Study the Effect of Treatment of Newly Synthesized *s*-Triazine Derivatives on Germination Pattern of Soybean (Glycine max) and Wheat (Tritium aestivum)

[1] Dr. Gopalkrushana H. Murhekar, [2] Supriya D. Belsare
[1] Assistant Professor, Department of Chemistry, [2] Research Scholar
Organic Synthesis Division, PG Department of Chemistry, Government Vidarbha Institute of Science and Humanities, Amravati (Autonomous Institute), Maharashtra, India-444602
[1] gopalmurhekar@gmail.com, [2] supriyabelsare@gmail.com

Abstract:

Successful germination and seedling development are crucial steps in the growth of a new plant. Seed germination is considered to be the initiation of the first developmental phase in the lifecycle of higher plants and is followed by the postgerminative growth of the seedling. A seed starts to germinate in favorable conditions in response to environmental stimuli such as light, temperature, soil components (especially nitrate), and the molecular mechanisms of a response that have been well characterized. Germination is a complex process during which the mature seed resumes growth and shifts from a maturation to germination-driven programed of development and subsequent seedling growth. During designing research schemes it was decided by us to synthesize such type of molecule in which both pyrazine and amine nucleus, hence ten novel series of s-triazine were synthesized and effects of all compounds were studied on germination of wheat and soybean. Total 10 compounds were tested to study an effect on root length, shoot length, root and shoot ratio, seedling height, and % of germination along with Vigour index.

***Key Words**:* Soybean, *Glycine max*), Wheat, *Triticum aestivum*, Germination, *s*-triazine

I. Introduction:

Agriculture provides the largest share of food supplies and ensures a critical number of ecosystem services. Therefore, agriculture is vital for food security and supports the sustainable development goal. Several studies have been published in different world areas with different research directions focused on increasing food and nutritional security from an agricultural land system perspective. [1]. In the field of agricultural sciences for achieving production of containerized vegetable and crops research was carried out. Growth-promoting action of simazine and other *s*-triazine herbicides was detected by the use of sorghum (Sorghum bicolor [L.I. Moench) callus tissue and the chlorophyll retention test. Soil application of simazine 12chloro-4,6-bis(ethylamino)-*s*-

triazine] at sublethal levels nearly doubled the growth-promoting action of sorghum root exudates. Treated plants yielded up to 26% more total protein than untreated plants. This indicated that the level of callus growth-promoting action in the root exudate of the plant has a positive effect on its final total protein yield and confirms a positive effect of Simazine on total protein content in certain instances. The results may provide a new understanding of the mode of action of *s*-triazine applied at sublethal levels in increasing protein content and certain enzyme activities of treated plants. It is speculated that the growth-promoting action of these herbicides is hormonal in nature and most likely kinetin-like [2].

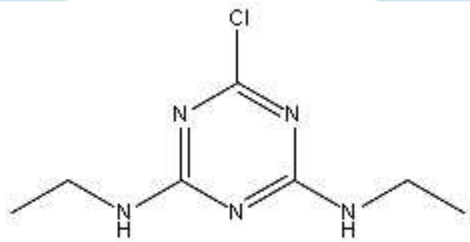


Figure 1: Structure of Simazine

Twenty-nine mercaptotriazinone derivatives were synthesized and their plant growth promoting activities were examined by the rice (Oryza sativa) seedling test in the presence or absence of gibberellic acid (GA3). For high activity in promoting the GA3-induced shoot elongation, an isopropyl or an appropriately substituted phenyl group, a hydrogen atom and a lower alkyl thio group were required in the 1, 3 and 4 positions, respectively of the 1,3,5 triazine2,6-dione structure. In more detailed experiments, 4-methylthio-l-(p-tolyl)-*s*-triazine-2,6-(^{1}H, 3H)-dione, one of the most potent mercaptotriazinones, was found to synergistically promote the GA3-induced elongation of the first and second leaves of rice seedlings. Several mercaptotriazinone derivatives, active or inactive, in the rice seedling test were examined by the radish (Raphanus sativus) leaf disk expansion test, but all of them were completely inactive. Structure-activity relationships of mercaptotriazinone derivatives are discussed in relation to those of the corresponding alkoxy triazinone derivatives [3].

Wheat:

Botanical Name: ***Triticum aestivum***

Family: Poaceae

Wheat is the universal cereal of the Old World agriculture and the world foremost consumed crop plant followed by rice and maize [4]. It is the most widely adapted crop, growing in diverse environments spanning from sea level to regions as high as 4570 m.a.s.l. in Tibet [5]. It grows from the Arctic Circle to the equator, but most suitably at the latitude range of 30° and 60°N and 27° and 40°S [6]. A crop of wheat is harvested somewhere in the world during every month of the year [7]. Wheat is the most traded agricultural commodity at the global level with a trade volume of 144 million tons, with a total value of 36 billion US dollars (2010) data [8]. Many of the developing countries that depend on wheat as a staple crop are not self-sufficient in wheat production, and accordingly, wheat is their single most important imported commodity.

Wheat also accounts for the largest share of emergency food aid [9].

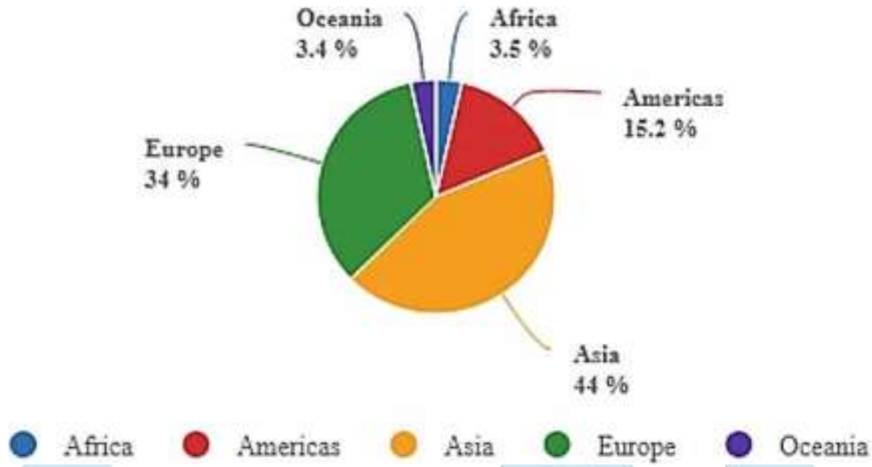


Figure 2: Production shares of wheat by region, TE2018.

Soybean:

Botanical Name: *Glycine max* Family: Poaceae

Soybean (Glycine max L. Merril) is the world's most important seed legume, which contributes to 25 % of the global edible oil, about two-thirds of the world's protein concentrate for livestock feeding. Soybean meal is a valuable ingredient in formulated feeds for poultry and fish. The cultivation and use of soybean could be traced back to the beginning of China's agricultural age. Chinese medical compilations, dating back 6,000 years, mention its utilization for human consumption [10]. To the populace of China, Japan, Korea, Manchuria, Philippines, and Indonesia, for centuries, soybean has meant to be meat, milk, cheese, bread, and oil. This could well be the reason, why in these countries, it has earned epithets like ''Cow of the field'' or ''Gold from soil'' [11]. Owing to its amino acids composition, the protein of soybean is called a complete protein. Its nutrition value in heart disease and diabetes is well known. It is significant that Chinese infants using soybean milk in place of cow's milk are practically free from rickets. Today, USA, Brazil, and Argentina are the ''Big-3'' producers of the world. Versatility of soybean was recognized in the West quite recently. Around 1921, China produced about 80 % of the world's soybean [12].

II. Experimental

Many researchers emphasizing on an interdisciplinary approach to control plant diseases to enhance vegetative growth and to increase yield of crops of various types. Germination is the initial stage in plant life cycle so it was thought interesting to test growth promoting effect of striazine derivatives with substituted amines on wheat and soybean designed this research scheme. In this investigation, following ten synthesized compounds are used.

1) 4,6 - dicchloro-N - (pyridine-2-yl)-1, 3, 5-triazine-2-amine

2) N^2,N^4 - dibenzyl-N^6 -(pyrazin-2-yl)-1, 3, 5-triazine-2,4,6-triamine

3) N^2,N^2,N^4,N^4-tetramethyl-N-(pyrazine -2 -yl)-1,3,5-triazine-2,4,6-triamine

4) N^2,N^2,N^4,N^4-(tetra phenyl)-N^6-(pyrazin-2-yl)-1,3,5-triazine-2,4,6-triamine

5) N^2,N^2,N^4,N^4-tetraethyl-N^6-(pyrazine-2-yl)-1,3,5-triazine-2,4,6-triamine

6) N^2,N^4-dimethyl-N^6-(pyrazin-2-yl)-1,3,5-triazine-2,4,6-triamine anisole

7) N^2-(pyrazin-2-yl)-N^4,N^6-di (pyridine-4-yl) -1,3,5-triazine-2,4,6-triamine

8) N^2,N^4-bis(2-aminophenyl)-N^6-(pyrazine-2-yl)-1,3,5-pyrimidine-2,4,6 triamine

9) N^2,N^4-dimethoxy-N^6-(pyrazine-2-yl)-1,3,5-triazine-2,4,6-triamine

10) N^2,N^4-bis(cyclopropylmethyl)-N^6-(pyrazine-2-yl)-1,3,5-triazine-2,4,6-triamine ***Procedure:***

Solutions were prepared in 40 % ethanol-water mixture. Healthy seeds of wheat and soybean were selected for study. Seeds were sterilized with 0.1% mercuric chloride solution for two minutes and then thoroughly washed with distilled water. Then 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. These dishes were incubated at 22°C under dark situation and they were washed with sterile water according to need. Petri dishes were kept moist by periodical spraying of distilled water on it. Control set were similarly run by using distilled water. Germination was observed and recorded every day up to five days. Germinated seeds were counted after each 24 hours, seeds with protruding radical and plumules were scored as germinated. Percentage germination and speed of germination index (SGI) were calculated according to given literature method. Morphological parameters like shoot and root lengths were recorded on each to calculate percentage of germination and vigour index. Experiment was also carried out in control medium [13-15].

Formulae used:

1) Speed of Germination Index = SGI = 4(5g + 4g + 3g + 2g + 1g)

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

2) Germination ercentage $\frac{\text{Number of total germination seeds}}{\text{Total Number of seed tested}}$ 100

3) oot Shoot atio $\frac{\text{oot dry Weight}}{\text{Shoot dry weight}}$

4) Vigour Index = % Germination [(root length + shoot length) mm] [16, 17]

Effect of synthesized compounds on Germination of Triticum aestivum (wheat)

Table 1: Effect of synthesized compounds on Germination of *Triticum aestivum* (wheat) (Day-1)

System	Root Length (cm)	Shoot Length (cm)	Weight of Dry Root (µg)	Weight of Dry Shoot (µg)	Root/Shoot Ratio	Seedling Height (cm)	% Germination	Vigor Index
Control	0.5	0.5	0.2	0.2	1	1	48	480
Compound 1	0.6	0.4	0.2	0.2	1.5	0.9	68	680
Compound 2	0.7	0.5	0.1	0.3	1.6	1.2	36	432
Compound 3	0.6	0.5	0.2	0.2	2.5	1.2	64	704
Compound 4	0.6	0.4	0.1	0.3	1.3	1.1	56	560
Compound 5	0.5	0.4	0.3	0.3	1.3	1.3	60	540
Compound 6	0.6	0.6	0.2	0.1	1.25	1.4	40	480
Compound 7	0.4	0.5	0.2	0.2	1	1.2	48	432
Compound 8	0.7	0.6	0.1	0.3	1.3	1.3	64	832
Compound 9	0.7	0.6	0.3	0.2	3	1	68	884
Compound 10	0.6	0.6	0.2	0.3	1.6	1.2	64	744

Figure 3: Effect of synthesized compounds on Germination of *Triticum aestivum* (wheat)

Day-1

Table 1 : Effect of synthesized compounds on germination of *Triticum aestivum* (wheat) (Day-2)

System	Root Length (cm)	Shoot Length (cm)	Weight of Dry Root (µg)	Weight of Dry Shoot (µg)	Root/Shoot Ratio	Seedling Height (cm)	% Germination	Vigor Index
Control	0.6	1.0	0.6	0.4	1.5	1.2	56	896
Compound 1	0.8	1.2	0.7	0.4	1.75	1.7	72	1440
Compound 2	0.8	1.2	0.6	0.5	1.2	1.6	44	880
Compound 3	0.6	1.2	0.8	0.6	1.3	1.6	68	1224
Compound 4	0.7	1.3	0.7	0.4	1.75	1.8	68	1360
Compound 5	0.8	1.1	0.6	0.3	3	2.3	68	1292
Compound 6	0.8	1.0	0.8	0.5	1.6	2.2	60	1080
Compound 7	0.7	1.3	0.7	0.4	1.75	1.6	72	1440
Compound 8	0.9	1.2	0.6	0.5	1.2	2.4	68	1428
Compound 9	0.9	1.2	0.7	0.5	1.6	2.6	68	1428
Compound 10	0.8	1.0	0.7	0.4	1.75	2.3	64	1152

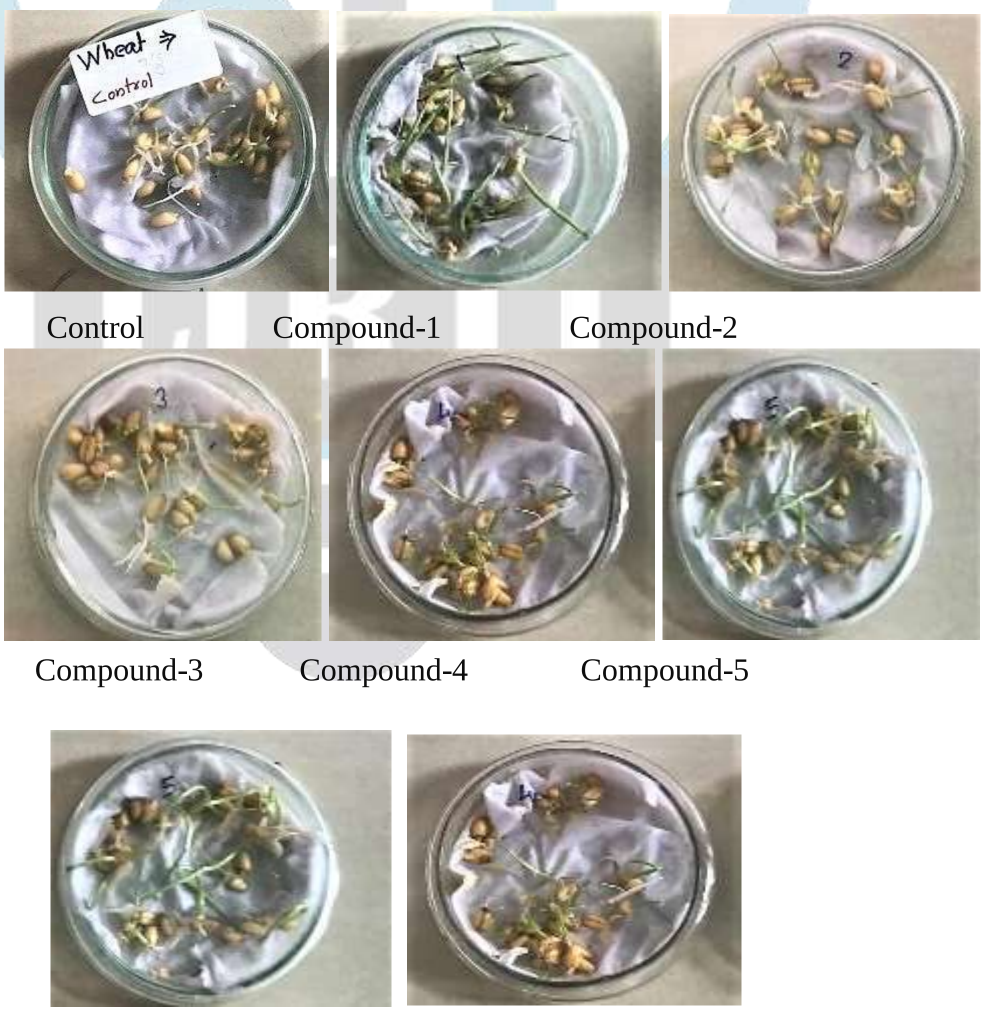


Figure 4: Effect of synthesized compounds on germination of *Triticum aestivum* (wheat) Day-2

Table 2 : Effect of synthesized compounds on germination of Triticum aestivum (wheat) (Day-3)

System	Root Length (cm)	Shoot Length (cm)	Weight of dry root (µg)	Weight of dry shoot (µg)	Root/Shoot Ratio	Seedling Height (cm)	% Germination	Vigor Index
Control	1.1	1.4	0.8	0.8	0.50	2.5	60	1500
Compound 1	2.1	1.6	0.7	0.8	0.56	3.7	76	2812
Compound 2	2.0	1.6	0.8	0.7	0.52	3.6	56	2016
Compound 3	1.3	2.0	0.9	0.9	0.57	3.3	72	2376
Compound 4	1.4	2.4	0.6	0.8	0.71	3.8	72	2736
Compound 5	2.1	2.8	0.8	0.7	0.70	3.9	68	2652
Compound 6	2.0	2.2	0.8	0.9	0.60	4.2	64	2688
Compound 7	1.2	2.2	0.9	0.6	0.58	3.4	68	2448
Compound 8	2.0	3.4	0.9	0.7	0.75	4.8	76	4104
Compound 9	2.4	2.8	0.8	0.6	0.14	4.2	68	3536
Compound 10	2.2	2.6	0.9	0.7	0.84	3.8	72	3456

Control

Compound-1

Compound-2


Compound-3


Compound-4


Compound-5


Compound-6


Compound-7


Compound-8

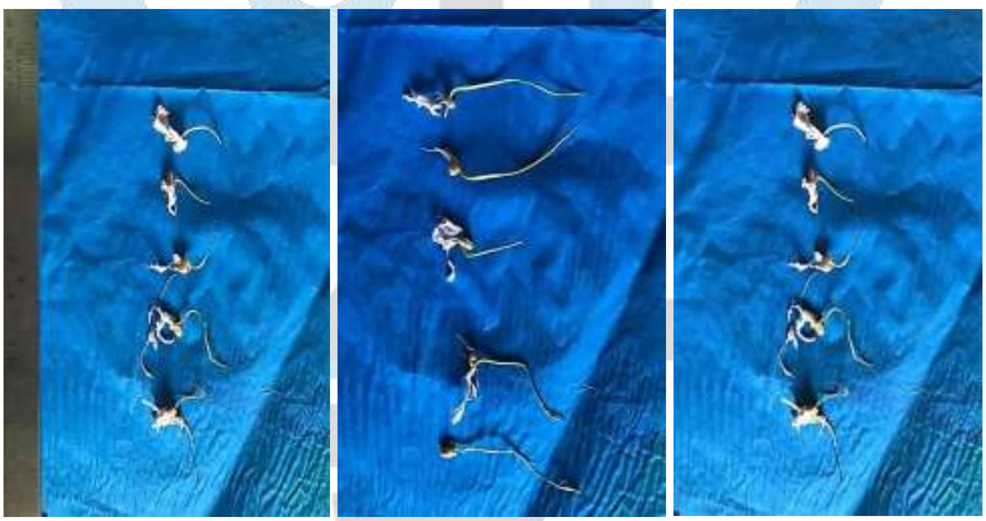

Compound-9


Compound-10

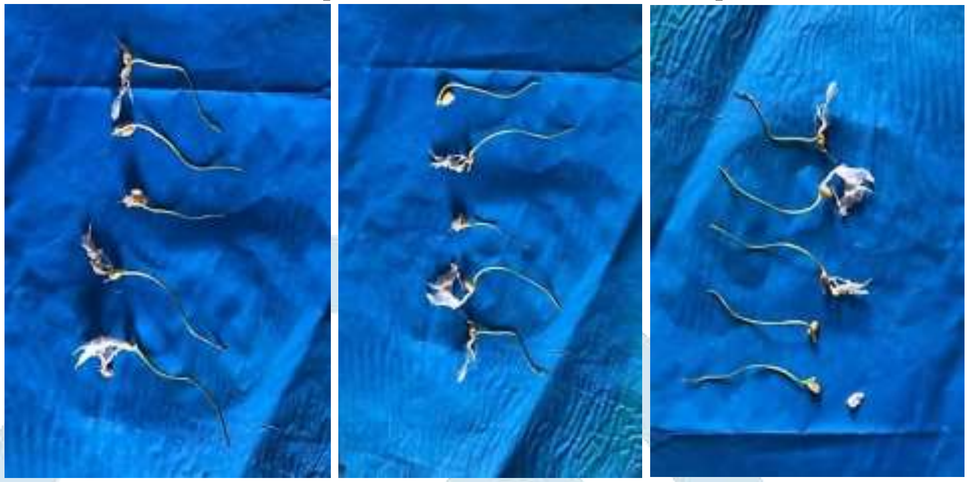
Figure 5: Effect of synthesized compounds on germination of Triticum aestivum (wheat) Day-3

Table 3: Effect of synthesized compounds on Germination of *Triticum aestivum* (wheat) Day-4

System	Root Length (cm)	Shoot Length (cm)	Weight of dry root (μg)	Weight of dry shoot (μg)	Root/Shoot Ratio	Seedling Height (cm)	% Germination	Vigor Index
Control	1.5	2.0	1.4	1.2	0.54	3.5	68	2380
Compound 1	2.6	2.8	1.3	1.0	0.64	5.4	76	4104
Compound 2	2.6	2.2	1.1	1.4	0.57	4.8	64	3072
Compound 3	1.8	2.6	1.2	1.3	0.57	4.4	76	3344
Compound 4	2.0	3.0	1.1	1.3	0.75	5.0	76	3800
Compound 5	2.1	3.4	1.4	1.1	0.69	5.0	80	4000
Compound 6	2.6	3.0	1.2	1.4	0.60	5.6	72	4032
Compound 7	2.3	2.5	1.3	1.4	0.66	4.8	76	3264
Compound 8	2.6	3.4	1.1	1.1	0.74	5.2	80	4800
Compound 9	2.8	3.0	1.4	1.3	1.07	4.4	72	4060
Compound 10	2.4	2.8	1.4	1.3	1.07	4.2	76	3952



Control Compound-1 Compound-2



Compund-3 Compound-4 Compound-5

Compound-6 Compound-7 Compound-8

Compound-9 Compound-10

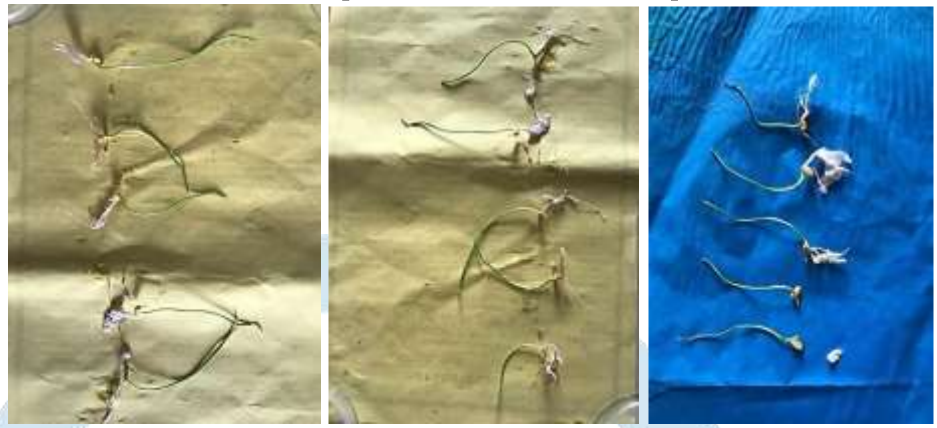
Figure 6: Effect of synthesized compounds on Germination of *Triticum aestivum* (wheat) Day-4

Table 4 : Effect of synthesized compounds on Germination of *Triticum aestivum* (wheat) (Day-5)

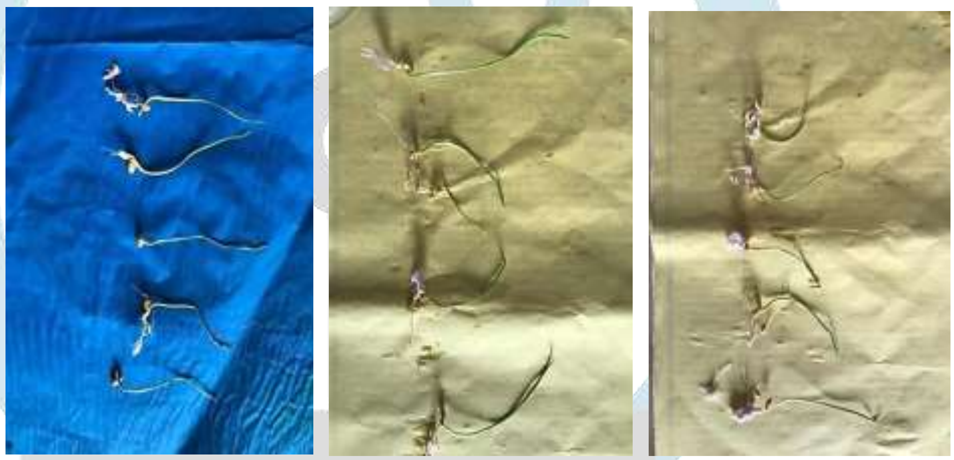
System	Root Length (cm)	Shoot Length (cm)	Weight of dry root (µg)	Weight of dry shoot (µg)	Root/Shoot Ratio	Seedling Height (cm)	% Germination	Vigor Index
Control	1.8	2.3	2.0	1.7	0.58	4.1	76	3116
Compound 1	2.8	2.7	2.1	1.6	0.71	5.5	88	4840
Compound 2	2.6	2.4	2.1	1.7	0.57	5.0	68	3400
Compound 3	2.3	3.8	1.9	1.7	0.63	6.1	80	4880
Compound 4	2.6	3.3	1.8	1.9	0.79	5.9	84	4956
Compound 5	2.9	3.8	1.9	1.8	0.70	5.7	88	5016
Compound 6	2.8	3.3	2.1	1.5	0.63	6.1	84	5124
Compound 7	2.6	3.4	2.0	1.7	0.65	6.0	80	4800
Compound 8	2.8	3.7	1.9	1.7	0.83	6.5	92	5980
Compound 9	2.9	3.8	1.9	1.8	1.05	6.0	74	4958
Compound 10	2.6	3.4	1.9	1.6	1.18	5.8	80	4800



Control Compound-1 Compound-2



Compound-3 Compound-4 Compound-5



Compound-6 Compound-7 Compound-8

Compound-9 Compound-10

Figure 7: Effect of synthesized compounds on Germination of *Triticum aestivum* (wheat) Day-5

Table 5 : Result for Germination Index of Wheat

System	Germination Index
Control	992
Compound 1	1184
Compound 2	888
Compound 3	1120
Compound 4	1132
Compound 5	1160
Compound 6	1068
Compound 7	1104
Compound 8	1208
Compound 9	1056
Compound 10	1112

Effect of synthesized compounds on Germination of Glycine max (Soybean)

Control Compound-1 Compound-2

Compound-3 Compound-5

Figure 8: Effect of synthesized compounds on Germination of *Glycine max* (Soybean) Day-1 Compound-4

Compound-6 Compound-7 Compound-8

Compound-9 Compound-10

Figure 9: Effect of synthesized compounds on Germination of *Glycine max* (Soybean) Day-2

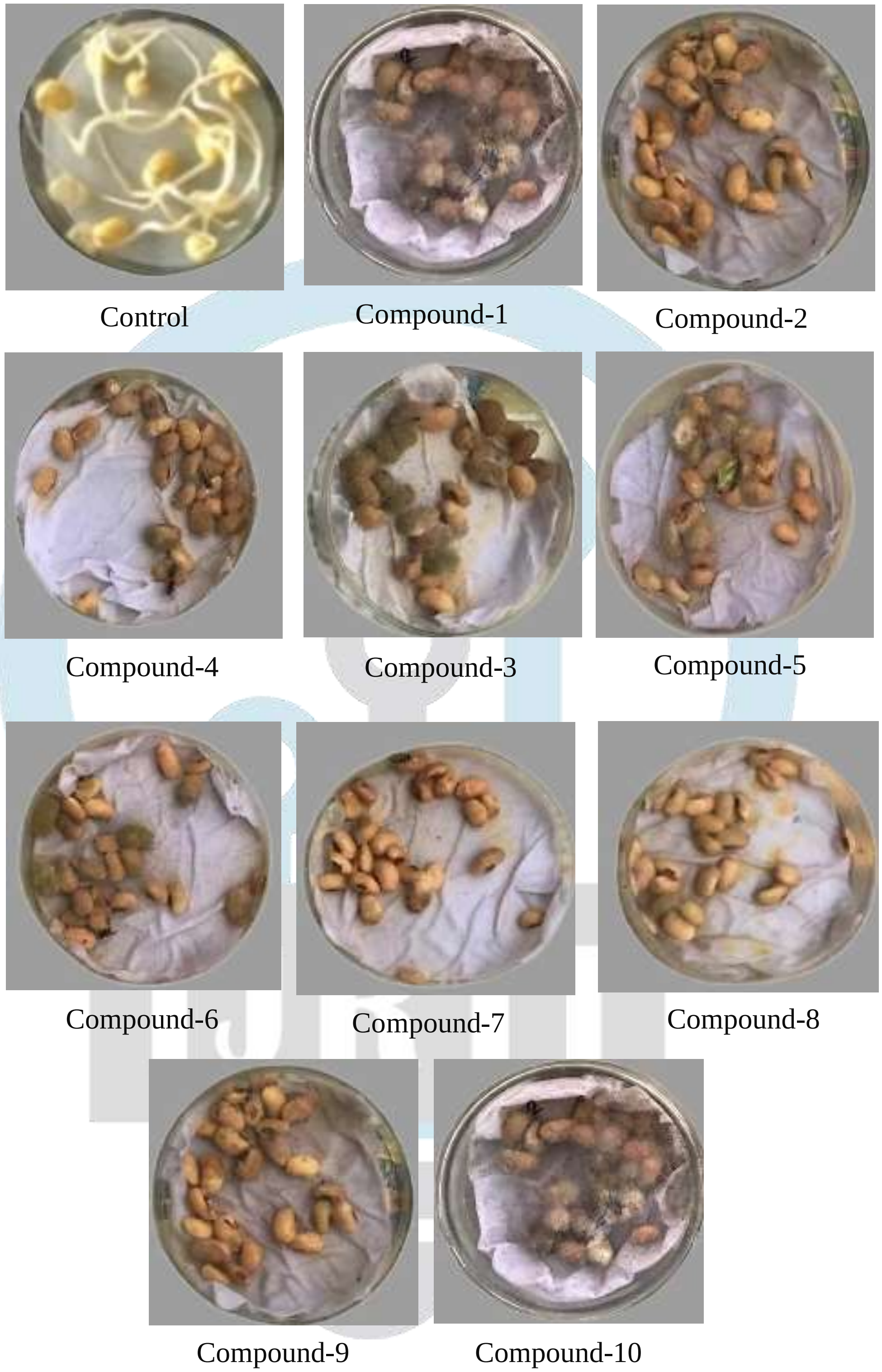


Figure 10: Effect of synthesized compounds on Germination of *Glycine max* (Soybean)

Day-3

Figure 11: Effect of synthesized compounds on Germination of *Glycine max* (Soybean) Day-4

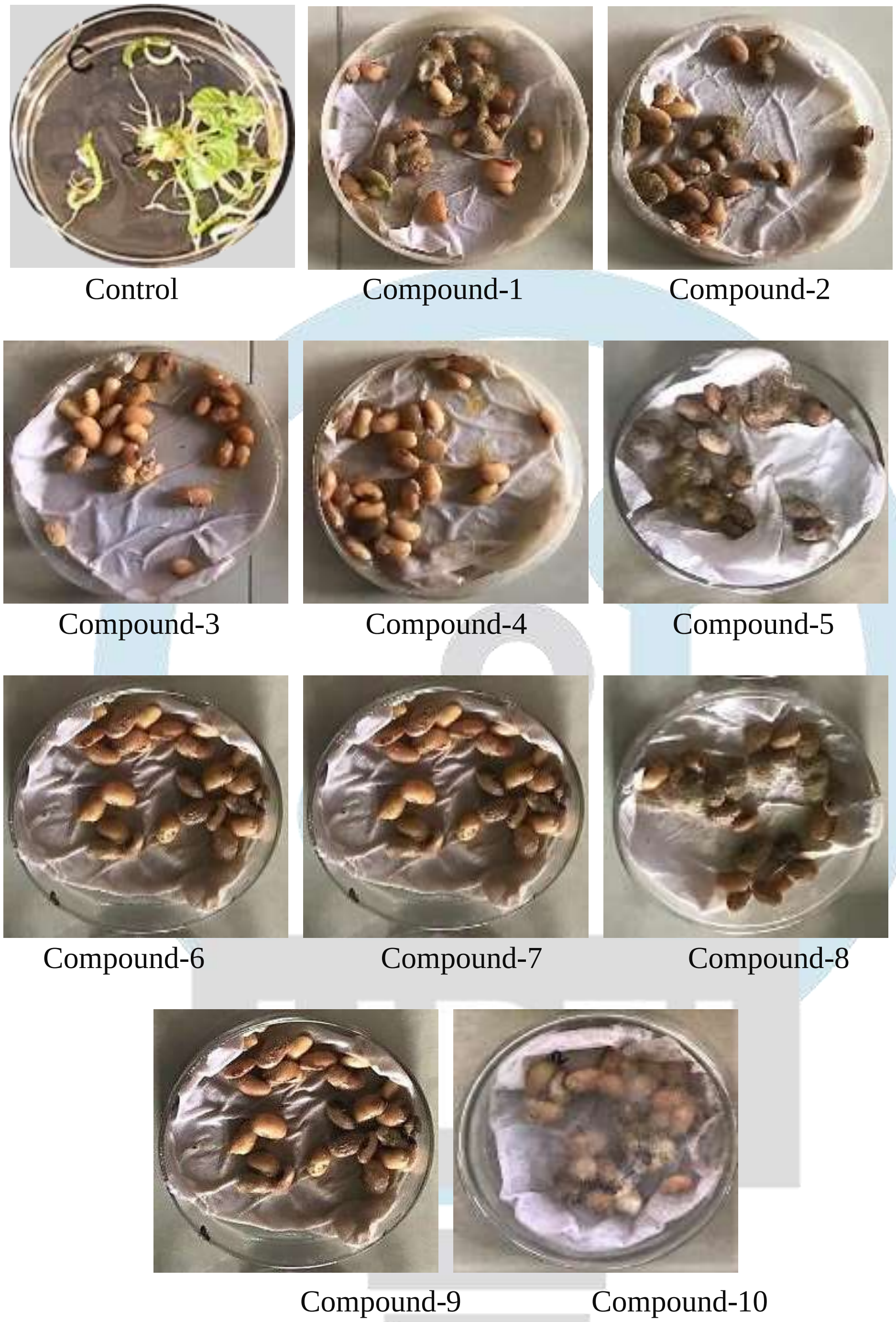


Figure 12: Effect of synthesized compounds on Germination of *Glycine max* (Soybean)

Day-5

Table 6 : Result for Germination Index of Soybean

System	Germination Index
Control	0
Compound 1	0
Compound 2	0
Compound 3	0
Compound 4	0
Compound 5	0
Compound 6	0
Compound 7	0
Compound 8	0
Compound 9	0
Compound 10	0

III. Result and Discussion:

Successful germination and seedling development are crucial steps in the growth of a new plant [18]. Seed germination is considered to be the initiation of the first developmental phase in the lifecycle of higher plants and is followed by the postgerminative growth of the seedling [19]. A seed starts to germinate in favorable conditions in response to environmental stimuli such as light, temperature, soil components (especially nitrate), and the molecular mechanisms of a response that have been well characterized. Germination is a complex process during which the mature seed resumes growth and shifts from a maturation to germination-driven programed of development and subsequent seedling growth [20]. During designing research schemes it was decided by us to synthesize such type of molecule in which both pyrazine and amine nucleus, hence ten novel series of heterocyclic compounds were synthesized and effects of all compounds from different chapters were studied to study effect of these compound on germination of wheat and soybean.

As per literature survey each nucleus of synthesized compounds possesses its own identity as well as importance in medicinal, agricultural, biotechnological and industrial sciences. Total 10 compounds were tested to study an effect on root length, shoot length, root and shoot ratio, seedling height, and % of germination along with Vigour index. Obtained results were compared in between control and newly synthesized compounds related to above parameters. This study was carried out continuously for 5 days and each day all seven parameters were checked and readings obtained for each day are shown in Table No: 1 to 7.

Root length ⟶ Control < 3 < 2 = 4 = 7 = 10 < 1 = 6 = 8 < 5 = 9 (WHEAT)

Shoot length⟶ Control < 2 < 1 < 4 = 6 < 7 = 10 < 8 < 3 = 5 = 9 (WHEAT)

Percentage germination ⟶ 2 < 9 < Control < 3 = 7 = 10 < 4 = 6 < 1 = 5 < 8 (WHEAT)

1) 4, 6 – dicchloro -N - (pyridine-2-yl) -1, 3, 5-triazine - 2 - amine

From study it can be observed that on 5th day root length of wheat seed treated with the compound (1) was higher than seeds treated with Compound (3, 2, 4, 7, and 10) including control and lesser than compound (5, 9) but similar as compound (6, 8), shoot length of same seed was is higher than seed treated with compound (2) and control lesser than (4, 6,7,10,8,3,5,9) also the percent germination of the same seed is higher than seeds treated with other compounds except seed treated with compound 5 and 8. **2)** N^2,N^4 **-dibenzyl-N^6-(pyrazin-2-yl)- 1, 3, 5-triazine-2,4,6-triamine**

It can be observed that on 5th day root length of wheat seed treated with the compound (2) was higher than seeds treated with Compound (3) including control and lesser than compound (1, 6, 8, 5, 9) but similar as compound (4, 7, 10), shoot length of same seed was higher than control and lesser than seed treated with other compounds also the percent germination of the same seed is lesser than seeds treated with all compounds. **3) N^2,N^2,N^4,N^4-tetramethyl-N-(pyrazine-2-yl)-1,3,5-triazine-2,4,6-triamine**

It can be observed that on 5th day root length of wheat seed treated with the compound (3) was higher than control and lesser than seed treated with all compounds as observed shoot length of same seed was higher than seed treated with compound (2, 1, 4, 6, 7, 10, 8) including control as similar to compound (5 and 9), percent germination of this seed is higher than seed treated with control, compound (2, 9) and similar to compound (7, 10) and lesser than compound (4, 6, 1, 5, 8).

4) N^2,N^2,N^4,N^4-(tetraphenyl)-N^6-(pyrazin-2-yl)-1,3,5-triazine-2,4,6-triamine

It can be observed that on 5th day root length of wheat seed treated with the compound (4) was higher than seed treated with compound (2, 3) including control lesser than seed treated with compounds (1,6,8,5,6) and similar to compound (7,10) as observed shoot length of same seed was higher than seed treated with compound (1,2) including control as similar to compound (6) and lesser than compound (7,10,8,3,5,9) , percent germination of this seed is higher than seed treated with control and compound (2,3,7,9,10) and similar to compound (6) and lesser than compound (1,5,8).

5) N^2,N^2,N^4,N^4-tetraethyl-N^6-(pyrazine-2-yl)-1,3,5-triazine-2,4,6-triamine

It can be observed that on 5th day root length of wheat seed treated with the compound (5) was higher than seed treated with compound (2,3,4,6,7,8,10) including control and similar to compound (9) and shoot length of same seed was higher than seed treated with compound (1,2,4,6,7,8,10) including control as similar to compound (3,9), percent germination of this seed is higher than seed treated with control and compound (2,3,4,6,7,9,10) and similar to compound

(1) and lesser than compound (8).

6) N^2, N^4-dimethyl -N^6-(pyrazin-2-yl)-1,3,5-triazine-2,4,6-triamine anisole

It can be observed that on 5th day root length of wheat seed treated with the compound (6) was higher than seed treated with compound (2,3,4,7,10) and lesser than compound (5,9) including control and similar to compound

(1,8) and shoot length of same seed was higher than seed treated with compound (1,2,4) including control as similar to seed treated with compound (4) lesser than compound (7,10,8,3,5,9), percent germination of this seed is higher than seed treated with control and compound (2,3,4,7,9,10) and similar to compound (4) and lesser than compound (1,5,8).

7) N^2-(pyrazin-2-yl)-N^4, N^6-di-(pyridine-4-yl)-1,3,5-triazine-2,4,6-triamine

It can be observed that on 5th day root length of wheat seed treated with the compound (7) was higher than seed treated with compound (3) including control and lesser than compound (1,6,8,5,9) including and similar to compound (2,4,10) and shoot length of same seed was higher than seed treated with compound (1,2,4,6) including control as similar to seed treated with compound (10) lesser than compound (3,5,8,9), percent germination of this seed is higher than seed treated with control and compound (2,9) and similar to compound (3,10) and lesser than compound (1,4,5,6,8).

8) N^2, N^4-bis (2-aminophenyl)-N^6 - (pyrazine-2-yl) - 1, 3, 5 – pyrimidine - 2,4,6-triamine

It can be observed that on 5th day root length of wheat seed treated with the compound (8) was higher than seed treated with compound (2,3,4,7,10) including control and lesser than compound (5,9) and similar to compound (1,6) and shoot length of same seed was higher than seed treated with compound (1,2,4,6,7,10) including control and lesser than compound (3,5,9), percent germination of this seed is higher as compare to seed treated with control and all compounds.

9) N^2, N^4-dimethoxy-N^6-(pyrazine-2-yl)-1,3,5-triazine-2,4,6-triamine

It can be observed that on 5th day root length of wheat seed treated with the compound (9) was higher than seed treated with all compound including control except 5 which is similar in root length of same seed, also shoot length of same seed was higher than seed treated with all compound including control, percent germination of this seed is higher than seed treated with compound (2) and lesser than seed treated with compound (3,7,10,4,6,1,5,8) including control.

10) N^2, N^4-bis(cyclopropylmethyl)-N^6-(pyrazine-2-yl)-1,3,5-triazine-2,4,6 – triamine

It can be observed that on 5th day root length of wheat seed treated with the compound (10) was higher than seed treated with compound (3) including control and lesser than compound (1,6,8,5,9) and similar to compound (2,4,7) and shoot length of same seed was higher than seed treated with compound (1,2,4,6) including control as similar to seed treated with compound (7) lesser than compound (3,5,8,9), percent germination of this seed is higher than seed treated with control and compound (2,9) and similar to compound (3,7) and lesser than compound (4,6,1,5,8).

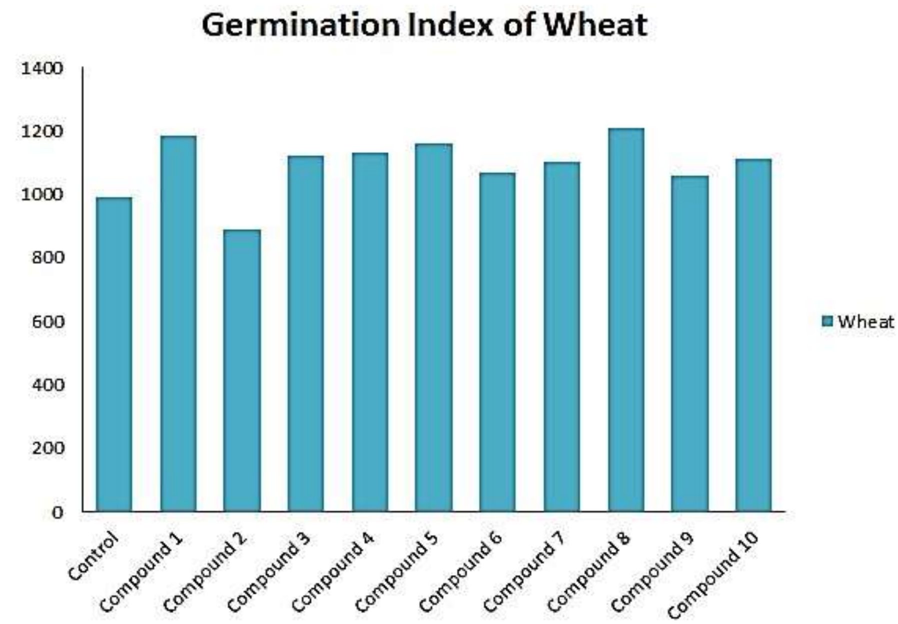


Figure 13: Germination Index of Wheat

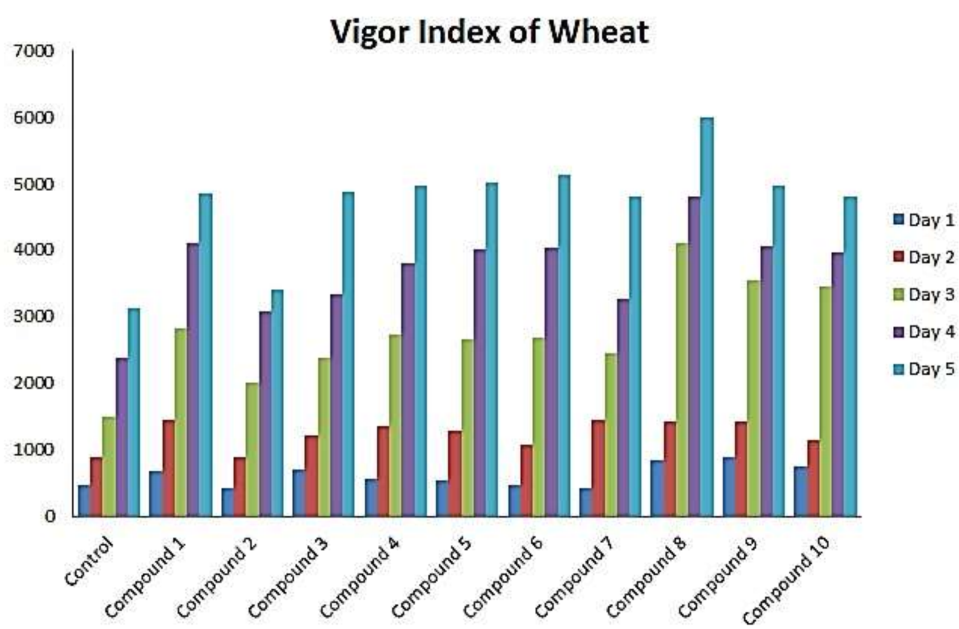


Figure 14: Vigour Index of Wheat

It was found by many workers [14, 15] that nitrogen containing heterocycle have broad spectrum of growth promoting hormonal effect so the present study was undertaken to investigate the effect of these chemicals on germination patter on wheat and soybean. 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 [16]. Considering all these facts it was thought interesting to synthesize nitrogen containing heterocyclic compounds viz. amine and were used for seed treatment and to test their growth promoting hormonal effect on wheat and soybean. It means that the synthesized compounds have agricultural applications and after detail study they can be used for agricultural purpose. From this study it can be concluded that 1,3,5-triazino nuclei are responsible and directly interfere in root length, shoot length, % germination of seeds. From the above result it can be observed that compound 1, 5 and 8) showed good result in terms of root length, shoot length % germination and germination index as compared to other compounds including control for wheat. While compounds 2, 3, 4, 6, 7, 9, and 10 showed good results terms of root length, shoot length and germination index respectively including control for wheat.

There was no effect of the pretreatment of all synthesized derivatives of *s*-triazine on the germination pattern of soybean seed. It was observed that from this study and concluded that 1,3,5-triazine nuclei did not have positive effect on root length, shoot length, % germination of soybean seeds. It means that the synthesized compounds have agricultural applications and after detail study they can be used for agricultural purpose. Synthesize such type of drugs, insecticides and pesticides which are useful to destroy pathogens and insects which are dangerous to crops resist to pathogens. It was found that all tested heterocyclic compounds used in concentrations ranging from 10^{-4} M in water solution significantly accelerate of only wheat seeds germination, plant growth and development of the root system as compared to control plant [20].

Conclusion

From germination study it can be concluded that 1,3,5-triazino nuclei are responsible and directly interfere in root length, shoot length, % germination of seeds. From the above result it can be observed that compound 1, 5 and 8) showed good result in terms of root length, shoot length % germination and germination index as compared to other compounds including control. While compounds 2, 3, 4, 6, 7, 9, and 10 showed good results terms of root length, shoot length and germination index respectively including control for wheat. There was no effect of the pretreatment of all synthesized derivatives of *s*-triazine on the germination pattern of soybean seed. It was observed that from this study and concluded that 1,3,5-triazine nuclei did not have positive effect on root length, shoot length, % germination of soybean seeds. Present research in chemistry leads to advancement in agricultural science.

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