International Journal of Medical Science and Clinical Invention 4(12): 3361-3370, 2017
DOI:10.18535/ijmsci/v4i12.07 **ICV 2016: 77.2**
e-ISSN:2348-991X, p-ISSN: 2454-9576

Research Article

Studies in the Effect Some Sulphur and Nitrogen Containing Heterocyclic Compounds on Germination Pattern of Jowar and Chickpea

P. V. Raut[1]*, P. S. Bodakhe[2], S. A. Waghmare[3], D. T. Tayade[4],

[1]Smt Sarda college Anjangaon (Surji), Dist. Amaravati (MS) 444728.
[2]Department of Chemistry, Vidya Bharti Mahavidhyalaya, Amravati 444606.
[3]Ghaulam Nabi Azad Arts, Comm. & Science College, Barshitakli Dist. Akola, (MS) 444401.
[4]Govt. Vid. Institute of Science and Humanities, Amravati (MS) 444606.

Abstract: Present research emphasizes the effect some sulphur and nitrogen containing heterocyclic compounds on germination pattern of jowar and chickpea. Nitrogen containing heterocyclic compounds used Cyanoformamidino-1-phenylimine, 3-Methylimine-5-methylguanidino-1,2,4-thiadiazole, 3-Phenylimine-5-phenylguanidino-1,2,4-thiadiazole, 2-Methyl guanidino-4-methylimine-6-phenylimino-1,3,5-thiadiazine, 2-Phenylguanidino-4-methylimine-6-phenylimino-1,3,5-thiadiazine, 1-Phenyl-2-phenylguanidino-4-methylimine-6-thio-1,3,5-triazine.

Keywords: Jowar, phenylimine, 1,2,4-thiadiazole, 1,3,5-thiadiazine, 1,3,5-thiadiazine, 1,3,5-triazine et

INTRODUCTION:

Agriculture is the science of farming as well as cultivation of the soil for the growing of crops. It is the art and practice of filling the earth to produce crops and rearing animals. Farming is the oversimplification of nature's food ensnare and the rechanneling of energy for human planting and animal consumption. It involves redirecting nature's natural flow of the food web. From the origin and development of human race, human beings are dependence on plant for the essentials of his existence.

The grains, fruits and vegetables have importance in human nutrition as these are rich source of vitamins and minerals. The civilization of any country can be decided on its crop farming. Before farming, human beings are totally dependent on hunting of animals and birds as well as gathering of fruits and berries.

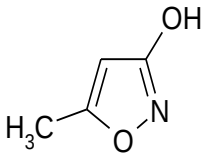
Today the India is almost self-sufficient for the production of food grains, vegetables and fruits. Our greatest achievement is self-sufficient in cereal, food and vegetables. Yet researchers are continuously working for improvement of quality as well as yield of agricultural products due to continuous increase in population.

Historical Development:

At least 10,000 years ago, Indian agriculture engross domestication of crops and animals and it was developed, although even earlier people began altering crop or plant and animals communities for their own benefit through fire- stick farming. Several intellectuals proposed number of theories for explaining the historical development of farming. Early forms of farming are called protofarming.

In the past century agriculture uses of synthetic fertilizers, insecticides and pesticides, selective breeding and mechanization in the developed nations has been characterized as the basis of superior productivity. In the recent era for vegetables and fruits farming new techniques are invented for human consumptions.

History of plant pathology[1-8] is as old as the history of human civilization. In 1996 Randhawa explores the term vegetable which includes all types of foods which have vegetable origin. But the definition now excludes cereals and dried seeds of pulses; however, it includes grain on the cob, potatoes, sweet potatoes and several other tubers. Horticulture is one of the important major branch which includes vegetable production.

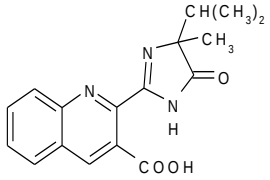


Hymexazole was found to accelerate root and shoot growth of many kinds of plants at seeding stages besides controlling soil borne disease, biological activities[9] were also observed.

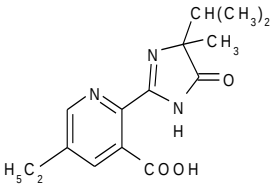
Orton (1900) and Biffen (1905) are the pioneers in the field of genetics. In the beginning of 21st century, scientist started research on plant disease resistance. They worked on control of rusts and wilt diseases of cotton, watermelon, cowpea etc. and developed resistance verities in crops. First antifungal activity of phorate against *Rhizoctonia Solani* in cotton was reported in 1958 by Erwin and Reyonolds[10].

Withenbank[11] studied antimicrobial activities and herbicidal

properties of imazoquin (a) and imazethapyr (b) it also showed pre and post emergence to control grasses and dicot weeds in soyabeans and other leguminous crop.

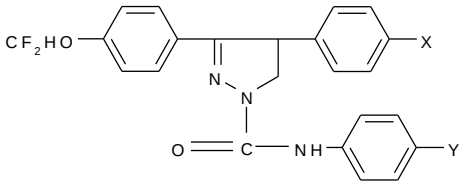


(a)



(b)

In last three decades, we are dependent on the technological developments through new and disquieting problems.



Ozawa *et al*[12] reported insecticidal propertyof1-N-phenylcarbomoyl-3-(4-difluromethoxyphenyl)-4-phenyl-2-pyrazoline and its derivatives.

In the last 15 years it has become more and more evident that the use of pesticides is at best a mixed blessing. Slowly the information has accumulated on the effects of the widespread use of other compounds. Today we know that organochloride e.g. DDT such substances spread throughout our biosphere regardless of the site of applications. Some instances developed resistance to the effect of the poisons some of them got metabolic dependence on it.

Origin of the Work:

Domestication of plant and animals was necessary for the evolution of agriculture and population increase of humans being during the Holocene, which facilitated the evaluation of technically innovative societies[13].

Recently scientists across the globe are emphasizing on an interdisciplinary approach to control plant disease to enhance vegetative growth and to increase the yield. In the field of agricultural sciences the production of containerized vegetable and crops has been reported by Vavrina[14]. Jakabi *et al*[15] synthesized and studied the herbicidal and plant growth regulators activities of substituted 1-(3-pyridinyl)pyrazol-4-glacetic acids.

Bhagwatkar *et al*[16] and Raghuwanshi *et al*[17] studied of triazino and their derivatives on the growth promoting effects on crop plants.

Research on fungi and plant diseases based on long term planning was started in the year 1934 at Imperial Agricultural Research Institute which is situated at Delhi. This institution became mile stone in the field of plant growth and diseases management research.

Literature survey reveals that many heterocycles of each class showed medicinal, pharmaceutical, agricultural, industrial, biochemical and biotechnological applications. By making the use of cyanoguanadine as an intermediate these compounds can be prepared.

Imines, thiocarbamides, 1,3,5-thiadiazines, 1,3,5-triazines and 1,2,4-thiadiazles are an important organic compounds due to its significant, versatile and biological and pharmacological activities various applications and significances in medicinal, pharmaceutical, drug and industrial sciences. In the last four decades the importance of these molecules had been increased due to its most resourceful properties.

Due to the high degree of importance for living beings Jowar and Chickpea is the main food source in the Asian, African and U.S.A. countries. Both show the effect of heterocycles on it. These two were selected for the study important information of these two is as depicted below,

Jowar:

Botanical Name : *Sorghum Vulgare*

Family : *Poaceae*

Sorghum is one of the most important tropical crops in Asia, Africa and America this plant belongs to family of Poaceae. Near about 50% of sorghum is grown directly for human consumption and the rest is used primarily as fodder, alcohol production and industrial products[18]. Medicinal literature survey reveals that in last four decades near about 40% patients of different ages and groups are suffer from diabetic and are under hypertension. Medicinal practiontioners suggest preferring jowar chapatti in meal. Jowar is a member of Sorghum millet.

Now-a-days the demand for sorghum is increases in developing countries. This is due to not only the increasing population but also to policy to enhance its processing and industrial utilization[19] is continuously done by researcher. More than 7000 sorghum varieties have been identified[20]. Generally ungerminated sorghum grains are used for the preparation of porridge and couscous. Malted sorghum is used in the process of local beer ‘dola’, infant porridge and non-fermented beverages.

Jowar grains are very testy and relished by ruler people, particularly by the farming community. It is good for health also. Jowar is a species of sorghum millet cultivated in many part of Asia and Africa. Sorghum is a genus of gealses. The name sorghum is commonly used for sugar producing grass which is the variety *S.Vulgare.* Jowar fodder is also nutritious and commonly fed to farm and diary animals.

Sorghum[21] is a good source of vitamin, notably the vitamin B (thiamine, riboflavin, pyridoxine etc.) and the lip soluble vitamin A, D, E and K. It is also rich in potassium, phosporous, iron and zinc. Various sorghum species are used for food as grain and in sweet sorghum syrup is called molasses more properly to different sweet syrup model as a byproduct of sugar cane of sugar beet production.

Seed analyst may accept morphological change such as protrusion of radical but to grower germination means seedling emergence. Technically germination is the resumption of active growth that results in rupture of seed coat and emergency of seedlings[22]. A seed is an embryo of plant and contain within itself nearly all the materials and energy to start of new plant. To get the most form one's seed at is needful to understand a little about their needs. So, right conditions can be given for successful growth. When a viable seed is wetted, water is taken out, respiration, protein synthesis and other metabolic process and after certain period of time, the embryo emerges from the seed, generally the radical first, the seed has germinated. Germination involves ambition, rapid oxygen uptake and hydrolysis of stored reserves and synthesis of new tissues.

The first process of seed germination requires aspiration of water with cardinal temperatures. The seed germination by Reed and Faris[23-24], Marcy[25-26] germinated sorghum seed in approximately neutral sand at 18^0-23^0C and to moisture contains of 30.

Dormancy is a suspended state of growth or rest conditions that may persist for an indefinite period despite of condition favoring germination.

Tanaka[27] reported a series of pyrimidine compounds showed good pre and post-emergency herbicidal activity towards barnyard grass in Paddy fields and some in Jowar fields. Deshmukh[28] studied substituted pyrrazole and used as ecofriendly herbicides for the control of broad leaved and narrow leaf weeds.

Hassan[29] reported that high tannin sorghum caused a highly significant reduction in the weight gain and feed intake of broiler chicks compared to law tannin sorghum and increased the feed conversion ratio. Salman and Roger[30] prepared 2-(4-pentaflurosulphanyl phenyl) pyrrazoles as insecticides.

Different processing methods have been employed; germination was superior to other processing methods in improving the nutritional and functional qualities of sorghum to improve the nutritive value of cereal grains, tannin extraction[31] and malting. Malting[32-33] increased the protein, lysine and reduced tannin contains of sorghum. Idris[34] reported that malting of low-tannin Sorghum reduced tannin content of seeds. Falfiolu[35] noticed that average weight of growing hens increased with increasing levels of malted sorghum sprout.

In the arid and semi arid region of India where scarify of water is a major problem. Researcher reported faster emergence, more vigorous plants, drought tolerance, earlier flowering and high grain yield in primed seed of various crop species seed priming[36].

Germination induces the synthesis of hydrolytic enzymes, it is important to note that it increases the content of nitro nitrilosides of the grain[38] e.g. starch degrading enzymes and proteases[37]. The breakdown of protease resistant proclaims and the increased availability of the minerals and essential amino acids upon germination have been reported[39-40].The reduction of fatty acid, some flavonoids and proanthocyanides has been observed during [38] germination usually has positive aspects, germination of sorghum is important for the preparation of weaning foods with low paste viscosity and high energy density[41].

Dalve[42] had proposed germinating systems as a mode system for assessing the toxicological potentials of pesticides. Choudhri[43]studied the effect of pesticides on germination and early seedling growth of Rye. Stom[44] studied the effect of polyphenols on shoot and root growth and on seed germination. Borthwick[45], Rollin[46] study the germination of light sensitive seeds. Fratianne[47] study the effect of fumes on germination pattern. The treatment of the seeds with pesticides significantly reduced seed germination, seedling height and root lengths[48]. In the present investigation, an attempt has been made to study the effect of thiocarbamide, dithiazole, thiadiazole and triazine on germination pattern of *sorghum vulgare.*

Chickpea:

Chickpea is also called as Cicer *arientium L. It* is *genus of Cicer, tibe Cicefae,* family *Fabaceae* and subfamily *Papilionaceae.* The name *Cicer* is a Latin word, its origin derived from Greek word *'Kikus'* means force or strength**.** In 1871 Duschak traced the origin of the word to the Hebrew *'Kirkes'* means round[49]. The word 'Arientium' is also a Latin word translated from the Greek word 'Krios'. Furthermore, another name for both ram and chickpea is an allusion to the shape of the seed which similar to the head of the ram[50]. Chickpea is also known as Chana (Hindi), Gram or Bengal Gram (English), garbanzo (Spanish), Kicharor Chicker (German) and Pois Chiche (French). There are two broad types of Chickpea, (1)Desi, (2)Kabuli.

Desi chickpea is coloured, small seeded, angular in shape and more fibrous while Kabuli is beige in colour, large seeded and rams-head shaped having lower fiber content. Desi chickpea is traditionally grown near the equator predominates in South Asia and East Africa.

In India *Cicer arientium L.* was widely cultivated. *Cicer arientium L.* was first domesticated in the Middle East, Mediterranean area and Ethiopia. *Cicer arientium L* is a very important pulse crop that is adapted to deep black soils in the cool semi-arid areas of the tropics, sub-tropics and the temperate areas. *Cicer arientium L.* is the important leguminous food grain in the diets of the people in South and West Asia as well as Northern Africa. Worldwide it is grown on about 10.3 million hectares. In India chickpea is one of the major growing crops, accounts 64%. The other major chickpea producing countries are Iran, Pakistan, Mexico, Ethiopia, Syria and Turkey. *Cicer arientium L.* is generally grown in drought prone areas and it required stored soil moisture rather than rainfall. *Cicer arientium L.* yields tend to those of cereals and other legums cultivated, in more

favorable areas[51].

Cicer arientium L. is nutritive seeds with high protein content (25.3-28.9%)[52] and serves as an economical source of nutrition's food for many poor households. Due to its ability to withstand drought stress, smaller holder farmers in India grow this at the end of the rainy season, by using residual soil moisture. This changes food security for the household and also the nitrogen fixation by the crop enriches soil nutrients for the subsequent cereal crop like wheat that follows in the rotation.

Cicer arientium L. are eaten as green vegetables or added to Salads, condiments and sweets. Flour of seed used as soup, dhal and bread. Dhal is the split chickpea without its seed coat, dried and cooked into a Soup or flavour for snacks and sweetmeats[53]. A small chickpea is used to produce fermented food. In many developing countries it is used as animal feed.

Cicer arientium L. is the hypocholesteremic agent. *Cicer arientium L.* possesses medicinal used to treatment of bronchitis, catarrh, cholera, constipation, diarrhea, dyspepsia, sunstroke and snakebite. Currently there are 7 million tones of chickpeas produced in 45 countries and the crop is made one of the widely grown grain legume in the world.

Germination of seed requires inhibition of water[54] which is the first process of germination with cardinal temperature[55]. Germination of the *Cicer arientium L.* was studied in sufficient details[56-57]. India is a suspended state of growth that may persists for an imprecise period despite conditions favouring germination.

In India lack of water is a major problem in semi-arid as well as temperate regions. The use of industrial effluent has emerged in the recent past as an alternative source of water in these areas[58]. Every type of industrial effluent possess a specific characteristics, hence it may or may not beneficial to plants. Therefore it becomes essential to carry out scientific study of effluent before its use in agriculture. Most of the researchers have investigated the effluent of various industries on seed germination and seedling growth[59-61].

The effect of polyphenols on root and shoot growth for the seed germination is studied[62]. It has been observed that during germination there is a reduction of fatty acid, some flavonoids and proanthocyanides[63]. Bioactive glycosides, terpenoids, cytotoxic (ribosome inactivating) proteins like momorcharin and momordin[64] were detected in plant. Alternaria diseases of vegetable crop and its control is also reported[65]. Several researchers studied the germination of light sensitive seeds[66-67] and effects of fumes[68] on germination pattern. The effect of pesticides on seedling growth and germination was also studied[69]. The treatment to the seed germination, seedling height and root length were carried out by some researchers[70-71].

Aim of Present Work

It was thought interesting to the study synthesized nitrogen and sulphur substituted heterocycles in the context of agricultural crop plants. The review of literature survey, clearly mentioned that nitrogen and sulphur containing heterocycles have a very broad spectrum of growth promoting hormonal effect.

The work presented in this chapter is the study of growth promoting hormonal effect on -

Jowar (*Sorghum Vulgare*) and Chickpea (*Cicer arientium L.)*

Present Work

Scientist across the globe are emphasizing on an interdisciplinary approach to control the plant diseases to enhance vegetative growth and to increase the yield of crops of various types. In the agricultural sciences there is a continuous evolution occurs due to change in the climatic conditions and evolutionary phenomenon of pathogens.

Considering all these facts it was thought interesting to synthesize nitrogen and sulphur containing heterocyclic compounds viz. imines, thiadiazines, triazines, thiadiazoles etc. and were used for seed treatment and to test their growth promoting hormonal effect on Jowar and Chickpea. In this investigation, following six synthesized compounds are used.

1) Cyanoformamidino-1-phenylimine (C1)
2) 3-Methylimine-5-methylguanidino-1,2,4-thiadiazole (C2)
3) 3-Phenylimine-5-phenylguanidino-1,2,4-thiadiazole (C3)
4) 2-Methylguanidino-4-methylimine-6-phenylimino-1,3,5-thiadiazine (C4)
5) 2-Phenylguanidino-4-methylimine-6-phenylimino-1,3,5-thiadiazine (C5)
6) 1-Phenyl-2-phenylguanidino-4-methylimine-6-thio-1,3,5-triazine (C6)

Experimental

Section A - Jowar

Healthy seeds of *sorghum vulgare* were selected for germination. Seeds were sterilized in 0.1% mercuric chloride solution for 2 minutes and it was thoroughly washed with distilled water. Following test solution were prepared and used during the work.

1. Distilled water 0.001 M
2. 0.001 M Cyanoformamidino-1-phenylimine (C1)
3. 0.001 M 3-Methylimine-5-methylguanidino-1,2,4-thiadiazole (C2)
4. 0.001 M 3-Phenylimine-5-phenylguanidino-1,2,4-thiadiazole (C3)
5. 0.001 M 2-Methylguanidino-4-methylimine-6-phenylimino-1,3,5-thiadiazine (C4)
6. 0.001 M 2-Phenylguanidino-4-methylimine-6-phenylimino-1,3,5-thiadiazine (C5)
7. 0.001 M 1-Phenyl-2-phenylguanidino-4-methylimine-6-thio-1,3,5-triazine (C6)

The sterilized seeds of Jowar and chickpea were washed thoroughly with water and 25 seeds were soaked for 6 hours in different test solutions as well as in water as a control.

Then these seeds were washed thoroughly with distilled water and sown in sterile petri dishes on double layer filter paper. The dishes were incubated at 22^0C under dark situation and they were washed with sterile water according to need. The petri dishes were kept moist by periodical addition of distilled water. A control set was similarly run by using distilled water. The germination was recorded every day up to 5 days. Germinated seeds were counted after each 24 hours, seeds with protruding radical and plumules were scored as germinated. The percentage germination and speed of germination index (SGI) were calculated according to given literature method [60].

The morphological parameters like shoot and root lengths[61] were recorded on 5th day to calculate the percentage of germination and vigour index. The experiment was also carried out in control medium.

Formulae used:

1) Speed of germination index= SGI = 4(5g + 4g + 3g + 2g + g)

Where, g = number of germinated seeds after each 24 hour period

2) Vigour Index = % germination [(root length + shoot length)mm]

Effect of synthesized compounds on Germination of *Sorghum Vulgare* (Jowar)

Table No. VIII -1(Day-1)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	0.8	1.6	0.5	2.5	72	180.0
1) C1	1.3	1.4	0.92	2.8	56	156.8
2) C2	1.2	1.2	1.0	2.5	59	147.5
3) C3	0.7	1.0	0.7	1.8	41	73.8
4) C4	0.4	0.5	0.8	1.0	43	43.0
5) C5	1.3	2.2	0.59	3.6	82	295.2
6) C6	1.5	1.8	0.83	3.4	58	197.2

Table No. VIII -2(Day-2)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	1.3	1.6	0.81	2.9	81	234.9
1) C1	2.4	2.4	1.0	4.8	70	336.0
2) C2	2.2	2.3	0.95	4.3	71	305.3
3) C3	1.1	1.6	0.68	2.7	58	156.6
4) C4	1.6	1.5	1.06	3.1	48	148.8
5) C5	1.8	2.2	0.81	4.0	91	364.0
6) C6	2.5	2.7	0.92	5.2	75	390.0

Table No. VIII -3(Day-3)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	1.5	2.0	0.75	3.5	79	276.5
1) C1	2.1	2.4	0.87	4.5	84	378.0
2) C2	1.9	2.2	0.86	4.1	73	299.3
3) C3	0.9	1.9	0.47	2.8	63	176.4
4) C4	1.9	2.0	0.95	3.9	68	265.2
5) C5	2.0	2.6	0.76	4.6	89	409.4
6) C6	2.3	2.7	0.85	5.0	88	440.0

Table No. VIII-4(Day-4)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	2.2	2.5	0.88	4.7	82	385.4
1) C1	2.6	2.6	1.0	5.2	65	338.0
2) C2	2.3	2.5	0.92	4.8	73	350.4
3) C3	2.2	2.0	1.1	4.2	58	243.6
4) C4	2.3	2.1	1.09	4.4	45	198.0
5) C5	2.7	3.1	0.87	5.8	92	533.6
6) C6	2.8	2.9	0.96	5.7	68	387.6

Table No. VIII-5(Day-5)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	3.0	3.6	0.83	6.6	73	481.8
1) C1	3.6	3.1	1.16	7.3	68	496.4
2) C2	2.8	3.0	0.93	5.8	74	429.2
3) C3	2.4	2.7	0.88	5.1	58	295.8
4) C4	2.3	2.6	0.88	4.9	53	259.7
5) C5	3.4	4.2	0.80	7.7	83	639.1
6) C6	3.9	3.4	1.14	7.3	71	518.3

System	% Germination	Germination Index
Control	77	311
C1	68	341
C2	70	306
C3	55	189
C4	52	182
C5	87	448
C6	72	386

Effect of synthesized compounds on Germination of *Cicer arientium L* (Chickpea)Table No. VIII -1(Day-1)
Table No. VIII -1(Day-1)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	1.1	1.1	1.0	2.2	74	162.8
7) C1	1.6	1.6	1.0	3.2	58	185.6
8) C2	1.5	1.4	1.07	2.9	71	205.9
9) C3	1.0	1.2	0.83	2.2	43	94.6
10) C4	0.7	0.7	1.0	1.4	45	63.0
11) C5	1.6	2.4	0.66	4.0	84	336.0
12) C6	1.8	2.0	0.9	3.8	60	228.0

Table No. VIII -2(Day-2)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	1.4	1.8	0.77	3.2	83	265.6
7) C1	2.5	2.6	0.96	5.1	72	367.2
8) C2	2.3	2.3	1.0	4.6	73	335.8
9) C3	1.2	1.8	0.66	3.0	60	180.0
10) C4	1.7	1.7	1.0	3.4	50	170.0
11) C5	1.9	2.4	0.79	3.3	93	306.9
12) C6	2.6	2.9	0.89	5.5	77	423.5

Table No. VIII -3(Day-3)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	1.6	2.2	0.72	3.8	81	307.8
7) C1	2.2	2.6	0.84	4.8	86	412.8
8) C2	2.0	2.4	0.83	4.4	75	330.0
9) C3	1.0	2.1	0.47	2.1	65	136.5
10) C4	2.0	2.2	0.90	4.2	70	294.0
11) C5	2.1	2.8	0.75	4.9	91	445.9
12) C6	2.4	2.9	0.82	5.3	90	477.0

Table No. VIII-4(Day-4)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	2.3	2.7	0.85	5.0	84	420.0
7) C1	2.7	2.8	0.96	5.5	67	368.5
8) C2	2.3	2.7	0.85	4.0	75	300.0
9) C3	2.3	2.2	1.04	4.5	60	270.0
10) C4	2.4	2.3	1.04	4.7	47	220.9
11) C5	2.8	3.3	0.84	6.1	94	573.4
12) C6	2.9	3.1	0.93	6.0	70	420.0

Table No. VIII-5(Day-5)

System	Root Length(cm)	Shoot Length(cm)	Root/Shoot Ratio	Seedling Height	% Germination	Vigor Index
Control	3.1	3.8	0.81	6.9	75	517.5
7) C1	3.7	3.3	1.12	7.0	70	490.0
8) C2	2.9	3.2	0.90	6.1	77	469.7
9) C3	2.5	2.9	0.86	5.4	60	324.0
10) C4	2.4	2.8	0.85	5.2	55	286.0
11) C5	3.6	4.4	0.81	8.0	85	680.0
12) C6	4.0	3.6	1.11	7.6	70	532.0

System	% Germination	Germination Index
Control	79	334
C1	70	364
C2	74	328
C3	57	201
C4	53	206
C5	89	468
C6	73	416

Results and Discussion:

The medicinal literature survey reveals that, in last two decades the patients suffers higher cholesterol percentage in their body are about 40% throughout the world population. And also suffers bronchitis, cholera and diarrhoea like dangerous diseases. Due to these diseases like paralytic and heart attacks become very common throughout the world. The medicinal practitioner gives reason for this, due to change in the life style of the human beings. The people are not aware about their diet and meal. Hence, the medicinal practitioners advised the patients who suffer from this type of diseases take roti of jowar and either soup of chickpea seed flour or dhals of it in their diet. Hence, it becomes prior duty of chemist and agriculturist to investigate such species of jowar and chickpea which have productive value and resist to pathogens.

It is prior duty of chemist to synthesize such type of drugs, insecticides and pesticides which are useful to destroy pathogens and insects which are dangerous to crops. Hence the above work was carried out.

The initial process of plant developments are germination, cell division and seedling growth. In germination seed dormancy could be derived from either tissues enclosing embryo or from the embryo itself. The inhibitory effect of synthetic compound on seed germination is related to the regulation of the endogenous auxin, oxygen supply and seed coat permeability[42].

There is only one synthetic compound having different molar concentrations showed good root/shoot ratio than control systems. The root length and simultaneously shoot length reduced and increased. Hence, it may affect production of substrate for respiration and consequently limited energy production but the resistivity[43-44] of crop increases. As we are interested in synthetic part, but as a wider programme of this laboratory to investigate significances and applications of synthesized compounds for human beings. This attempt was carried out. This study open new doors for the chemist in agricultural field.

References:

1. Mehta P.R., Plant pathology in India- Past, Present and Prospects, Indian Phytopath, 16, **1963**, 1-7.
2. Raychaudhari S.P., History of Plant Pathology in India, Annu. Rev. Phatophol, 10, **1963**, 21-36.
3. Raychaudhari S.P., Development of mycological and plant pathological researchers, education and extension work in India, Rev. Appl., Mycol.,46, **1963,** 577-583.
4. Grover R.K., Plant pathology research in India-An introspection and prospects, pesticides Annual, **1975.**
5. Wareing P.F., Phillips L.D.I., "The Control of Growth and Differentiation in Plants", Second Edition, New York, Pergaman, **1978**.
6. Singha R.S., Plant Diseases, Fifth Edition, Oxford and IBH Publishing Co., New Delhi, **1983**.
7. Singha R.S., Plant Diseases, Seventh Edition, Oxford and IBH Publishing Co., New Delhi, **1983.**
8. Frankine P., Gardner R., Roger B.P.L., Mitchell, "Physiology of Crop Plants", First Edition, **1885**.
9. Takahi Y., Tamita K., Hymexazol a new plant protecting agent, Ann. Sankya Res. Lab., 25, 1973, 1-51.
10. Yesugi Y., Development of Organophophorous Fungicides, Japan Pestic. Inf., 2, **1971,** 11.
11. Withenbank C.S., Fifth International Congress Pestic Chem. Tokyo, Abs.II, C-7, **1982.**
12. Kiyomi O., Yasuyuki N., Makota T., Shigeru I., Masataka H., Masayoshi H., Masaki K., US., 4, 1985, 540,706.
13. Gupta A.K., Amelioration Current Science, 87(1), **2011**, 54-59.
14. Vavrina C.S., Cultural Practice for Vegetables Adopted from Lorenz and Maynard, **1988.**
15. Jakobi H., Ort O., Hills M., Kehne H., Rosinger C., Feucht D., Patent Application Publication (U.S) US, **2009**/0036310A1.
16. Bhagwatkar A.K., Tayade D.T., Orbital Brazi. Elec. J. Chem., 3(1), **2011,** X-2-4.
17. Raghuwanshi M.R., Tayade D.T., Bhagwatkar A.K., Aswale S.R., Canadian Int. J. chemistry, 3(2), **2011**, 74-78.
18. Awika J.M., Rooney L.W., Phytochemistry, 65, **2004**, 1199-1221.
19. Akintayo I., Sedgo J., J. Eds., WASRN/CRISAT,

1999,162.

20. Kangama C.O., Rumei X., Afr. J. Biotech, 4, **2005**, 575-579.
21. Anglani C., Plant foods Hum. Nutr., 52, **1998**, 85-89.
22. Vohl G.J., Pflanzeribau, 14, **1938**, 465-480.
23. Reed, Faris J.A., A.M.J. Bat., 11, **1924**, 518-534.
24. Reed, Faris J.A., American Journal Bot., 11, **1924**, 579-599.
25. Marcy D.E., Bull Torrey Bot. Club, 64, **1937**, 209-228.
26. Marcy D.E., Bull Torrey Bot. Club, 64, **1937**, 245-267.
27. Tanaka K., Tahahashi A., Umeda N., Yamada H., Adachi H., Kawana, Nineth International Congr. Pestic, Chem. Abst., T(1-4) 1C-007, **1998**.
28. Deshmukh M.P., "Synthesis, Antimicrobial, Physicochemical study and effect on crop plant growth of 4-bromo-3-(chlrorary)-5-arylsubstituted-pyrazolines and pyrazoles, Ph.D. Thesis, Sant Gadge Baba Amravati University, Amravati, **2005**.
29. Hassan I.A., Elzubeir E.A., Eltinay A.H., Trop. Anim. Health Prod., 35, **2003,** 189-196.
30. Roger S., Chem. Abstr., 119, **1993**, 3921BW.
31. Musharaf N.A., Latshaw J.D., Sudan J. Anim. Prod., 4, **1991**, 53-64.
32. Shaya N.B., Laswai S.H., Tiisekwa B.P.M., Nnko S.A.M., Gidamis A.B., Njoki P., Inter., J. Food Sci. Nutri., 52, **2001**, 117-126.
33. Okoh P.N., Kubiczek R.P., Njoku P.C., Lyeghe G.T., J. Sci. Food Agri., 49, **1989,** 271-279.
34. Idrix W.A., Hassan A.B., Babikar E.E., Eltinay A.H., Arch. Zootech., 55, **2006**, 361-371.
35. Falfiolu A.O., Oduguwa O.O., Ikeobi C.O.N., Onwuka C.F.I., Arch. Zootech., 55, **2006**, 361-371.
36. Rashid A., Harris D., Hollington P.A., Rafiq M., Centre for Arid Zone Studies, Univ. of Wales, UK., 40, **2004**, 233-244.
37. Dicko M.H., Gruppen H., Traore A.S., Voragen A.G.J., Van Berkel W.J.H., African J. of Biotechnology, 5(5), **2006**, 384-395.
38. Traore T., Mouquet C., Icard-verniere C., Toroxe A.S., Trech, J. Food Chem., 88, **2004**, 105-114.
39. Mazhar H., Chandrashekar A., Moench Central Chem., 70, **1993**, 667-671.
40. Anglani C., Plant food, Hum. Nutr., 52, **1998**, 85-89.
41. Malleshi N.G., Desikachar H.S.R., J. food Sci. Technol, 25, **1998,** 103.
42. Dalvi R.R., Singh B., Salunke, J. Ags, Food Chem., 20(5), **1972**, 1000-1003.
43. Chaudhari U.S., Dixit A.J.,J. Ecotoxicoi, Envioron Monit, 11(4), **2001**, 245-249.
44. Stom D.J., Biologia, Platarum (Praha), 24(1), **1982**, 1-6.
45. Borthwick H.A., Hendricks S.B., Toole E.H., Toole V.K., Bot. Gaz, 115, **1954**, 205-225.
46. Rollin A., Mitrakos P., In phytochrome, Academic press, New York.
47. Fratianne D.G., The Ohio J. of Sci, 74(5), **1974,** 291-295.
48. Prakash N.S., Lakshmi M., Cytologia, 53, **1988**, 709-715.
49. Duschak, M., Zur Botanik des Talmud. I . Neuer, Pest, **1871**, 105-106.
50. Van der Maesen L.J.G., Origin, history and taxonomy of chickpea, **1987,** 11 - 34.
51. Singh F. And Diwakar B., Chickpea botany and production practices, ICRISAT, Patancheru, A.P., India, **1995**, 1-4.
52. Muehlbauer F.J. and Singh K.B., Genetics of chickpea, Wallingford, UK, **1987**.
53. Saxena, M.C., and Singh, K.B., Oxon, UK: CAB Internat ional, eds. Walling ford , **1990** .
54. Vohl G.J., Pflanzenbau, 14, **1938**, 465-480.
55. Amen R., Am.Sci., 51, **1963**, 408-424.
56. Reed, Faris J.A., Am.J.Bot., 11, **1924,** 518-534.
57. Reed, Faris J.A., Am.J.Bot., 11, **1924,** 579-599.
58. Hegde B.A., Patil T.M., Poll.Res., 2(1), **1983**, 37-39.
59. Padhan A., Sahu S.K., J.Environ. and Pollution, 5(4), **1998**, 253-256.
60. Augusthy P.O., Mani A.S., J. Environ. And Pollution, 22(2), **2001**, 137-139.
61. Geetha S., Vemb B., J.Exotoxicol.Environ.Monit., 8(3), **1998**, 183-186.
62. Stom D.J., Biologia Plantarum (Praha), 24(1), **1982**, 1-6.
63. Traore T., Mouquet C., Icard-verniere C., Toroxe A.S., Trech, J. Food Chem.,88, **2004**, 105-114.
64. Ray A., Preserve Article, **2012.**
65. Neeraj, Verma S., Asian J. Expt. Bio. Sci., 1(3), **2010**, 681-692.
66. Rollin P., Mitrakos K., In Phytochrome, Academic Press, N.Y., **1972**, 226-254.
67. Borthwick H.A., Hendricks S.B., Toole E.H. and Toole V.K., Bot.Gaz., 115, **1954**, 205-225.
68. Douglus G.F., The Ohio J. Sci., 74(5), **1974,** 291-295.
69. Chaudhari U.S. and Dixit A.J., J.Exotoxicoi. Environ.

Monit., 11(4), **2001**, 245-249.

70. Dalvi R.R., Singh B. And Salunke, J.Ags.Food Chem., 20(5), **1972**, 1000-1003.
71. Anis M. And Abbasi N., Acta Bot. Indica, 25(2), **1997**, 231-236.