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EFFECT OF ORGANIC PRIMING ON GERMINATION OF CUCUMBER (VARIETY BHAKTAPUR LOCAL) SEED AND SEEDLING ESTABLISHMENT

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ABSTRACT: Cucumber (*Cucumis sativus* L.) is one of the most important cucurbitaceous vegetable grown through the world and ranks fourth after tomato, cabbage and onion. Priming allows some of the metabolic process to occur necessarily for germination to get start. Organic priming is also used in seed treatment against diseased and insect eggs. The experiment was conducted in the seed laboratory of college of natural resources management, Bardibas, Mahottari district of Nepal. Seven different treatments were carried out: T1- Unprimed, T2- Distilled water (24hrs), T3- cow urine at 2%, T4 – cow urine at 6%, T5- cow urine at 10%, T6- Curry leaf extract at 6%, T7- curry leaf extract at 10%. It was found that all the organic priming methods showed better result than unprimed seed. Highest germination percentage, Speed of germination, Shoots length and leaf area index were observed in T5(100), T6(2.194), T7(8.63) and T5(0.8445). The study helps to improve the quality of seeds with the help of seed organic priming treatments which are cost effective and economic, nontoxic, eco-friendly sources. Treatment T6 (curry leaf extract at 6%) gave better result in comparison to others treatments so curry leaf extract at 6% can be used as organic priming for effective germination of cucumber seed. Further research must be carried out in farmer's field for validation.
Keywords*:* Organic priming, cucumber, cow urine, tomato

Cucumber (*Cucumis sativus* L.), an extensively cultivated vegetable plant, belongs to the "Cucurbitaceous" family. It is native to Southern Asia. In Nepal, it is cultivated from Terai to high hills; altitude ranging from 100 masl to 1800 masl. Three main forms of cucumber: slicing, pickling, and burp less have been cultivated across the globe and within these varieties, numerous other cultivars have been introduced in the market.(Khanal et al., 2020) Cucumber is one of the most important cucurbitaceous vegetable grown throughout the world and ranks fourth after tomato, cabbage and onion. The crop is probably originated in India from where it seems to have spread to Asia and Africa and then to Europe. The world average productivity of cucumber is 16.53 t / ha, but, on the contrary it is only 6.67 t / ha. As compare to our country the area, production, and productivity of cucumber in Nepal is 9396.80 ha, 159041.80 ton (t), and 16.9tha-1 respectively (MOALD 2019).

Priming allows some of the metabolic processes to occur necessarily for germination before actual germination to get start. Priming triggers the synthesis or activation of some enzymes (protease, amylase and lipase) that catalyze the mobilization of storage reserves in seed, while endosperm weakens by hydrolase activities.(Adhikari & Shrestha, 2020). Due to environmental concerns, there is an urgent need to reduce the use of chemical fertilizers and pesticides in agriculture and horticulture and alternative to chemicals are being sought to improve crop establishment and health. One option is the use of organics nutrients or growth regulators to seed or roots, which may promote plant growth or provide diseases control through a variety of mechanisms, including supply of organic nutrients production of plant hormones, antibiotic or enzyme; induced systemic resistance; direct parasitism of plant pathogen or deleterious micro-organisms; or competition with pathogen for or nutrients. Further, organic seed is a crucial link in the chin from research to organic seed production and ultimate supply of high quality seed at reasonable price to the commercial seed producing farmers for promotion of organic seed production. Hence, the safe and feasible approach is the priming of seeds with organics which are safe, ecofriendly, economical and easily available. Organic seed priming provides hardiness to high temperature, low moisture especially in semiarid tropics. It promotes faster germination, higher seedling vigour leading to higher crop productivity. The main benefits of organic seed treatments include increased phosphate levels, nitrogen fixation and root development. Cow urine contains about 1.0% nitrogen, traces of P2O5 and 1.0% of K2O. Approximately 2400 to 2500 L of urine are produced per year per animal. If this urine were not conserved, nitrogen in the urine, which is mainly in the form of urea, would be quickly lost as ammonia. It is also considered as a natural disinfectant and pest repellent and forms the main component of Panchagavya (an organic crop booster prepared and sprayed by Indian farmers)(J. K. P. Kumar P Chaurasia AK and Bineetha M. Bara, 2017)

Objectives: The objective of doing the research is to evaluate the effect of different level of cow urine and curry leaf extract on Cucumber germination.

Materials and methods: The experiment was conducted in College of Natural Resources Management, Bradibas, Mohottari District of Nepal. College of natural resource management is located in Kishanagar. Cucumber seed was used for priming. The seeds were treated with cow urine at the concentration of 2, 6 and 10% and curry leaf extract at

the concentration of 6 and 10% along with distilled water and dry seed as control. Locally available cow urine was used for organic seed priming which acts as growth promoter by preventing plant disease. 2, 6, and 10 ml of cow urine were added separately in 100 ml water to get 2%, 6%, 10% of solution which were used for seed treatment as per the required weight by volume ratio of seed to solution. The solutions were made and seed were soaked to 24 hours. The data collected from the experiments were analyzed statistically and using of experimental design in complete randomized block methods.

Seed priming treatments are first was made unprimed, second was primed with distilled water, third treatment was made with cow urine at 2% concentration, fourth was made with cow urine concentration at 6%. Similarly fifth treatment was made with cow urine concentration at 10%, sixth treatment was made with curry leaf extract at 6% and seventh treatment was done with curry leaf extract at 10%. Seed were soaked in prepared solutions of cow urine at different concentrations at 2%, 6%, 10%. Likewise curry leaf extract was prepared at 6% and 10% concentrations and seed were soaked in them same as cow urine. For priming of seed in distilled water, 100ml distilled water was kept in beaker in which 25 seeds were soaked. For preparation of cow urine at 2%, we took 2ml cow urine and 98ml distilled water to make 100ml solution. Likewise for cow urine at 6% and 10% were prepared by applying 6ml cow urine + 94 ml distilled water and 10ml cow urine + 90ml distilled water respectively.

Similar process like above was followed to prepare curry leaf extract solution at 6% and 10% by mixing 6ml curry leaf extract + 94ml distilled water and 10 ml curry leaf extract + 90ml distilled water respectively.

Statistical Analysis

The recorded data was systematically arranged in Ms Excel which was used for simple statistical analysis, constructing graphs and tables. The compiled data were subjected to analysis of variance (ANOVA) using Gen-stat statistical package. ANOVA was constructed and significant data were subjected to Duncan Multiple Range Test.

S.N	Treatment	Germination (%)	Speed of Germination	Shoot length	Leaf area index	Germination rate	Absolute growth rate
1	T1	100	1.611	7.177	0.5703	1.389	0.288
2	T2	100	2.194	7.810	0.4795	1.806	0.512
3	T3	86.7	2	6.978	0.4055	1.444	0.417
4	T4	100	2	6.630	0.8445	1.667	0.048
5	T5	100	1.778	7.130	0.7398	1.667	0.365
6	T6	100	2.167	7.487	0.6538	1.944	0.372
7	T7	93.3	1.694	8.360	0.7269	1.417	1.170
GRAND MEAN		97.1	1.921	7.367	0.6315	1.619	0.453
LSD at 0.05		17.09	0.5125	0.1729	0.02260	0.6249	0.1282
CV%		10	15.2	1.3	2	22	16.1
SEm(±)		7.97	0.239	0.0806	0.01054	0.2913	0.0598

RESULTS AND DISCUSSION

Germination (%)

A range of 86.7 to 100 percent was observed for the germination percentage. The mean value for this parameter was 97.1 percent. Maximum germination percentage (100) was recorded with T5 Cow Urine at 10%. Whereas minimum significantly germination percentage followed by (93.3) with T7 application of Curry leaf extract 10%. Minimum germination percentage was recorded by T3 (86.7) with Cow urine 2%. Organic primed seed germinated better than unprimed seed was also observed in organic priming in cluster bean.(Patel et al., n.d.) Germination percentage (83.25%) was highest in Cow urine at 6% seeds and it was significantly low in unprimed (control) seeds (70.25%)(J. Kumar P, 2017).

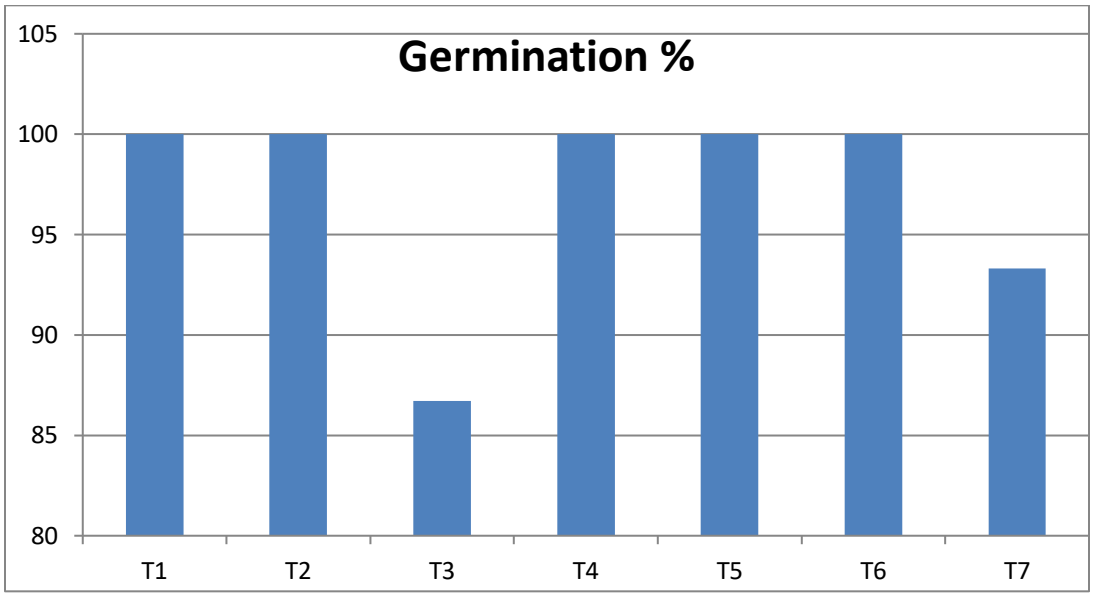
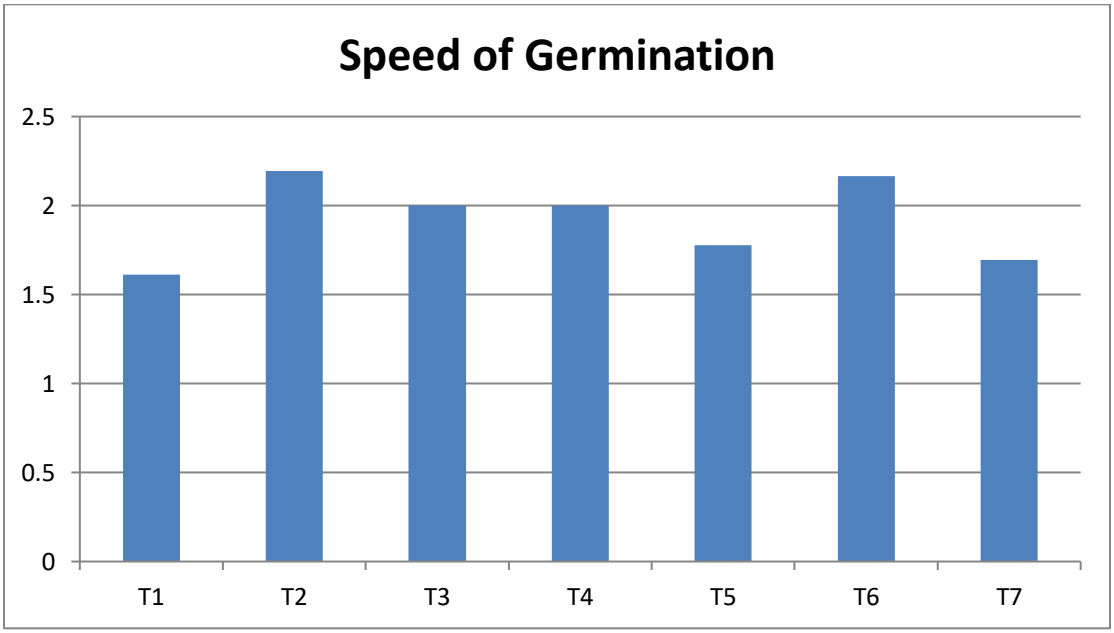


Fig- 1: Germination percentages as Influence by different Organic priming treatments on cucumber seeds

Speed of germination:

A range of 1.611 to 2.194 was observed for the seed of germination. The mean value for this parameter was 1.921. Maximum speed of germination (2.194) was recorded with T2 Distilled water. Whereas minimum significantly speed of germination followed by (2.167) with T6 application of curry leaf extract 6%. Minimum speed of germination was recorded by T1 (1.611) with unprimed seed. Speed of germination was obtained highest in organic primed seed than unprimed.(Patel et al., n.d.) Speed of germination obtained in organic primed seed was greater than unprimed seed.(Adhikari & Shrestha, 2020)



.Fig- 2: Speed of germination as Influence by different Organic priming treatments on cucumber seeds

Shoot length: Among shot length there exists a significant variation as influence by organic priming methods and seeds primed with T7 with replication of curry leaf extract at 10% (8.36cm) has highest shot length, cow urine at 6% (6.63cm) has lowest shoot length. T1 unprimed and T5 cow urine at 10% has

statistically similar result. Organic priming increases shoot length than unprimed seed were also observed in *Effect of organic priming on germination and vigour of cotton (Gossypium hirsutum L.) seed*.(J. Kumar P, 2017). Organic priming give better result in shoot length than unprimed (control).(Adhikari & Shrestha, 2020)

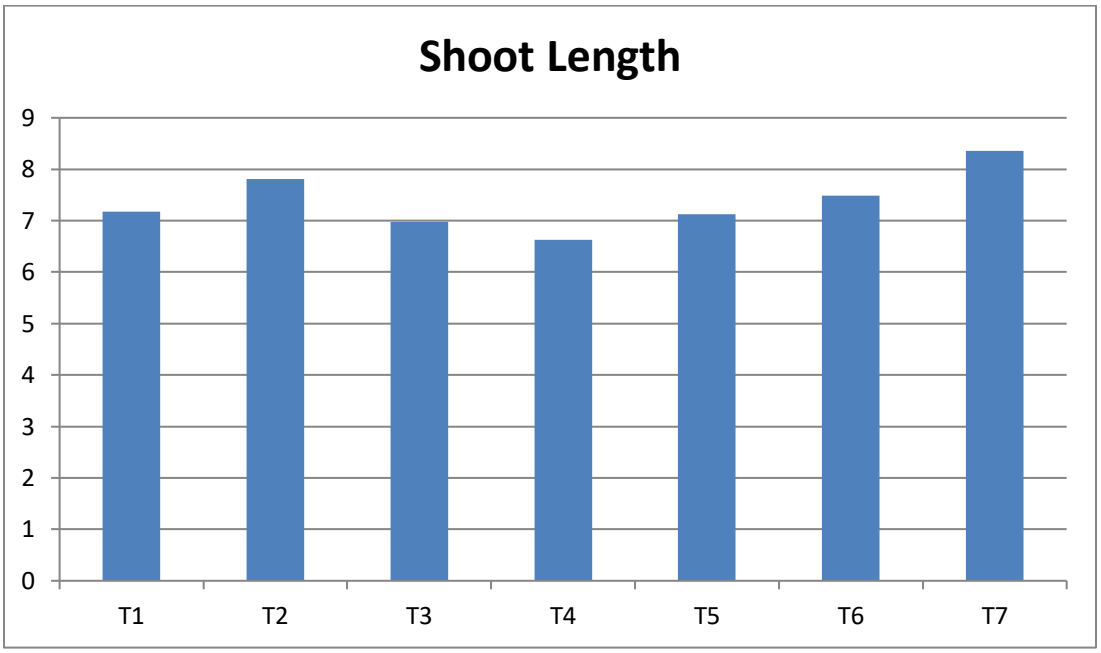


Fig- 3: Shoot length as Influence by different organic priming treatments on cucumber seeds.

Leaf area index

A range of 0.4055 to 0.8445 was observed for leaf area index. The mean value for this parameter was 0.6315. Maximum leaf area index was recorded with T4 (0.8445). Whereas, minimum unprimed seed .(Adhikari & Shrestha, 2020)

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significant leaf area index by T5 (0.7398) with cow urine was 6%. Minimum leaf area index was recorded by T3 (0.4055) with cow urine at 2%. Organic seed priming gives higher value of leaf area index than cow urine at 6%

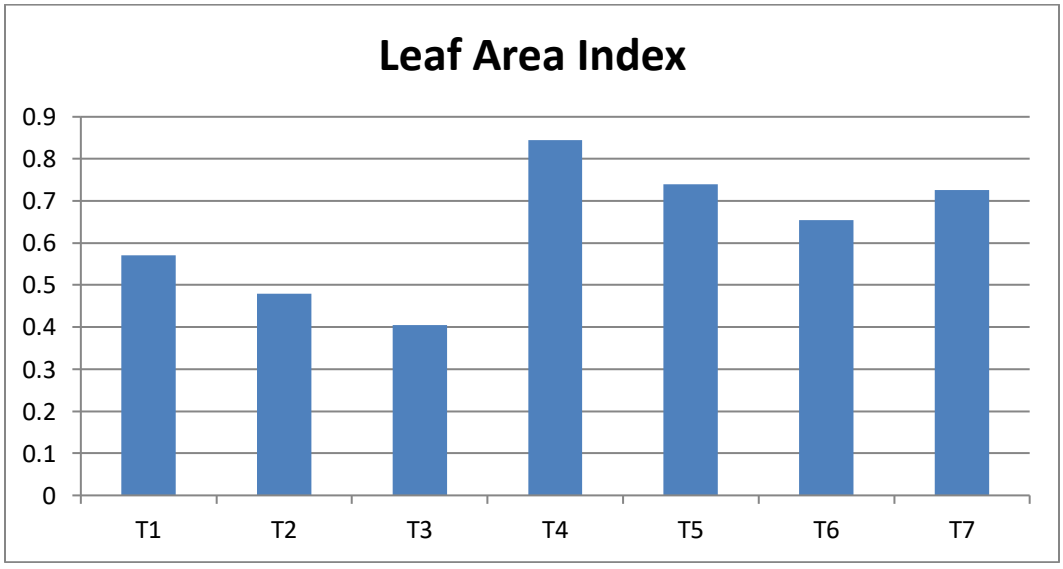


Fig 4: Leaf area index as influence by different organic priming treatments on cucumber seeds

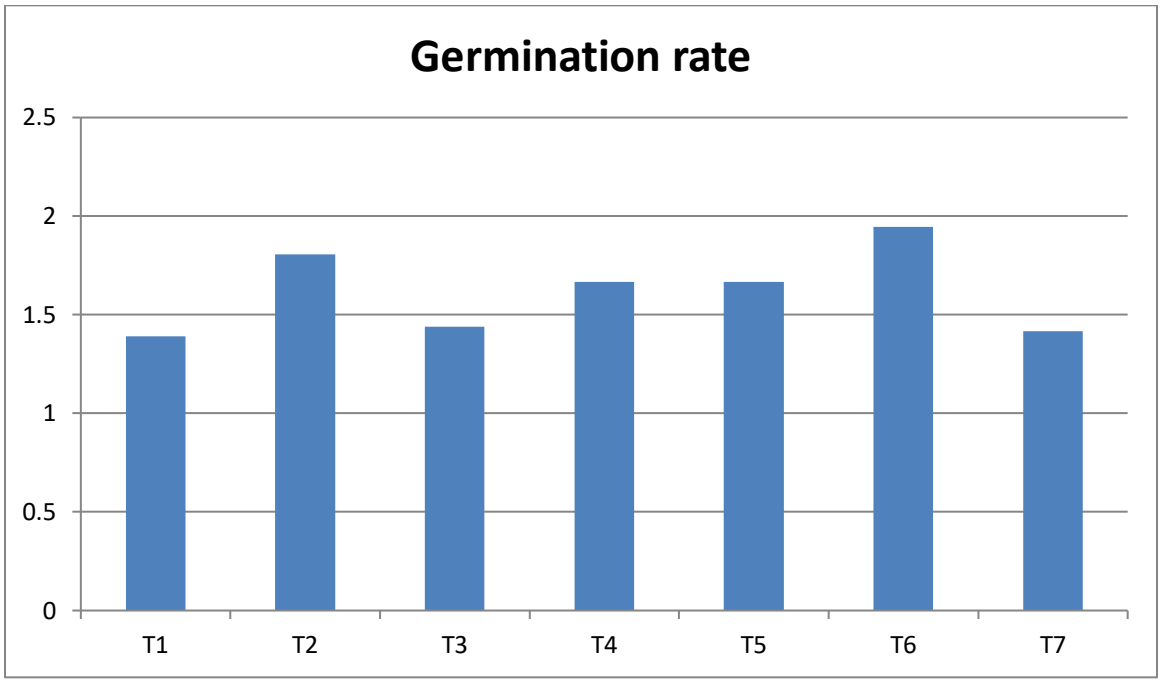


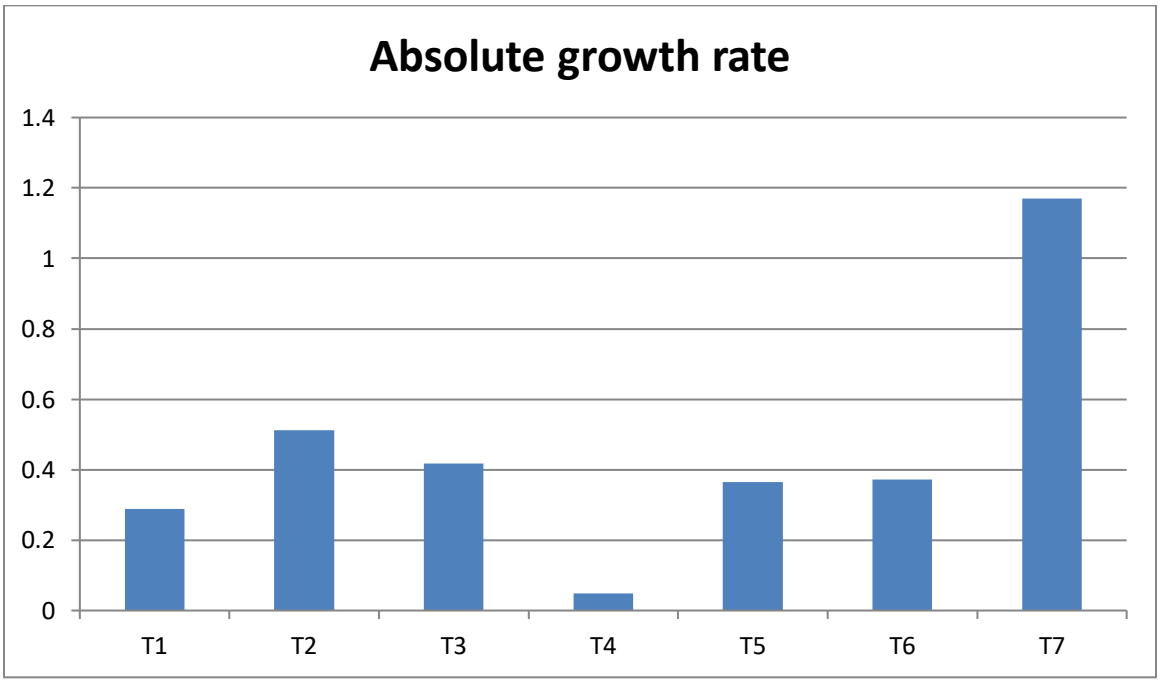
Fig: 5 Germination rate as influence by different organic priming treatments on cucumber seed

Germination rate

The mean performance of germination rate range from 1.389 to 1.944 with mean value was 1.619. Maximum germination rate was recorded by T6 with application of curry leaf extract at 6% and it was followed by T2. Minimum value of germination rate was recorded by T1 (unprimed seed). Organic priming of seed gave better result of germination rate than unprimed seed.(Galappaththi et al., 2021)

Absolute growth rate (AGR):

The mean performance of absolute growth rate ranged from 0.048 to 1.170 with mean value of 0.453. Maximum absolute growth rate was recorded by T7 with application of curry leaf extract at 10% and it was followed by T2. Minimum absolute growth rate was recorded by T4. Organic priming of seed increases absolute growth rate value than controlled (unprimed). (Gunasekar et al., n.d.)



Conclusions

All the priming methods have positive influence on seed quality parameters of cucumber individually which was found significant. Speed of germination was highest in T6 with curry leaf extract at 6%. The germination percentage was highest in T5 with cow

urine at 10% and it was significantly low in T3 with cow urine at 2%. Shoot length was highest in T7 with curry leaf at 10% and it was non-significant in T4 with cow urine at 6%. Leaf area index was highest in T5 with cow urine at 10% and it was significantly low in T2 with distilled water. Germination rate was highest at T6 with curry leaf extract 6%.All the organic priming treatment show better result than distilled water and unprimed treatment. Among all organic primed treatment,T6 with curry leaf extract at 6% show better performance on germination parameter. So curry leaf extract at 6% is recommended in priming of cucumber seed.

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Conflict of interest: Our research was experimented in the laboratory so germination parameters varied with the research field. By the help of this research paper, researcher can further modify with more germination parameters, data and result.

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