VARIATION IN SEED QUALITY PARAMERTES OF OFF-SEASON SOYBEANOF DIFFERENT PLANTING DATES AND VARIETIES.

ABSTRACT

The work was carried out to assess the effect of varieties and dates of sowing on seed quality parameters of soybean seed produced during off-season i.e., *Rabi* at Rajendranagar. The seeds of varieties AISb-50, Basara and JS-335 were used for estimation of seed quality parameters which were sown on 15th December and 15th January. The seed quality parameters differed significantly due to dates of sowing and varieties. The treatment sum of squares revealed a significant difference ingermination, seedling vigour index-I, seedling dry weight, speed of germination and fieldemergence, whereas seedling length was non-significant for varieties. While the seedlingvigourindex-IIandelectricalconductivityshowednon-significantvariationintheinteractionbetweenvarietiesanddatesofsowing. The 15th December sown crop showed higher germination (91.11%), seedling length (27.63 cm), seedling vigour index-I (2518), dry weight (95.90 mg), seedling vigour index-II (8713), speed of germination (25.05) and field emergence (89.22%). The variety JS-335 exhibited higher germination (92.83%), seedling length (27.55cm), vigour index I (2558), speed of germination(28.25%), while higher seedling dry weight and vigour index II was exhibited by Basara (94.86 mg and 8097). Theamount of leachates was found in Basara with electrical conductivity of 23.82 $\mu Scm^{-1}g^{-1}$. The interaction between dates of sowing and varieties revealed that the variety JS-335 of 15th December sown exhibited higher germination (95.33%), seedling length (28.43 cm), seedling vigour index I (2711), speed of germination (29.97) among other varieties. The variety Basara of 15th December

sown crop showed higher seedling dry weight (103.93 mg) and seedling vigour index II (8936). The electrical conductivity was higher in case of Basara of 15th January (24.59 $\mu Scm^{-1}g^{-1}$).

KEY WORDS:Germination, seed production, seed quality.

INTRODUCTION:

Soybean(*Glycinemax*L.Merrill)isoneofthemajoroilseedcropsanditisrecognized as pulse as well as oilseed crop. Soybean is known as miracle crop as being arichsourceofprotein,oil,carbohydratesandother nutrientsforhumansandanimals.

India is the fifth majorsoybean growing country in the world and it occupies an area of 12.92 m hectares with aproductionof12.61mtandproductivityof976kgha^{-1}(INDIASTAT,2020-21).Basically, it is a tropical crop but extends to subtropics and temperate climates.Soybean is short day plant and it is grown in a temperature range between 25-45^{o}C. Soybean seed quality deteriorate very quickly due to various constraints. The different varieties of soybean are sensitive to changes in environmental conditions where the crop is being grown (Calvono, 2003). Quality seed is prerequisite for exploiting full potential of crop and it ensures geneticpurity, physical purity, germination (%) and seed vigour (Tatic*etal*.,2012). which resulted in better cropproduction.

Soybeanseed quality is being affected by sowing time and hotter environmental conditions that associateswithlowerseedquality. In order to assess the best dates of sowing and varieties during off-season in Telangana State the present study was taken up to assess the seed quality parameters of soybean seed produced during off-season at Rajendranagar location.

MATERIAL AND METHODS

The experiment was conducted at Rajendranagarwith three varieties *viz*., AISb-50, Basara and JS-335 and two dates of sowing (15th December and 15th January) during *Rabi* 2021-22 at Seed Research and Technology Centre, Rajendranagar.The seed collected from two dates of sowing were used to assess the seed quality parameters. Laboratory experiment was conducted at Seed Research and Technology Center, Rajendranagar in FCRD with three replications. The observations were recorded for germination (%), seedling length (cm), seedling vigour index-I,

seedling dry weight (mg), seedling vigour index-II, speed of germination, field emergence (%) and electrical conductivity (μScm^{-1} g^{-1}).Germination test was conducted as per ISTA using between paper method, the number of normal seedlings were counted on 8^{th} day by following formula.

$$\text{Germination \%} = \frac{\text{Number of normal seedlings}}{\text{Total number of seeds placed}} \times 100$$

And seedling vigour index-I and seedling vigour index-II was calculated as per the formula given by Abdul-Baki and Anderson (1973) and expressed in whole number.

SVI-II = Germination (%) × Seedling dry weight (mg)

SVI-I = Germination (%) × Seedling length (cm)

The data were subjected to statistical analysis as per the method given by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The mean sum of squares disclosed significant differences for germination,seedling length,seedling vigourindex-I,seedling dry weight,seedlingvigour index-II,Fieldemergence among dates of sowing(Table 1). While the germination, seedlingvigourindex-IIandelectricalconductivityshowednon-significantvariationintheinteractionbetweenvarietiesanddatesofsowing.

Significant variation was observed for dates of sowing and varieties with mean variedfrom 88.11% to 91.11% and 85.34% to 92.83% respectively (Table 2 and Figure 1).Among the varieties, significantly higher percent of germination was recorded in JS-335(92.83%)overBasara(85.34%),whileitwasfoundtobeonparwithAISb-50.Germination was significantly high in 15^{th} December (91.11%) over 15^{th} January (88.11%).The higher germination % noticed on 15^{th} December is due to congenial weather conditionsduring the crop period. The significant superiority among the interactions was exhibited byJS-335 of 15^{th} December over Basara of 15^{th} January.

The results on seedling length as influenced by varieties and dates of sowing wererepresentedinTable2.Forthistrait,varietiesshowednon-significantdifferencewhereas fordates of sowing, 15thDecemberexhibited significant superiority (27.63cm)over15thJanuary(25.93cm). Theinteractioneffectswerefoundtobeonparwitheachother except 15th January with Basara. The higher seedling growth in 15th December sowncrops is due to higher test weight or seed size which might due to adequate food reserves toresumeembryogrowth.SimilarreportswerefoundbyDoddagoudar*etal.*(2006)in cotton.

These findings are in conformity with Uem and Unioeste (2003) who reported thatseedsfromoptimumsowing dates had higher percentage of germination than delayedplantingbecauseofmorefavourableclimaticconditionsduringseeddevelopmentinsoybean.

Significant increase in shoot length might be due to higher seed index, which might have supplied adequate food reserves to resume embryo growth. These findings are in accordance with those of Kumar *et al*. (2011) who reported that in niger seed quality parameters like germination percentage and seedling length were observed to be lower in the delayed planting.

The results indicates that the varieties and dates of sowing mean ranged from 2226 to2558 and 2287 to 2518 respectively for seedling vigour index-I (Table 2). The varietyJS-335 (2558) exhibited significant superiority for this trait. Significant difference wasshownbythecropsownon15thDecember(2518)over15thJanuary.Amongtheinteractionseffects,th evarietyJS-
335(2711)of15thDecemberregisteredsignificantsuperioritycomparedtootherinteractionsstudied.Infl uenceofsowingdatesonseedlingdry weightwassignificantatinitialstagewith mean ranges from 799.50 to 959.00 mg, with the highest dry weight in 15th December sowncrop (Table 2). The variety Basara (948.60 mg) showed significant superiority comparedto JS-335 but itwas on par with AISb-50. Among the interactionsthe variety Basara of15th December (1039.30 mg) was found to be significantly high over other interactionsstudiedexceptAISb-50withDecember15thsowing.

Seedling vigour index differed for dates of sowing, varieties and its interactions.Significantly higher vigour index-II was observed in Basara (80968) over JS-335 and incase of dates of sowing 15th December exhibited superiority (87134) over 15th January.The

interaction between dates of sowing and varieties revealed that all the three varieties of 15thDecemberwerefoundtobesignificantlysuperiorwhencomparedtovarieteswith15th January sowing. The highest vigour index was exhibited by Basara of 15th December(89364)whileleastwasobservedinJS-335of 15th January (Table 2). These results are in accordance with the findings of Rahman *et al*. (2013) whoreportedthatoptimumtimeofsowinghadhighvigourindex.

Theresultsrevealedthatforvarietiesthemeansrangedfrom20.85to28.25(Table2)andthevariety JS-335(28.25)showedsignificantlyhigherspeedofgermination compared to other two varieties. Effect of dates of sowing and varieties onspeed of germination revealed that JS-335 of 15th December was found to be significantlysuperioroverotherinteractions.

Thefieldemergence exhibited arange from82.00%to89.22%forthe datesofsowing and 77.70% to 91.00% for varieties (Table 2). The highest andlowestfieldemergencewasobservedinJS-335(91.00%)andBasara(77.70%)respectively. The crop of 15th December recorded significant superiority over 15th January.Alltheinteractioneffectswerefoundtobeonparwitheachotherexcept Basaraof15thJanuarywhichexhibitedlowestfieldemergence.Field emergence recorded to be higher in JS-335 followed by AISb-50, which mightbe due to bold sized seed associated with higher vigour. Similar observations was noticedby Indrakumar*et al*. (2009) who reported that seed size and test weight positively related tofieldemergenceinpea.

Theelectricalconductivityatinitialstagerangesfrom19.07to23.82µScm^{-1}g^{-1}and 20.74to20.82µScm^{-1}g^{-1}fordatesofsowingandvarietiesrespectivelywithgeneralmeanof 20.78 µScm^{-1}g^{-1} (Table 2 and Figure 2). The variety Basara exhibited higher EC,whereas JS-335 (19.07 µScm^{-1}g^{-1}) and AISb-50 (19.47 µScm^{-1}g^{-1}) recorded lower values.Incaseofdatesofsowingthistraitwasfoundtobenon-significant.Amongtheinteractions, Basara of 15th January showed high EC which indicates larger leakage ofleachatesfromseedandpoorquality.

CONCLUSION:

The interaction between dates of sowing and varieties significantly affects the seed quality parameters. The seed of 15th December sown crop is having good seed quality. The variety JS-

335 was found to have good seed quality in most of the traits.Among the interactions the crop sown on 15th December of variety JS-335 showed good seed quality parameters among all the varieties.

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Table 1. Analysis of variance for seed quality parameters of off-season soybean sown at Rajendranagar

Source of variation	Df	Germination (%)	Seedling length (cm)	Seedling vigour index I	Seedling dry weight (mg)	Seedling vigour index II	Speed of germination	Field emergence (%)	Electrical conductivity ($\mu Scm^{-1}g^{-1}$)
Dates of sowing (A)	1	40.50*	13.00*	239662.70**	11452.90**	127660700.00**	0.98	234.72*	0.03
Varieties (B)	2	89.38**	3.31	167341.60**	3320.08**	7640633.00	83.36**	296.05**	41.84**
A × B	2	5.16	8.64*	59513.55*	306.59	3238792.00	10.05*	90.05	9.70
Error (B)	12	6.22	1.51	14411.72	342.95	2558395.00	2.07	41.27	4.36
Total	17	17.89	3.24	50959.63	1342.45	40595310.00	12.51	88.36	9.14

*,** Significance at 5% level

Table 2. Effect of sowing dates and varieties on seed quality parameters of off-season soybean sown at Rajendranagar

Treatment	Germination (%)	Seedling length(cm)	Seedling vigour index I	Seedling dry weight (mg)	Seedling vigour index II	Speed of germination	Field emergence (%)	Electrical conductivity ($\mu Scm^{-1} g^{-1}$)
D_1	91.11	27.63	2518	95.90	8713	25.05	89.22	20.74
D_2	88.11	25.93	2287	79.95	7029	24.58	82.00	20.82
V_1	90.67	26.74	2424	88.86	8057	25.34	88.20	19.47
V_2	85.34	26.07	2226	94.86	8097	20.85	77.70	23.82
V_3	92.83	27.55	2558	80.07	7460	28.25	91.00	19.07
D_1V_1	92.00	26.37	2426	94.23	8668	24.67	90.33	20.89
D_1V_2	86.00	28.10	2417	103.93	8936	20.50	85.67	23.05
D_1V_3	95.33	28.43	2711	89.54	8536	29.97	91.67	18.29
D_2V_1	89.33	27.10	2421	83.48	7446	26.00	86.00	18.04
D_2V_2	84.67	24.03	2035	85.78	7257	21.20	69.67	24.59
D_2V_3	90.33	26.67	2405	70.59	6384	26.53	90.33	19.84
GM	89.61	26.78	2403	87.92	7871	24.81	85.62	20.78
CD @5%								
D	2.56	1.26	123.30	6.01	519.51	1.48	6.60	2.15
V	3.14	1.55	151.01	7.37	636.27	1.81	8.08	2.63
DxV	4.44	2.19	213.56	10.42	899.82	2.57	11.43	3.72
C.V. (%)	2.78	4.60	5.00	6.66	6.43	5.81	7.51	10.05
S. Em.(±)	1.44	0.71	69.31	3.38	292.03	0.83	3.71	1.21
SE.d.	2.04	1.01	98.02	4.78	41.99	1.18	5.25	1.71

D_1- Sown on 15th December **D_2**- Sown on 15th January

V_1-AIsb-50 **V_2**-Basara **V_3**-JS-335

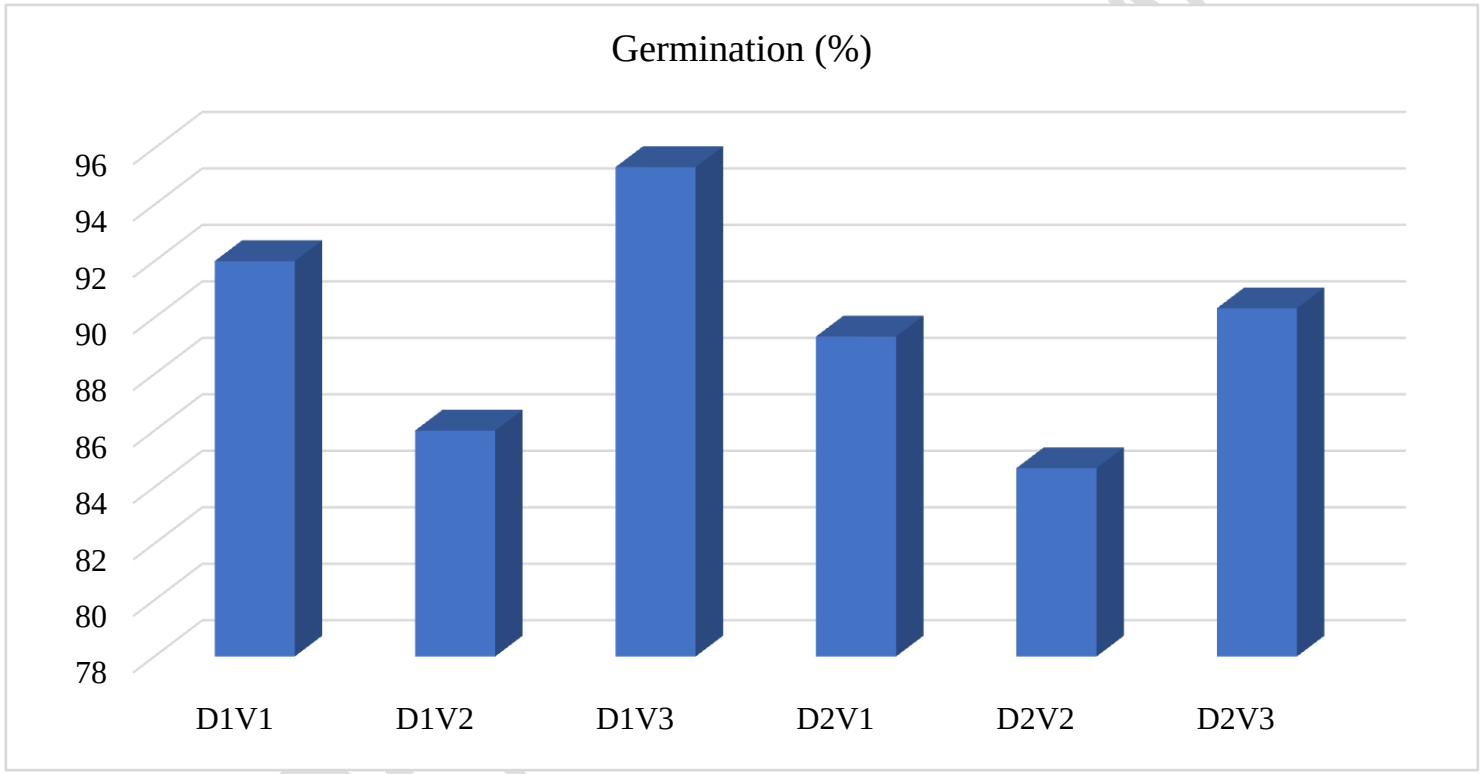

Figure 1.Effect of dates of sowing and varieties on germination (%) ofsoybean seed produced during off-season at Rajendranagar.

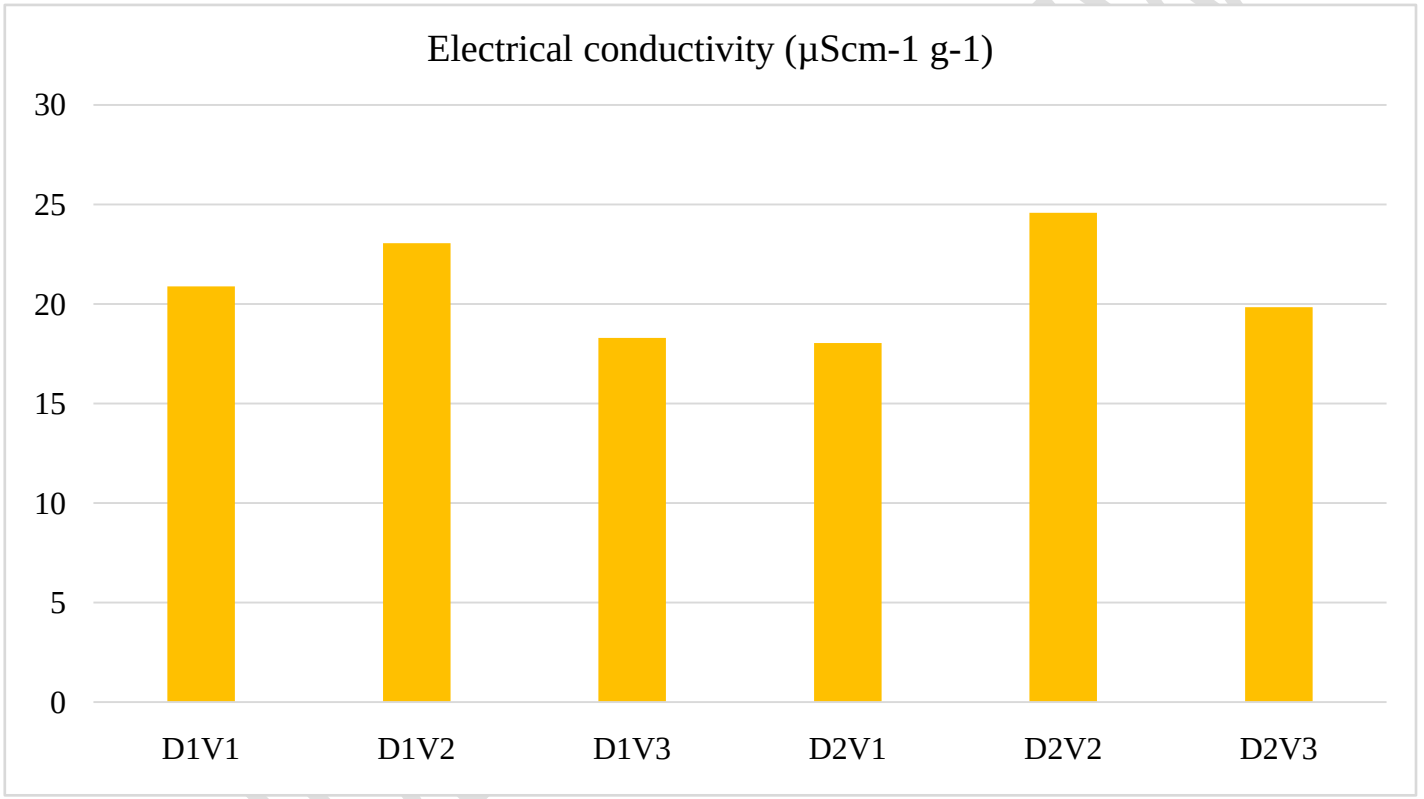

Figure 2.Effect of dates of sowing and varieties on electrical conductivity (µScm^{-1}g^{-1}) of soybean seed produced during off-season at Rajendranagar.