

POTENTIALITY OF SEEDLING ROOT OF CHICKPEA (*CICER ARIETINUM*) SEED DEVELOPED UNDER DEFERENT CULTIVATION PRACTICES

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ABSTRACT

Tillage is dominant thing affecting crop root distribution styles in usage of nutrients from soil for higher crop and crop produce. The mulching impact in cultivation sample produced the optimum magnificence of seed to hold the exceptional popular in garage duration. In assessment of seed storability, the selection criteria associated with maximum promising young root initials developed from number one or secondary root must be supportive for nutrient absorption from rhizospheric area of soil this is strictly adhered to the enhancement of surface area and general root duration. The seedling roots had been beneficial to plant stand as well as nutrient uptake in affiliation of water. The evaluation of high-quality seed production thru characterization of root at storability sample, the Zero Tillage with Mulching at Irrigated (T7) and Rainfed (T10) confirmed most guide in young root development allied to sample of cultivation although a few exceptions were located in average root diameter and higher diameter range of root. Brought average root diameter may be useful to plant stand mainly in stress but nutrient uptake predominantly dependent lower diameter containing younger roots. Therefore, the unique cultivation agenda ought to be integrated in seed manufacturing manual for continuance in first-class of produced seed.

KEYWORDS: Tillage, Root improvement, Zero Tillage, Storability, Cultivation, Rhizospheric Zone.

INTRODUCTION

In crop cultivation, the numerous vegetation predominantly pulses were used in crop rotations with conventional vegetation below Nadia, West Bengal no longer only to lessen diseases, pests, weeds etc., it become tremendous to fulfil the nutritive popularity and meals habit of the neighbourhood populace. Long term rotation of legumes with cereals advances the bodily and chemical houses of soil with properly edition of herbal habitation¹. In practice, the cultivation strategies no longer have completed properly because of inadequate talent and negligence on second crop. In superior agricultural device, best seed was one of the integral commodities in technique of crop or seed production for enhancement in productivity and first-rate of the produce. In seed manufacturing, seed fine is fastidiously interrelated to basic seed source, cultivation methods, environmental repute at seed increase and many others. Consequently, advanced genotypes may not take advantage of their supremacy in absence of appropriate earlier correlated features. In reformed cultivation time table, suitable genotype can get better the position through escalation as high capacity seed this is recognizable with the crop/seed manufacturing inside the

next season. Unexposed genotypic potentiality is allied to absence of harmonious conditions in cultivation that may be achieved in next by formation of poor seed. The seed quality determining indicator, seedling potentiality primarily depends on steady root parameters like overall root duration, floor vicinity, root types, rhizospheric nature etc⁸. Where storability and garage period of seed have a power. Desirable storability of seed can be endured thru most suitable seed increase allied to both inherent capability and fine cultivation agenda. The examine on precise root device can recognize superior seedling useful for confirmation of decisive goal i.e. Improvement of suitable seed in unique cultivation schedule. In scientific literature, the facts regarding keeping of seed high-quality at storage is inadequate especially in performance of seedling roots, even though their most have an effect on at early tiers to hold uniformity and field emergence, the essential features of production. Root facts on any crop can also possibly support the manufacturers to adapt the device of crop rotation with existing useful resource use efficiency because the inclusion of crops with special rooting patterns in a cropping device may additionally settle the water and nutrient use performance. Being enormously

associated with cultivation time table, soil is an crucial a part of the complete global ecosystems, obligatory for maintaining maximum life approaches due to its precise organic composition. Additionally, soil is a crucial supply to encourage the association of root gadget and cultivation sample wherein there are diverse organisms contain in nutrient biking, regulating soil organic matter, and improving plant health essential for growth of fine seed. To prioritise the seedling capability, the prevailing studies goal is characterizing of rooting patterns for qualitative evaluation of seed produced at diverse cultivation time table with emphasising their ability mind-set in storability beneath a crop, chickpea.

MATERIAL AND METHODS

The experiment was conducted at Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal, India (22.94° N altitude, 88.533° E longitude and 9.75m MSL) during 2014-16. Climate in this region is classified as humid region and received 200-400cm rainfall annually. The variable techniques of field trial on crop chickpea (cv. Jg-315) had been executed as treatments to don't forget the seed manufacturing viz. T1- CT (Conventional Tillage) + IR (Irrigated); T2- CT + RF(Rainfed); T3 - ZT (0 Tillage) with five cm Rice Straw + IR; T4 -ZT with 10 cm Rice Straw + IR;T5- ZT with rice straw mulching IR;T6 -ZT with five cm rice Straw + RF; T7- ZT with 10 cm rice straw + RF;T8- ZT with rice Straw Mulching + RF. The freshly harvested chickpea seed of numerous remedies have been saved in ambient condition to judge the storing functionality of seed and these were assessed at 2 months of language (viz. 0, 3, 6, 9, three hundred and sixty five days as M1, M2, M3, M4, M5 respectively) thinking about the seedling root growth crucial for field established order. The variable duration of stored seed of numerous field treatments were assessed at the day of very last rely i.e. 10 das (days after sowing) to categorize the basis characters through glass-plate technique 2. The extended seedling roots below various treatments alongside precise periods had been evaluated thru root picture analyser, win rhizo (seasoned basic std 4800). Computerized evaluation of root characters changed into done the usage of the software of win rhizo (regent tool inc.), which works below home windows via skeletonization approach for measuring the basis parameters1, 3, and 6. The program operated with 256 levels gray-scale pictures in tiff file format, which have been similarly transformed into threshold (binary) and skeleton photos. Threshold pictures were used for evaluation of root diameter, even as root duration becomes measured on so called skeleton images1, 15. Measurements concerned general root period, common root diameter, floor region, in addition to root period measurements as a characteristic of different root diameter instructions. The scanning strategies had been carried out by the use of the flat-bed scanners (Epson Expression/Std 1600 scanner). Absolutely randomized layout (CRD) became utilized for statistical analysis of records related to these activities. The outcomes were

achieved at 1% stage of massive by using the usage of the computer software program gadget, opstat.

RESULT

Better emergence in addition to proper establishment of seedling in discipline function relies upon on seedling energy in which rhizospheric sample play a pivotal function. The number one categorization on rhizosphere at preliminary stage of seedling through root analyzer was valuable for estimating the seedling excellent essential for field establishment. The saved seed settled beneath changed cultivation system have been analyzed to make certain the storability with following root parameters mean treatment outcomes on total root duration (Table 1) indicated a massive variation amongst various treatments wherein T7 (ZT, Mulching, Recommended NPK, IR) and T3 (CT, Recommended NPK, IR) showed great effect followed by means of T4 (CT, Recommended NPK, RF). The possible parameter, outside surface region of overall root gadget particular a nice outcome (Table 1) in existence of different remedies useful for established order of seedlings at early period. High values of T7 (ZT with Mulching, Recommended NPK, IR), T10 (ZT with mulching, Recommended NPK, RF) and T3 (CT, Recommended NPK, IR) reassured seed satisfactory during publicity of root floor supportive to provide energetic plant. For categorization of root system, the common root diameter thinking about total root device was one of the key parameter mainly at early ranges (Table 1) that may promote seedling electricity. T1 (CT, Recommended NPK, IR) and T2 (CT, Recommended NPK, IR) deliberated as highest effect in suggest treatment consequences under years. Root diameter up to one. 5 mm (Table 1) become associated with the occurrence of new roots initials or lateral roots at early seedling level which may be favorable to water uptake as well as some of minerals vital to make a nutritive balance for the seedling. The root duration of this definite diameter may be a sign of top seed with preserving first-class as a mirrored image of modified cultivation pattern. A maximum performance was discovered in T7 (ZT with Mulching, Recommended NPK, IR) and T10 (ZT with Mulching, Recommended NPK, RF) followed by using T3 (CT, Higher NPK, IR) in a vast way considering years treatment suggest. The following step of root diameter from 1.5 to 4.5 mm was similarly constructive in nutrient absorption in addition to setting up the seedlings at early ranges in which specific treatments suggest indicated the sizable variation bearing topmost impact in T1 (CT, Recommended NPK, IR), T4 (CT, Recommended NPK, NIR) and T5 (ZT with 10 cm straw, encouraged NPK, IR). The maximum root diameter (4.5 - > 4. 5 mm) containing root duration was frequently accommodating to preserve the plant stand in soil, at the same time as it could be supportive to take in moisture from distinctive soil layer by means of operating their penetrating functionality. Here, the suggest price of remedies signified a positive variation with greatest effect in T1 (CT, Recommended NPK, IR), T4 (CT, Recommended NPK, NIR) followed by T5 (ZT

with 10 cm Straw, Recommended NPK, IR) among all remedies. In attention of diverse remedy effects, the widespread remedies observed equal pattern in total root period, surface area and lowest diameter containing root that changed into related to newly formed root initials in surface level (lateral roots) or may be as number one or secondary roots mostly in brief length crop. Evaluation of root device for the relaxation i. e. Average diameter and root duration of upper diameters can be supportive to seedling power in subject. The various duration seed storage (Table 2) indicated a good sized disparity with numerous rate of deterioration that become habitually highest in M4 (Eight Months Storage). A significant decline became endured with the development of garage independently in every year. But it become surprising that the price of floor location and root duration of particular diameter (1.5 to 4.5 mm) turned into truly improved in M2 (4 Months) after which decreased typically with development of garage length. The average diameter of the basis progressively deteriorated with the garage series in a sizeable way thinking about suggest fee of both years. In interaction outcomes of remedy 12 months and 12 months garage period additionally indicated equal sample as ordinary imply of remedies and months of garage respectively. Considering interacted values of general factors like range, remedy and month of garage pointed out a non-full-size version wherein values of T7 become top no matter all with only exemption in average diameter. The interaction of treatment-year confirmed same non-great response even though T10 (ZT, Mulching, Encouraged NPK, RF) and T7 (ZT with mulching, advocated NPK, IR) showed highest in Y2 and Y1 respectively. In duration of 0 to 1.5mm diameter containing root, the price of deterioration turned into most in M6 (one year storage) and M5 (10 months) below Y1 and Y2 respectively. The basis length of specific diameter (1.5 to 4.5mm) was slightly accelerated at M3 (6 months garage) and abruptly dropped after that. In main diameter containing root (>4.5mm), the basis period deterioration turned into commence at M4 (eight months) and it changed into persevered after that for each years. In interacted values, the exceptional ranges of interplay proven contradictory technique solely in average diameter though higher diameter containing root period pursued in some cases. The uneven root diameter especially lower type

confirmed non-massive interaction in treatment-year aggregate. The variation within 12 months showed a big isolation with a significant prominence of Y2 (2nd 12 months) (Fig. 1) for substantial root parameters in rhizosphere though trend turned into similar for each year considering each cultivation patterns and storability. In present observation, the quality seed determination during root have a look at at various garage period followed by numerous cultivation agenda turned into pertinent for its comfy association at seed formation and seedling status quo in subsequent season. The root morphology and branching styles have been vital determinants of water and nutrient uptake via flora that may be promoted thru cultivation adaptation 4, 12. The precise root thickness conferred drought resistance, as roots are able to growing root period density and water uptake by way of generating greater and larger root branches at early established order in field 7. The spatial distribution of roots and their density in soil are the essential determinants of the capacity of vegetation to gather the vitamins and water important for growth at later stages¹⁰, 4. In view of precise root characters, seed pleasant may be judged which was developed at exact cultivation time table. In cultivation device, tillage is a element affecting crop root distribution styles by using inducing variations within the soil nutrient repute and its effect on root sharing was obtrusive within the layer laid low with ploughing 8, 9. 0 tillage of ten resulted in the stratification of soil vitamins, specially the immobile factors which include phosphorus, accordingly inducing a higher root period density in the topmost layer may additionally enables the best plant in addition to quality seed progress 3, 6, 8, 10. Roots in 0 tillage system accrued to a extra volume from zero to 5 cm compared with the roots in traditional tillage system 8, 9. The promising rhizospheric nature may additionally have an influential position in very last product i. e. Seed via a qualitative up gradation in phrases of seed storability. Furthermore, primary establishment of seedling for subsequent crop is fully dependent on advanced best seed, potential to hold seed storability. The seed containing appropriate storability turned into best to hold seedling power via perfect rhizospheric sample tremendous to early germination and uniformity that changed into the introduction of precise cultivation time table.

Table1: Study on root parameters of Lentil seed developed in varied cultivation techniques.

ROOT PARAMETERS	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	SE M	LSD (1%)
Total root length (cm)	45.5 7	44.6 8	48.2 4	47.4 2	44.7 2	44.1 8	48.8 2	41.5 0	43.2 1	47.0 7	0.21	0.77
Surface area of root(cm ²)	57.8 0	55.4 8	62.9 9	55.8 7	56.6 5	56.8 5	64.1 1	57.3 8	58.1 1	63.9 0	0.26	0.96
Av. Dia. of Root (mm)	6.60	6.55	6.35	6.51	6.18	6.35	6.12	6.29	6.49	6.14	0.02	0.07
Root length (0-1.5 mm dia.)	25.1 5	24.8 3	26.8 1	24.9 0	24.2 8	23.4 9	27.1 4	24.8 2	25.2 7	27.0 6	0.11	0.4
Root length (1.5-	10.6	10.3	10.1	10.6	10.5	10.3	9.92	10.3	10.1	10.0	0.04	0.14

4.5 mm dia.)	2	2	4	2	8	9		2	5	8		
Root length (above 4.5 mm dia.)	15.54	15.90	15.84	15.75	15.21	15.82	16.35	16.07	16.07	16.13	0.06	0.24

Table2: Deterioration pattern of root parameters during varied storage duration.

ROOT PARAMETERS	M1	M2	M3	M4	M5	M6	SEM	LSD (1%)
Total root length (cm)	64.6	59.5	51.5	39.6	31.0	26.9	0.16	0.59
Surface area of root (cm ²)	67.0	69.6	63.8	60.2	50.5	42.3	0.20	0.75
Av. Dia. of Root (mm)	7.3	6.7	6.4	6.0	6.0	5.8	0.01	0.05
Root length (0-1.5 mm dia.)	31.7	31.1	27.4	25.3	20.7	16.1	0.08	0.31
Root length (1.5-4.5 mm dia.)	11.3	11.8	11.9	9.2	9.6	8.2	0.03	0.11
Root length (above 4.5 mm dia.)	19.4	18.8	19.0	14.5	13.1	10.5	0.05	0.18

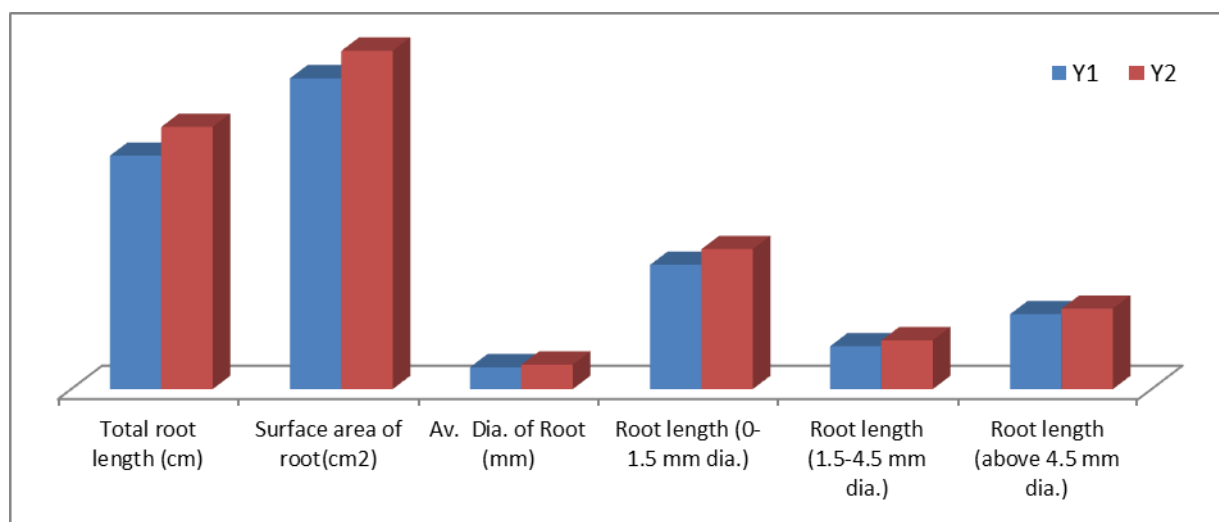


Fig. 1: Performance of root parameters in two different years.

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