ISSN (Online): 2455-7838
SJIF Impact Factor (2016): 4.144

EPRA International Journal of

Research & Development

(IJRD)

Monthly Peer Reviewed & Indexed International Online Journal

Volume:2, Issue:5, May 2017

Published By :
EPRA Journals

SJIF Impact Factor: 4.144 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 2 | Issue: 5 | May | 2017

EFFECT AND APPLICATION OF DIFFERENT CHEMICALS SEED TREATMENT ON SEEDLING DEVELOPMENT DURING SEED GERMINATION IN HYBRID COTTON

Vikhe Amol Chandrakant.S[1]
[1]Seed Testing Division, Department of Quality Assurance, Ajeet Seeds Pvt.Ltd, Chitegaon, Aurangabad

ABSTRACT

Chemicals play an important role in seed treatment act as disinfectants. Many seeds of crops damaged due to the improper seed handling or seed treatment, several chemicals has their own specific ability to kills the infectant micro-organisms present on the seed surface which is causing the decaying the seedling during the germination ;which leads great loss in the seed production; to prevent these problems or to overcome the problems of fungal attack by the various kinds of fungi having their feeding on the seed surface which leads in damaging of seeds during the germination; here we apply the various kinds of chemicals on the Hy.Cotton seeds with different concentrations, the response showed by the chemicals according to their mode of action on the fungal agents which is directly affect and present on the seed surface.

KEYWORDS-*chemicals, seed treatment, seed germination, seedling evaluation*

INTRODUCTION

Cotton (Gossypium spp.) belonging to family malvaceae is major fiber crop growing in kharif season for the commercial as well as economic purpose. The various countries growing the cotton in large quantity for their economic value the five leading exporters of cotton in 2011 are the United, India, Brazil, Australia, and Uzbekistan. The largest nonproducing importers are Korea, Taiwan, Russia, and Japan. In India, the states of Maharashtra (26.63%), Gujarat (17.96%) and Andhra Pradesh (13.75%) and also Madhya Pradesh are the leading cotton producing states; these states have a predominantly tropical wet and dry climate. Global pests of cotton include the pink bollworm, Pectinophora gossypiella; the chili thrips, Scirtothrips dorsalis; the cotton seed bug, Oxycarenus hyalinipennis; the tarnish plant bug, Lygus lineolaris; and the fall armyworm, Spodoptera frugiperda, Xanthomonas citri subsp. malvacearum.

The cotton affected by the various diseases caused by the (micro-organisms) fungi, bacteria, viruses. The micro-organisms are present in soil as well as on the seed surface during the harvesting stage. Large number of fungi which is invisible to our necked eyes attack on the seed surface during harvesting period which further causing the serious diseases to the seedling as well as in plant growth stages upto maturity period.

Advances in seed treatment technology will refine existing treatment strategies and future research should be focused on biological seed treatments in addition to chemical treatment using microbial inoculants as diseases and pests

suppressing and/or seed enhancing materials which will be applied to seeds either alone or in combinations by K.K. Sharma et.al;(2015)

The industry recognizes that seed treatment must provide "added seed value" (e.g. better emergence, higher seedling establishment, improved crop health, higher yields and improved crop quality). It expects seed treatments to be easy to handle and apply to seeds, to complement and protect genetic improvements, to function as part of IPM (Integrated Pest Management), to be safe and cost-effective in use and to reduce personal and environmental risks. Seed treatments, compared to conventional application of crop protection products, offer convenience to the grower, saving time and energy and reducing application efforts.

MATERIALS AND METHODS

Materials

Hybrid seeds of Cotton variety produced at Aurangabad, state of Maharashtra growing in kharif season were selected for Seed treatment.

Method of Seed Treatments

1. 1gm Thiram+1.5gm Seed star,
2. 2ml Seed star,
3. 1gm Thiram+1ml Seed star,
4. 2gm Roar-power+1gm Thiram+1.5ml Seed star,
5. 2gm Roar-power+2ml Seed star,
6. 1gm Roar-power+2ml Seed star.

The control sample of said cotton crop kept for comparison with the concentrations of chemical fungicides.

The various concentrations of different chemicals, viz. Thiram, Seed star, Roar-power were made separately added in a transparent plastic bag containing 250gm of Cotton seed separately and thoroughly mixed by shaking plastic bag until we get uniform mixture. Little amount of water was added and thoroughly mixed in order to facilitate proper coating and the seeds were allowed to dry under shade. The dried treated seed was packed with plastic bags until Use and labeled. Seeds which are treated by above mentioned chemicals once and the untreated seeds were used as control.

Methods

The seeds of cotton variety were used in between paper method of paper treatment.

There were seven Concentrations made for Seed Treatment including Control, each for Thiram, Roar-power, and Seed star.

The three different chemicals were used to determine seed germination and seedling development in between paper method of germination; to compare control with treatments. (I.e. which chemical more vigorous for seed germination in Seed treatment (between paper methods of germination)

The seeds of given Hy. Cotton variety was kept in 4 replications (i.e.100 seeds in each replication) for germination, the trays was kept in Germinator/Germination room at 22 degree temperature. The water is given by Humidifier.

After germination period is over (i.e. after 4 days of germination) the fresh seedlings were counted. The seedlings were counted in five categories (Normal seedlings, abnormal seedlings and fresh seeds, hard seeds, dead seeds). The weight and length of fresh Normal seedlings were measured in gm and cm. respectively(i.e. wt. of plumule, wt. of radical, total wt.(mass),length of plumule, length of radical, total length).

The seedlings after measurement were kept in Oven at 103 degree temperature for 18 hrs for the Dry weight. After 18 hrs the dried seedlings are weighted through the weighing balance. (I.e. dry wt. of plumule, dry wt. of radical) to calculate Vigor index and Mass index. The difference of weight between the initial weight of seedlings and after drying should be calculated.

Procedures

Working sample

Four hundred seeds are counted at random from the well-mixed pure seed. Replicates of 100 seeds are normally used. Spaced sufficiently far apart on the seed bed to minimize the effect or adjacent seeds on seedling development, To ensure adequate spacing, Split replicates of 50 or even 25 seeds may be necessary.

Particularly where there is seed-borne disease. When the seeds are heavily infected it may also he necessary with a paper substrate to change the substrate at an intermediate count. Testing four hundred seeds is recommended on seed law enforcement. Seed certification and service samples

Methodology

BP (Between Papers)

The seeds are germinated between two layers of paper. This may be achieved by loosely covering the seeds with an additional layer of paper or by placing the seeds in rolled towels. The rolled towels are to be placed inside the germinator in an upright position. Subsequent watering should be avoided wherever possible as it is likely to increase the variability between replicates and between tests. Therefore, precautions should be taken to ensure that the substrate may not dry out and that sufficient water is supplied continuously during the test period.

Temperature

Temperature should be as uniform as possible throughout the germination apparatus and care should be taken that the temperature of tests does not exceed the level prescribed and variation due to the apparatus should not be more than ±1°c The lower temperature should usually be maintained for 16 hours and the higher for 8 hours.

Light

The substrate from artificial source or by day light is generally recommended for better seedling development to avoid etiolating and also to detect seedlings having chlorophyll deficiency.

Duration of the Test

The tests lasting 4-10 days Intermediate count's to remove seedlings which are sufficiently well developed are recommended in order to make counting easier to prevent them from affecting the development of other seedlings.

Seedling Evaluation Criteria

Seedlings, which have been reached at particular stage when all essential structures can be accurately assessed, Shall be removed from the test at the first or any other intermediate counts, decayed seedlings should be removed in order to reduce the risk of secondary infection. But abnormal seedlings with other defects should be left on the substrate until the final count.

Categories of seedlings

Normal seedlings

Normal seedling is one which shows the capacity for continued development into mature plant when grown in good quality soil and under favorable conditions of water supply. Temperature and light this capacity for continued development Depends upon the soundness and correct functioning of the developing structures during germination.

Abnormal seedlings

An abnormal seedling is one which does not have the capacity to develop into a normal plant when grown in the soil under favorable conditions because one or more of the essential structures is irreparably defective.

Fresh seeds

Seeds remain as it is after end of test period with none of the essential structures.

Dead seeds

Seeds absorb the water but fail to metabolism due to decaying the food material inside the seed coat and at the end of test period if presses the decaying matters emerge out of the seed.

The result of the germination test is calculated as the averages of 4 x 100 seed replicates is expressed as percentage by number of normal seedlings. The percentage is calculated to the nearest whole number. The percentage of abnormal seedlings, hard, fresh and dead seeds is calculated in the same way.

The germination calculated in percentage by given formula below.

Germination (%) =Total no. of Germinated seed/ Total no. of seed kept for germination x 100

R/S ratio = Total Length of Radical (mean)/ Total Length of Plumule (mean) x 100

Vigour index (Length) = Germination % x Total length (mean)

Vigour Index (Mass) = Germination % × Seedling Dry weight (gm)

Seed Metabolic Efficiency (SME) = Amount of food material respired (RESP) is calculated by RESP = SDW - (SHW + RTW + RSW) Where, SDW= Dry wt of seed before germination, SHW = Dry wt of Shoot, RTW= Dry wt of Root, RSW = Dry wt of seed after germination, **SME =** SHW + RTW/ RESP

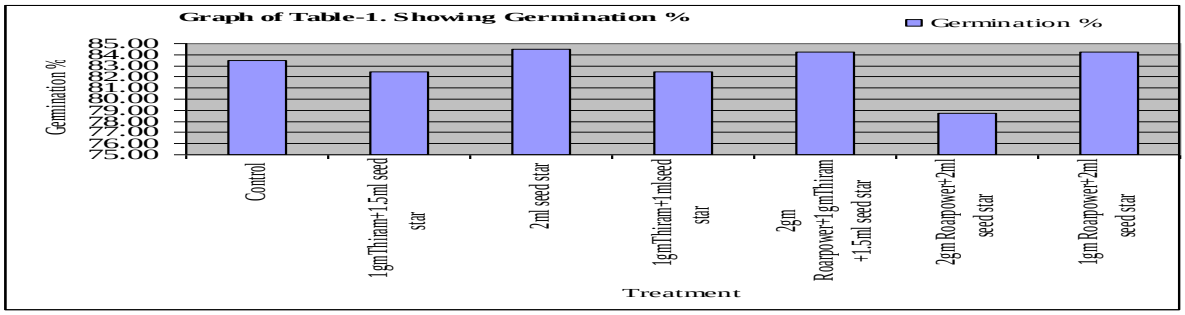
Mobilization Efficiency (M.E.) = Dry wt of seedling/Decrease in wt of cotyledon*100

RESULTS AND DISCUSSIONS

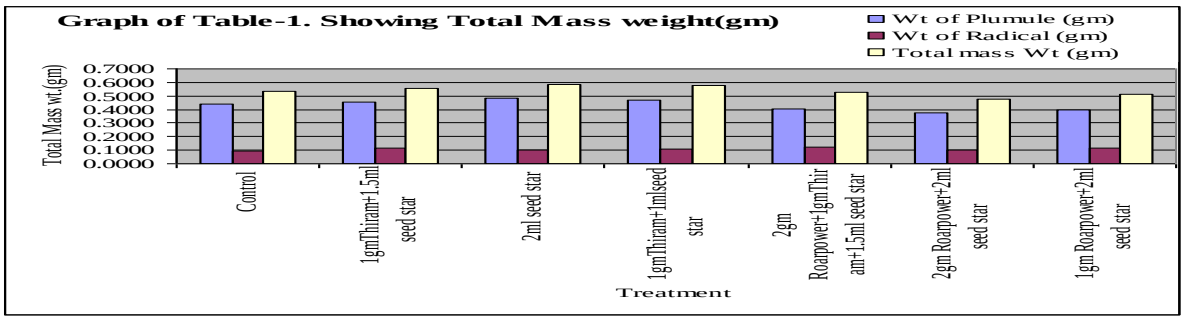
TABLE-1. SEED TREATMENT OF DIFFERENT CHEMICALS ON HY.COTTON

Sr No	Treatment	Germination %	Wt of Plumule (gm)	Wt of Radical (gm)	Total mass Wt (gm)	Length of Plumule (cm)	Length of Radicle (cm)	Total length (cm)	Vigour Index (Length)	Vigour Index (Mass)	Root-Shoot Ratio	Dry wt (gm)	Mobilization Efficiency (ME)	Seed Metabolic Efficiency (SME)
1	Control	83.50	0.4430	0.0910	0.5350	8.2200	9.0040	17.2240	1437.8700	57.0800	109.5300	0.6836	86.9600	0.5670
2	1gmThiram+1.5ml seed star	82.50	0.4580	0.1130	0.5590	9.1760	11.2760	20.4520	1687.1200	58.5900	122.9000	0.7102	87.2300	0.6170
3	2ml seed star	84.50	0.4810	0.1010	0.5820	8.8000	10.5680	19.3680	1635.9200	61.6900	120.0000	0.7301	96.1000	0.6160
4	1gmThiram+1mlseed star	82.50	0.4720	0.1080	0.5800	9.2800	12.0080	21.2880	1755.6000	60.8600	129.3100	0.7378	88.3800	0.6690
5	2gm Roarpower+1gmThiram+1.5ml seed star	84.25	0.4040	0.1210	0.5260	8.3200	12.4440	20.7640	1749.0300	59.4200	149.5100	0.7054	84.0100	0.6240
6	2gm Roarpower+2ml seed star	78.75	0.3730	0.1020	0.4760	6.9320	10.8400	17.7700	1399.3800	49.0500	156.3700	0.6229	66.2400	0.5600
7	1gm Roarpower+2ml seed star	84.25	0.3980	0.1140	0.5130	8.3680	12.1320	20.5000	1727.1200	54.1900	145.0900	0.6433	73.7800	0.5540
±SD		***2.004***	***0.041***	***0.010***	***0.038***	***0.787***	***1.185***	***1.570***	***148.732***	***4.395***	***17.320***	***0.043***	***10.005***	***0.042***
±SE		***0.758***	***0.016***	***0.004***	***0.014***	***0.298***	***0.448***	***0.593***	***56.231***	***1.662***	***6.548***	***0.016***	***3.783***	***0.016***

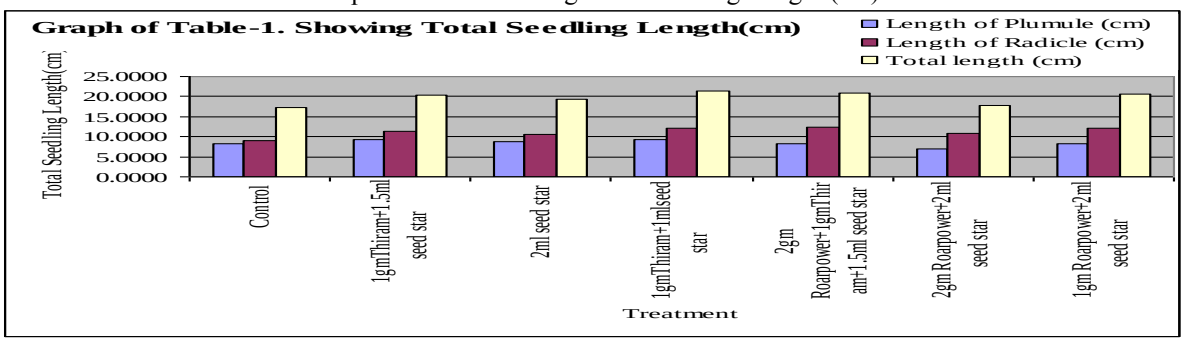
Graph- Table-1.Showing Germination %



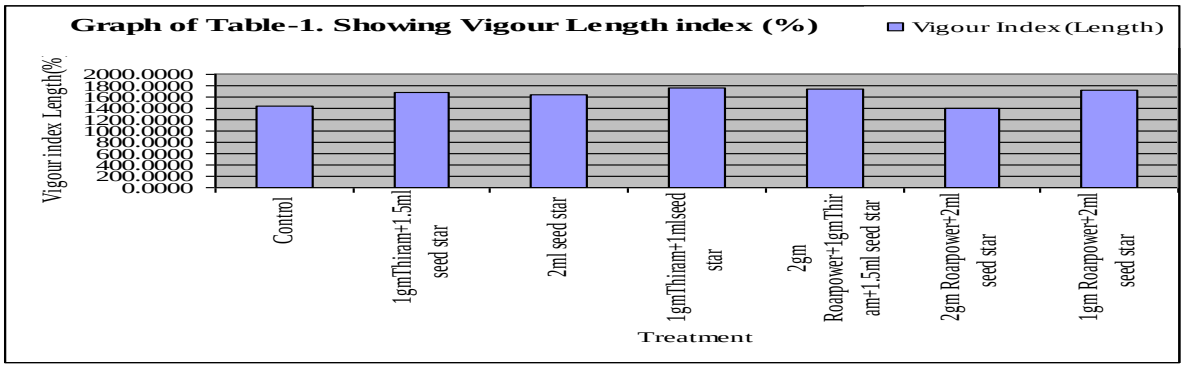
Graph- Table-1.Showing Total Fresh Mass wt. (gm)



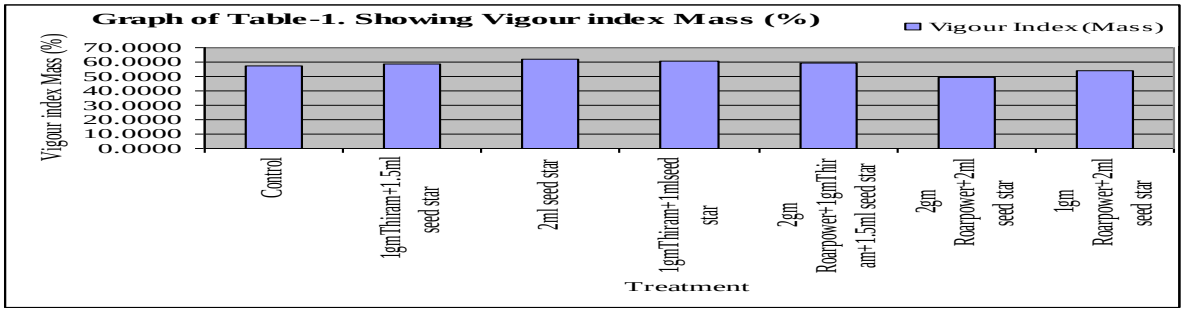
Graph- Table-1.Showing Total Seedling Length (cm)



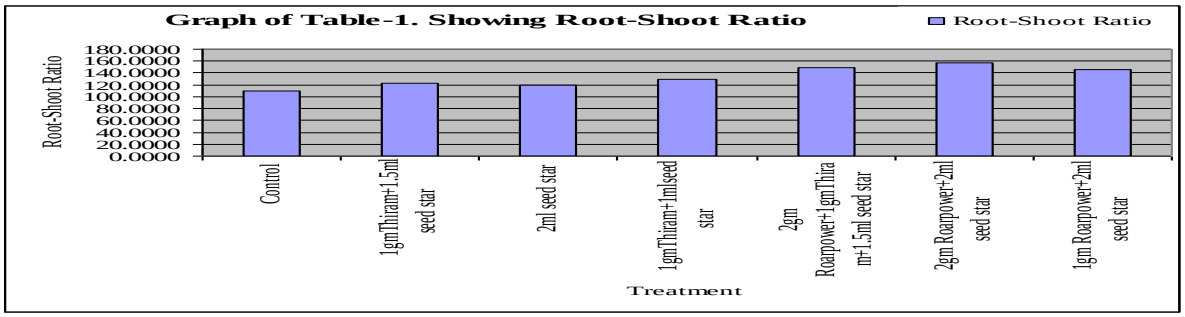
Graph- Table-1.Showing Vigour index Length (%)



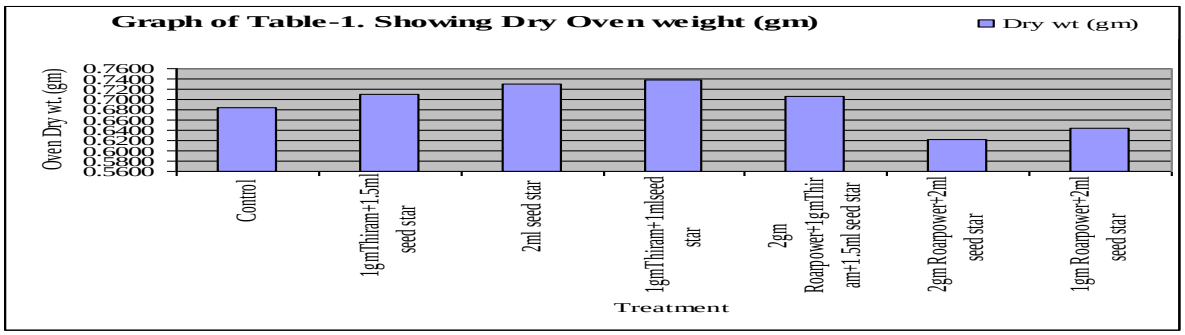
Graph- Table-1.Showing Vigour index Mass (%)



Graph- Table-1.Showing Root-Shoot Ratio



Graph- Table-1.Showing Oven Dry wt. (gm)



DISCUSSIONS

The Seed treatment of three chemicals (Thiram, Roar-power, Seed star) with given concentrations each for tested The Seed treatment 1gm Thiram+1.5gm Seed star, showed 0.5590gm mass wt., 20.4520cm total length, 1687.1200 vigour index length, 58.5900 vigour index mass index, 122.9000 root-shoot ratio, 0.7102gm dry wt., 87.230 mobilization efficiency, 0.6170 seed metabolic efficiency; in 2ml Seed star, showed 0.5820gm mass wt., 19.3680cm total length, 1635.9200 vigour index length, 61.6900 vigour index mass index, 120.0000 root-shoot ratio, 0.7301gm dry wt., 96.1000 mobilization efficiency, 0.6160 seed metabolic efficiency; 1gm Thiram+1ml Seed star showed, 0.5800gm mass wt., 21.2880cm total length, 1755.6000 vigour index length, 60.8600 vigour index mass index, 129.3100 root-shoot ratio, 0.7378gm dry wt., 88.3800 mobilization efficiency, 0.6690 seed metabolic efficiency; more significant stimulating effect on seed germination and seedling development, vigour index (mass, length),root-shoot ratio, dry wt, m.e, s.m.e, ; as that of control.; while Seed treatment of 2gm Roar-power+1gm Thiram+1.5ml Seed showed less effect on seed germination and positive seedling development, vigour index (mass, length),root-shoot ratio, dry wt as compared to control. The 2gm Roar-power+2ml Seed star, showed lower the seed germination % and other parameters except total length and root-shoot ratio found to be positive; in 1gm Roar-power+2ml Seed star, showed the high germination percentage, total length, length index and root-shoot ratio as compare to control.

These results suggest that the some concentrations of chemicals were more effective and significant than Control used for Seed treatment of seed germination and seedling development in between paper method.

CONCLUSION

Seed treatment is an effective on cotton seed in the given study to improve quality parameters with respect to control. The study

reveals that the various concentrations of chemicals acts antimicrobial activity; hence it suggest for further investigations to made the proper suitable concentrations of chemicals for seed treatment and also advise to the followers ,researchers made suitable concentrations during the seed treatments.

All mentioned Results concluded that the several chemicals recorded most significant seed germination, vigour index and other parameters than control recorded less seed germination, vigour index.

The Chemicals has ability to increase or enhance germination % & seedling development. These are available and it can be used as fungicide in combination with each other by making the suitable concentrations or in single for Seed treatment.

REFERENCES

1. *Seed treatments for sustainable agriculture-A review K.K. Sharma*, U.S. Singh and Pankaj Sharma et.al ;(2015): Received: April 2, 2014; Revised received: February 10, 2015; Accepted: April 30, 2015 Journal of Applied and Natural Science 7 (1): 521 – 539 (2015)*
2. *Bayer Crop Science (2014): 6th International Congress of Nematology: Bayer Crop Science aspires to further invest in innovative nematode control tools, held at Cape Town, South Africa on 16 May, 2014. Retrieved: September 5, 2014*
3. *Bel'skii, A.I. and Mazulenko, N.N. (1984): Effects of presowing treatment of barley seeds on the incidence of fungal diseases on the plants. Mikologiya Fitopatologiya, 18: 312-316.*
4. *Bennett, M.A., Grassbaugh, E.M. and Evans, A.E. (2013): Vegetable crop seed vigor and seedling performance. Acta Horticulture, 975: 172-179.*
5. *Bennett, M.A., Fritz, V.A. and Callan, N.W. (1992): Impact of seed treatments on crop stand establishment. Hort. Technology, 2: 345-349.) sd*
6. *Syngenta, Seed Care (2012): Technical Brochure: The FarMore® Technology-Seed Treatment Platform. Retrieved: September 2, 2014*
7. *Syngenta- Research & Development (2009): Syngenta in Switzerland, Facts and Figures, 2009: Increased yields and high quality products. Retrieved: September 2, 2014*
8. *National Cotton Council of America – Rankings. Cotton.org (13 March 2011): Retrieved on 2011-11-27*
9. *"Three largest producing states of important crops", Retrieved 6 April 2008.*
10. *A Tool for Sustainable Agriculture the Seed Treatment and Environment Committee of the International Seed Federation (ISF) 2007.*
11. *Seed Technology (2000): Dhirendra Khare & Mohan Bhale, Scientific Publishers, Jodhpur.*
12. *Seed Technology: Ratanlal Agrawal, Oxford & IBH Publishing CO. PVT. LTD. New Delhi*