms vary in size from 5 ha up to 15 ha although 15 ha would be considered large. The farms are labour intensive, growing a range of crops and raising stock. Horsepower is widely used with tractors and combines being found only on the larger farms and state owned co-operatives. The climate of Poland is partly continental, with very cold winters, hot summers and clearly defined spring and autumn seasons. The high latitude gives long days in summer and short days in winter.

South east Poland was chosen for the expedition because it is less agriculturally developed than other parts of Poland (Goral, 1991). Because of the hilly and mountainous terrain of the region, agriculture is still based on traditional methods of cultivation using horsepower and labour intensive operations. This region has a wide range of species-rich, semi-natural grassland that has evolved under various altitude, management and edaphic conditions. With a few exceptions, the soil throughout the region was loam or loam based, deep, light in texture and easily worked by horse drawn ploughs (Table 4). According to landowners the soils were of low mineral status and required fertilizer application. Landowners used organic fertilizer as an integral part of their crop rotation system.

The expedition concentrated on four geographical subregions of the south east, each with different climates and agricultural systems (Fig. 1).

**Regional climate and agriculture**

*Nizina Mazowiecka*. This flat lowland region south of Warszawa (Fig. 1), forms part of the vast north European plain. It lies between 60 m and 200 m above sea level. There is a continental winter with the January mean temperature falling to -2.8 °C and three months with mean temperatures below 0 °C. Snow cover can last up to 80 days per year. Spring is a bright season with many sunny days and gives way to warmer weather with June having a mean temperature