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Analysis of Seed Proteins in Groundnut Cultivars (*Arachis hypogaea* L.)

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ABSTRACT
The seed protein contents and protein banding pattern were studied in commonly cultivated groundnut cultivars. The groundnut cultivars such as ICGV00351, TMV-7, CO-4,CO-6 and TG-374 were used for quantitative and qualitative analysis of seed proteins. The protein contents varied among the different varieties of groundnut. The maximum protein content was observed in CO-6 followed by CO-4, TMV-7, ICGV00351 and TG-374. There was a slight differences in protein content among the different cultivars. All the five cultivars of groundnut were subjected to SDS-PAGE analysis. The results revealed that the variation in total number of bands and MW-Rf values. The maximum number of MW-Rf value was noticed in TG-374 and ICGV00351, and the minimum MW-Rf value was 11 recorded in CO-6 and TMV-7.

Keywords: Seed proteins, Spectrophotometric and Electrophoretic analysis

I. INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an annual warm-season plant of the legume family that originated in South America and groundnut has been cultivated since ancient times. The seeds contain 40-50% oil, 20-30% proteins and are an excellent source of vitamins B. Large seeded varieties are used for roasting and confections and small-seeded types are used for oil. The groundnut meal is rich in protein and can be used as food or feed [1].

Many workers used seed protein electrophoresis for characterization of cultivated and wild species of groundnut [2-9]. The seed storage protein were analysis helps in identification and characterization of diversity in crop varieties, cultivars and their wild varieties and also provides information on phylogenetic relationship of the accession[10-12]. Seed storage protein profiles have also been used to study evolutionary relation of several crop plants [13]. The objective of this study was the estimate the seed storage proteins and know the banding pattern of proteins in some of the commonly cultivated groundnut varieties.

II. MATERIALS AND METHODS

2.1. Seed Material

Five commonly cultivated groundnut cultivars such as ICGV00351, TMV-7, CO-4,CO-6 and TG-374 were obtained from Tamil Nadu Agricultural University, Coimbatore and used as an experimental material.

2.2. Protein Estimation

The protein estimation was carried out by using Lowry *et al.,* (1951).

2.3. SDS-PAGE Analysis:

The Sodium dodcyl sulphate polyacrylamide gel electrophoresis Laemmli, (1970) was followed in this study.

III. RESULTS

3.1. Protein content in different groundnut varieties

The protein content was estimated in seeds of five groundnut varieties. The seed storage protein content was maximum in Co-6 (193mg/g/fw) followed by 187mg/g/fw in ICGV00351. At the same time the protein trend was 176mg/g/fw in TMV-7 and 162 mg/g/fw in CO-6 and 144 mg/g/fw in TG-374. The protein analysis of groundnut seeds indicated the differences among the five varieties (Table- 1).

3.2. SDS - PAGE analysis of seed proteins:

The seed storage proteins were analyzed by SDS-PAGE for all the five varieties. The maximum number of bands observed was 21 for all the varieties. In TMV-7 and Co-6 MW-Rf was 11. But in TG-374 and ICGV00351 recorded highest MW-Rf of 17. At the same time in Co-4 the MW-Rf of 12 was noticed. The following proteins with MW-Rf values of 0.457, 0.642, 0.685, 0.714, 0.785, 0.814, 0.857 and 0.928 were commonly noticed in the all the five varieties. The MW-Rf 0.528 was present in ICGV00351, TG-374 and Co-6 but absent in Co-4 and TMV-7. Like that 0.514

was expressed in ICGV00351, TMV-7 and TG-374 but not found in Co-4 and Co-6. The MW-Rf 0.557, 0.585 and 0.742 were observed in ICGV00351 and TG-374. The MW-Rf 0.342 present in all the varieties except ICGV00351. The MW-Rf of 057, 0.842 and 0.871 recorded in TG-374 but absent in all the four varieties. The MW-Rf of 0.328 and 0.385 were present only in ICGV00351. The MW-Rf 0.900 was expressed in ICGV00351 and Co-6 but not noticed in remaining three varieties. The MW-Rf of 0.971 was present in all the varieties except Co-6.

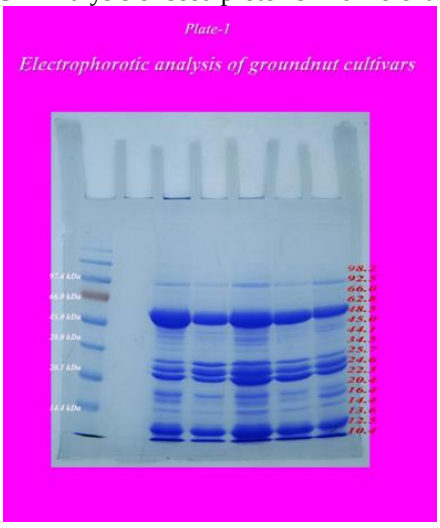
Table -1 Protein content in seeds of groundnut cultivars

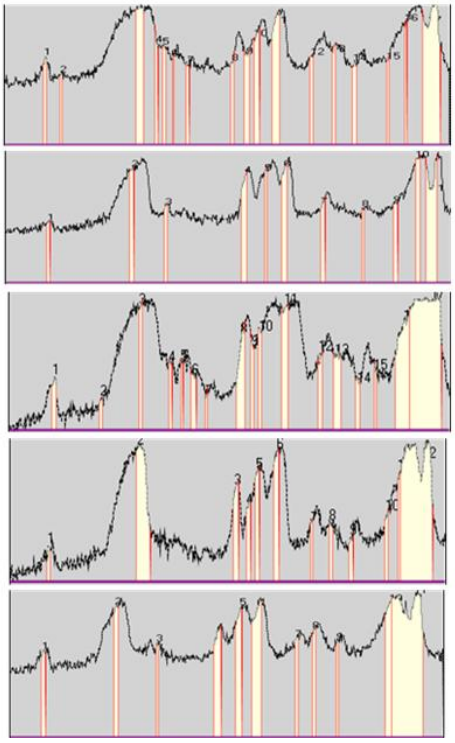
Serial No.	Name of the sample/variety	Protein content mg/g/fw
1	ICGV00351	187
2	TMV-7	176
3	CO-6	193
4	C0-4	162
5	TG374	144

Table :2 Rf Value on different protein bands of groundnut cultivars based on SDS-PAGE

S.NO	Rf-Value	ICGV00351	TMV-7	TG-374	CO-4	CO-6
1	0.328	+	-	-	-	-
2	0.342		+	+	+	+
3	0.385	+	-	-	-	-
4	0.457	+	+	+	+	+
5	0.514	+	+	+	-	-
6	0.528	+	-	+	-	+
7	0.557	+	-	+	-	-
8	0.585	+	-	+	-	-
9	0.642	+	+	+	+	+
10	0.685	+	+	+	+	+
11	0.714	+	+	+	+	+
12	0.742	+	-	+	-	-
13	0.757		-	+	-	-
14	0.785	+	+	+	+	+
15	0.814	+	+	+	+	+
16	0.842	-	-	+	-	-
17	0.857	+	+	+	+	+
18	0.871	-	-	+	-	-
19	0.900	+	-	-	-	+
20	0.928	+	+	+	+	+
21	0.971	+	+	+	+	-

Figure 1- SDS-PAGE Analysis of seed proteins in different groundnut cultivars





Densitogram for seed proteins of different groundnut cultivars

IV. DISCUSSION

The quantitative estimation of seed protein contents showed variations among the five varieties of groundnut. Like that of our present study [14] studied the chemical composition of five varieties of groundnut. They suggested that protein content is genetically controlled. It is also influenced by nitrogen fertilizer application and agronomies practices. Similar studies were reported by [15-17] in bambara groundnut (*Vigna subterranean*)[18]. analyzed the changes in protein contents associated with storage of summer groundnut seeds.

In this research work the seed storage proteins were analyzed by SDS PAGE. The SDS-PAGE technique is mostly thought as a reliable means for the reason that total seed proteins are mainly free of environmental variations [19]. Genetic diversity can be easily evaluated through biological markers [20,21]. Protein types and their diversity varied among a variety of crop species, which may assist us for the early detection of species at seed level and to acquire the information on clarity genetic assets [22]

Seed storage have been used as genetic markers obtained by electrophoresis to resolve the taxonomic and evolutionary problems of several crop plants [23]. Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis (SDS-PAGE) is used due to its validity and simplicity for describing genetic structure of crop germplasm, but its implication has been limited mainly to cereals due to less polymorphism in most of the legumes [24]. Like that of our research work,[25] reported electrophoretic studies on seed protein profile of blackgram, *Vignamungo* (L.) hepper.

In our study, the MW-Rf values were significantly varied among the five varieties of groundnut. The diversity in seed storage protein have been reported by [26] for wheat varieties. According to [27] in mature seeds, the type and amount of proteins are more constant than other plant tissues. So , the SDS-PAGE pattern of seed storage proteins of groundnut showed polymorphism on the basis of difference in protein intensity among the varieties. [28] reported that the presence are absence of protein bands has also been applied for detection of polymorphism of Brassica cultivars.

The present investigation revealed that differences in seed protein profiles. The different groundnut cultivars showed some variations. Similar to our finding the result of differentiation of yellow sarson and brown seeds types of Brassica clearly separated the yellow seeds and brown seeded varieties by SDS PAGE [29].

Like that of our present study, several researchers such as [30,31] reported significant variation among different species of groundnut for seed storage proteins, therefore it is suggested to use different species of groundnut to increase the genetic diversity of the germplasm. [32] reported low genetic diversity in Arachis hypogaea.

V. CONCLUSION

The present study clearly indicated the seed storage proteins in terms of quantitative and qualitative analysis of groundnut cultivars. The MW-Rf values were significantly varied among the cultivars. The presence or absence of MW-Rf values are useful for identification of particular variety of groundnut.

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