



Research Article

SEED GERMINATION AND ITS RELATIONSHIP WITH PROTEIN CONTENTS OF SEED AND SEEDLINGS OF ONION

KARAK C.* AND HAZRA P.

Department of Vegetable Crops, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal 741252, India

*Corresponding Author: Email - totdrck@gmail.com

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Abstract: The study was conducted in the Post Graduate Laboratory of Vegetable Crops, Bidhan Chandra Krishi Viswavidyalaya employing Ten varieties of onion containing ninety seeds of each treatment in 3 replications of 30 each were taken for germination test following the between paper (BP) method (ISTA, 1985) under growth chamber. Ten normal seedlings were selected on the fourteenth days of germination test (i.e., final count day) and their root and shoot lengths were measured in centimetre. The mean seedling root and shoot length was calculated based on ten seedlings. Protein content was estimated from the seeds and the seedlings which grew appreciably within ten days in growth chamber after germination. Analysis of variance clearly suggested wide varietal difference for all the characters viz., protein content of dry seeds (%), protein content of 10 days seedlings % (fresh weight basis), protein content of the seedlings % (dry weight basis), seed germinability (%) and length of seedlings (cm). Mean of the different seed and seedling characters indicated recommended minimum seed germinability (above 60%) in all the variety excepting Nasik Red (56.8%). Very high seed germination is being recorded in two outstanding varieties for its very high seed production potential in this method and climatic condition of West Bengal viz., Agrifound Dark Red (93.4%) and Baswant 780 (97.0%) which indicated close correspondence between seed production ability and seed germinability. Seedling protein content on dry weight basis was lower than recorded in the seeds and it also varied widely from 6.60 % in Agrifound Dark Red to 11.05% in Baswant 780. However, seed germinability also was uncorrelated with both seed and seedling protein content.

Keywords: Germinability, Onion, Seed & Seedling Protein

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Introduction

Germination test of the seeds was carried out following the method using germination paper by the between paper (BP) method under growth chamber [1]. Ninety seeds of each treatment in 3 replications of 30 each were taken for test. The seeds were placed between two moist sheets of paper towel, which were then rolled carefully ensuring no excess pressure is placed on seeds, wrapped in a sheet of butter paper to reduce surface evaporation and placed in a germination chamber at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ in an upright position [Fig-1]. On the tenth day, number of germinated seeds was counted. Ten normal seedlings were selected on the fourteenth days of germination test (i.e., final count day) and their root and shoot lengths were measured in centimetre. The mean seedling root and shoot length was calculated based on ten seedlings. Protein content was estimated from the seeds and the seedlings which grew appreciably within 10 days in growth chamber after germination [2]. Analysis of variance [Table-1] clearly suggested wide varietal difference for all the characters viz., protein content of dry seeds (%), protein content of ten days seedlings % (fresh weight basis), protein content of the seedlings % (dry weight basis), seed germinability (%) and length of seedlings (cm). Mean of the different seed and seedling characters [Table-2] indicated recommended minimum seed germinability (above 60 %) in all the variety excepting Nasik Red (56.8 %). Very high percentage of seed germination could be recorded in two outstanding varieties viz., Agrifound Dark Red (93.4) and Baswant 780 (97.0) for their very high seed production potential in this new seed production method and climatic condition [3]. It indicated close correspondence between seed production ability of the variety and their seed germinability.

Soluble protein content of the dry seeds (average 8% moisture content) varied widely among the varieties ranging between 10.42% in Sukhsagar and 12.44% in Nasik Red [Table-2]. Seedling protein content on fresh weight basis varied widely among the varieties [Table-2]. Seedling protein content on dry weight basis was lower than recorded in the seeds and it also varied widely from 6.60 % in Agrifound Dark Red to 11.05% in Baswant 780 [Table-2]. Seed germinability varied widely among the varieties and it was found highest in Baswant 780 and lowest in Nasik Red [Table-2]. Length of the seedlings also varied widely among the varieties [Table-2]. However, seed protein content did not register any relationship with seed germinability [Table-3]. These two genotype dependent characters have been apparently expressed independently and seed protein content cannot be regarded as an indicator of seed germinability. Lower seedling protein content compared to seed protein content could be explained in the light of exhaustion of stored protein content during metabolic activity which took a spurt at the initiation of germination process and growth of seedlings although, seed germinability was also uncorrelated with seedling protein content [Table-3].

Table-1 Analysis of variance for different seed and seedling characters

Characters	Mean sum of squares	
	Variety	Error
Protein content of the seeds (%)	1.98**	0.14
Protein content of 10 days seedlings (%)	0.07**	0.01
Seed germinability (%)	723.19**	0.40
Seed germinability (Transform value)	412.78**	0.26
Length of seedlings(cm)	8.60**	0.003

**Significant at 0.01 probability level

Table-2 Mean of different seed and seedling characters in the varieties

Variety	Protein content of the seeds (%) #	Protein content of 10 days seedlings (%) §	Protein content of seedlings on dry wt basis (%) ¶	Seed germinability (%)	Seed germinability (Transform value)	Length of seedlings(cm)
N-53	10.71	0.83	9.46	78.49	62.38	5.16
Pusa Red	12.35	-	-	64.16	53.23	-
Sukhsagar	10.42	0.72	7.98	79.44	63.04	4.87
ADR	12.41	0.50	6.60	93.44	75.19	7.84
Baswant-780	11.67	0.89	11.05	97.00	80.08	7.33
Phule safed	11.24	-	-	60.42	51.01	-
ALR	10.96	0.73	8.51	61.63	51.73	6.03
Nasik Red	12.44	-	-	56.79	48.90	3.25
S.E.m (±)	0.22	0.05	0.01	0.37	0.29	0.03
C.D. at 5%	0.66	0.18	0.13	1.11	0.89	0.10

Note: #Average 8% moisture, § Average 94% moisture, ¶ Considering 8% moisture, ADR-Agrifound Dark Red, ALR-Agrifound Light Red

Table 3 Correlation co-efficient of seed and seedling protein content with seed germinability and seedling growth

Component	Protein content of the seeds (%)	Seed germinability (Transform value)
Protein content of the seeds (%)	1.000	r = 0.0005 NS
Component	Protein content of 10 days seedlings (%)	Length of seedlings(cm)
Protein content of 10 days seedlings (%)	1.000	r = 0.074 NS
Component	Protein content of seedlings on dry wt basis (%)	Length of seedlings(cm)
Protein content of seedlings on dry wt basis (%)	1.000	r = 0.005 NS

NS = non-significant



Fig-1 Germination of onion seeds in Growth Chamber employing BP method

Application of research: The Seed germinability and seedling is a genetically controlled character independent of other component of seed

Research Category: Vegetable Crops

Abbreviations:

ADR-Agrifound Dark Red, ALR-Agrifound Light Red

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***Research Guide or Chairperson of research:** Dr P. Hazra

University: Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal 741252, India

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