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Protein content of *Lathyrus sativus* collected from diverse locations

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Abstract
Grass pea (*Lathyrus sativus*) is a legume crop having great potential for global food security due to its exceptional tolerance to drought and flooding. It has a very hardy and penetrating root system hence can be grown on a wide range of soil types. Compared with other legumes, it is resistant to many pests including storage insects. This protein-rich legume crop serves as a food source for poor farmers when other crops fail under harsh environmental conditions. Breeding programmes involving genotypes combining high yield with high protein content are going on all over the world. This prompted us to investigate the variation for protein content in our grass pea collection. In the present investigation, 37 local genotypes collected from the different districts of Bihar and adjoining districts of Jharkhand and 3 national checks were subjected for protein estimation by Lowry method. The genotype (IC127616) contains highest protein and the LKH L-15 genotype contains lowest protein. The result of present study led to a conclusion that protein rich variability is present in a genotype and it should be explored further for grass pea improvement programme.

Keywords: Grass pea, protein content,

Introduction
Lathyrus sativus, commonly known as grasspea or as Kesari dal in India has immense potential as a food, feed, fodder and green forage manure. This important crop, (2*n*=14), belongs to the family Leguminosae subfamily Papilionoideae and is the only species widely cultivated as a food crop in the genus *Lathyrus*, whereas other species are cultivated to a lesser extent for both food and forage. It can survive harsh environmental conditions, making the crop suitable for drought prone areas (Massawe *et al.* 2016). A strong and penetrating root system allows grasspea to grow in a wide range of soil types including very poor soils and heavy clays, while its ability to utilize remnant water and soil nutrients makes the species adapted to low or zero inputs (Asmussen and Liston, 1998). In addition, it effectively modulates with *Rhizobium leguminosarum* leaving the soil enriched in nitrogen. Compared with other legumes, grass pea also has better resistance to many pests, including storage insects (Vaz Patto *et al.* 2006). It is the most important grain legume cultivated as one of the cheapest sources of dietary lysine rich protein for the people of low income food deficit countries (LIFDCs) and also as fodder for farm animals (Zhelyazkova *et al*. 2016). When other crops fail due to adverse condition, Grasspea can be the only available food source for the poorest section of the population and sometimes a survival food in times of drought induced famine.

Protein is an important nitrogenous macromolecule composed of amino acids linked together by peptide linkage. Proteins play significant biological function in human as well in plants. These can be analyzed from seeds and other parts of plants such as leaves and stems. Protein synthesis occurs in leaves and green stems and is mobilized into seeds or fruits**.** Pulses constitute an essential part of the Indian diet for nutritional security and environmental sustainability. Grass pea is important pulse crop due to its high protein content 20 to 25 per cent, carbohydrates 55 to 60 percent and rich in calcium as well as iron (Jiao *et al*. 2011a).

Materials and method
Lathyrus genotypes used in this study was collected from different districts of Bihar, Jharkhand and NBPGR, New Delhi. 37 Grasspea genotypes along with three checks were sown in last week of November, 2017 in lines by furrow method on the experimental field of Bihar Agriculture College, Sabour. Plot size for each line was 20×20 cm. And laid out in Randomized Block Design (RBD) with three replications. 5oomg.sample was measured by weighing machine and crushed using phosphate buffer (p^H=7.4) and made up volume 1ml.

Result

The results for protein content in the studied lot of grass pea is summarised in table 1. The protein content for 40 genotypes ranged from 8.6% to 32.2%. These differences in protein content may be due to a combination of genetic and environmental factors. Highest protein content (32.2%) was observed in genotype IC 127616 from the NBPGR, New Delhi and lowest protein content (8.6%) was observed in genotype in the LKH L-15.

Table 1

S. No.	Genotype	Protein (%)
1	Nalanda L-1	23.2
2	Nalanda L-2	23.6
3	Chapra L-1	22.4
4	Lakhisarai L-1	27.4
5	LKH L-2	25.4
6	LKH L-3	22.8
7	Shahebjang local	23.6
8	Shab. Local pahadi	25
9	Shab. local diyara	27.6
10	LKH L-4	23.6
11	LKH L-5	14.2
12	LKH L-6	21.6
13	LKH L-7	15.4
14	Samastipur local	15.4
15	Sabour L-1	15.2
16	Sabour local diyara	14
17	LKH L-8	23.4
18	LKH L-9	15.8
19	LKH L-10	18.6
20	LKH L-11	16
21	LKH L-12	12.8
22	LKH L-13	15.2
23	LKH L-14	15.6
24	LKH L-15	8.6
25	LKH L-16	22.4
26	LKH L-17	21
27	LKH L-18	15.2
28	LKH L-19	26.4
29	LKH L-20	31.6
30	LKH L-21	26.8
31	Ratan	23.4
32	Prateek	23
33	Mahateora	25.6
34	IC 127617	22
35	IC 127625	16.8
36	IC 127616	32.2
37	IC 142561	13.2
38	IC 127619	19.8
39	IC 127690	20.4
40	IC127603	25.4

Discussion

Although the seeds of *L. sativus* has been consumed for centuries as a legume, the plant is not intensively cultivated in India for pulse purpose. Grasspea grown in India but mostly for the purpose of leafy vegetables and animal fodder. Recently, the interest in its cultivation has been increased, but still there are little information on the nutritional value of this legume. The present study investigated differences in protein content in lathyrus genotypes. The data obtained from our analyses emphasized the grasspea seeds has high content of proteins. The analysis of protein was reported first time in the local germplasm of Bihar and adjoining districts of Jharkhand. The result of present study led to a conclusion that protein rich variability is present in a genotype and it should be explored further for grass pea improvement programme.

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