PEAS AND LENTILS

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Contents

Summary

Pea is a widely cultivated crop and is accepted as a model in crop science. Pea is cultivated for its seeds but the other parts of the plant are used in animal feeding.

The protein content of pea seeds is 20-25%; it contains 35-45% starch depending on genotype. The anti-nutritional compound content in pea is relatively low, but before consumption they have to be inactivated.

Dried pea is a valuable protein source for humans and monogastric animals. The dried seeds are processed by industry; pea flour, pea concentrate and isolate are produced by dry and wet technologies. The pure protein and starch fractions are used in the food industry and are applied for non-food purposes.

Pea is the most important legume in Europe; the total production is about 4 million tonnes.

Lentil is a highly nutritious legume crop, which has been cultivated since the beginning of agriculture. Lentils are consumed as human foods. The criteria of lentil commercialization are seed size, seed coat color, cotyledon color and tannin content.

Lentil is cultivated on the Atlantic coast of Europe and Africa, and in the semi-arid regions of Asia.

The protein content of lentil is 25-28%; it is an excellent source of vitamins, minerals and dietary fibre. The average annual production of lentil in 1993 to 1995 was about 2.9 million tons. Developing countries have 87% of the world's lentil producing area.

1. Pea (Pisum sativum L.)

1.1. Introduction

The pea (see Figure 1) is widely accepted in cultivation and useful as a model in crop science. The special characteristics of pea such as the clear dichotomous variation (red-white flower color, smooth-wrinkled seeds, green-yellow pods) and the simplicity of performing crosses (easy to castrate, pollinate and protect against cross-pollination) facilitated Mendel's inheritance studies. The first character described by Mendel was the difference in the shape of seeds, which may be round or wrinkled. The morphologies are controlled by the *r* (rugosus) locus, where recessive alleles produce wrinkled seed and cause reduction in starch content and increase in the proportion of amylose in the starch.

Figure 1. The pea, *Pisum sativum L.*

Some of the characteristics of *Pisum sativum*, such as its diploid nature and small chromosome number (2n=24), as well as the ability to produce inbred lines and the high mutability, proved valuable assets in genetic studies.

Pea crops are cultivated mainly for their seeds, but the vegetative parts of the plant may be used for silage. Peas are consumed in different ways; immature seeds and pods are prepared in home conditions or subjected to freezing or canning. Dry seeds are consumed after soaking and cooking according to home recipes.

1.2. History, Taxonomy and Distribution

History

Pea is one of the most ancient cultivated plants, originating from Asia Minor, the Caucasus area, Afghanistan and Ethiopia.

Peas were cultivated in Neolithic times, and were among the first crops exploited by early man. Presently, mainly hybrids are cultivated, hybridisation begun in England in 1787 by Thomas Knight.

Taxonomy

Four types of pea are cultivated in the world. The round seeded yellow or green seeds with white flowers are used for animal feeding, these genotypes were selected and grown in Europe. The round seeded, colored peas (with tannin content) are widely cultivated in Eastern Europe and Australia. These genotypes are used for animal feeding after cooking and rolling or micronizing. The marrowfat peas are used only for human consumption (mainly for canning and fast-food preparation in the United Kingdom). The chemical composition of marrowfat peas is very similar to round seeded peas, but the seed coat of pea is dimpled and dented. The wrinkled peas are cultivated for human utilization; they are harvested before maturity and processed by the canning industry. The rugosus mutations, which produced the wrinkled seed shape, caused great changes in pea seed composition.

Distribution

Different pea genotypes have been cultivated almost all over the world. The cultivated varieties manifest great variations. The day neutral plants are early maturing varieties; these genotypes are cultivated in Mediterranean countries, Europe, and India. The short day species with reduced leaf size and changed plant structure are mainly cultivated in the hilly regions of Afghanistan, Iran, Syria and North Africa.

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Biographical Sketch

Dr. Ildikó Schuster-Gajzágó was born in 1942 in Budapest, Hungary. He is married with one child. From 1961 to 1966 he attended the Eötvös Lóránd University of Sciences in Budapest, attaining an MSc in Biology. In 1985 he was awarded a University Doctoral Degree and in 1997 a PhD in Biology
From 1967 to 1986 he was a Research Worker at Department of Enzymology at the Central Food Research Institute. From 1986 he was a Research Worker in the Department of Technology at Central Food Research Institute, and from 1997 a Senior Research Worker.
His research activities have focused on the following:
1967-1972. Basic and applied research of enzymes (glucose oxidase, milkclotting enzyme of microbial origin, cellulase).
1972-1986. Study of enzymic browning of fruits (apple, pear, apricot) and establishment of the relationship between PPO activity and endogen substratum content. Study of the inhibition of enzymic browning of fruits. Study of the effect of location and year on polyphenoloxidase-polyphenol content of apple.
1986-1998. Enzymic modification of plant protein. Study of the effect of animal and microbial origin protease enzyme on the colloid properties of modified plant protein. (This program was supported by the EU Copernicus project). Study of antinutritional compounds of legume seed (protease inhibitors and oligosaccharides).
1998-present. Study of health protecting compounds such as glucosinolates and polyphenols of legume seeds and mustard. Determination of polyphenol content and composition as well as antioxidant properties of mustard varieties.