International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

Absorption And Phytotoxic Effects Of Expired And Non-Expired Paracip And Ranglim VG1 Tablets On Trigonella Foenum-Graecum

Divya. J[1*], Vasudha Ranjan[2], Basavarajappa S.H.[3]
[1*]Assistant Professor, [1]Research Scholar, Department of Environmental Science, JSS Academy of Higher Education and Research, Mysore-570015
[2,3]Assistant Professor, Department of Environmental Science, Shankaraghatta, Kuvempu University, Shimoga – 577451

Abstract
Among the various class of drugs, the antidiabetics and acetaminophen are one such group of pharmaceuticals that has got greater usage in the current scenario. The improper disposal of these medicines after expiry and unused has become a concerning environmental issue. This research is focused on determining the toxic impacts of expired and non-expired Paracip and Ranglim tablets on the plant growth parameters and residue absorption using Trigonella foenum-graecum. For the toxicity study, both the expired and non-expired paracip and ranglim tablets were powdered and added at the rate of 1g, 5g and 10g to the soil sample. The fenugreek seeds were added to the soil and kept for observation. A tracer amount of water was added regularly. After the complete growth of plants, the growth parameters were evaluated. In order to assess the translocation of both the tablets, the percentage absorption through the root and shoot system were analysed. The root and shoot of both the samples were dried, powdered and extracted. Later, it was subjected to LC/MS analysis. From the experimental result, it was found that, the expired paracip and ranglim treatments, resulted in decreased germination percentage in comparison with the control and non-expired treatments. In 10g concentration of expired paracip treatment, none of the seed were germinated. From the LC/MS result, it was found that, the maximum percentage of the expired paracip (0.063) was observed in 1g concentration in shoot part of the plant. Whereas in case of ranglim LC/MS result, it was shown that, the maximum percentage absorption was observed in 5g concentration of the expired ranglim (6.83%) treatment in root part of the plant. The proper disposal of the expired tablets is essential to avoid the residual absorption and minimize the risk of growth inhibition.
Key Words: *Toxicity, Expired, Non-expired, Paracip, Ranglim, Metformin and LC/MS*

INTRODUCTION

The expired and unused medicinal products are considered as emerging risk to the environment and public health. Its improper management and disposal have created a greater concern in the present scenario. The diabetes is one of the most common diseases affecting the people across different age groups. To manage this condition, a variety of medicines are currently in use. The widely prescribed medications for the diabetes include insulin, alpha-glucosidase inhibitors, biguanides, dopamine-2 agonists, dipeptidyl peptidase-4 (DPP-4) inhibitors, Ranglim, meglitinides, sodium-glucose transport protein inhibitors, sulfonylureas and thiazolidinediones. Among these, metformin is an antidiabetic drug that is frequently prescribed for the adults with type II diabetes mellitus (Kadam, et al., 2016). Similarly, paracetamol (acetaminophen) is among the most commonly used drugs across the globe, because for its analgesic (pain-relieving) and antipyretic (fever-reducing) properties. It is used for treating mild to moderate pain such as headaches, muscle pain and toothaches and it is included in more than 600 pharmaceutical formulations.

The Paracip and Ranglim VG1 are listed as an essential medicine by the World Health Organization, highlighting its importance in a basic healthcare system. On the same way, the disposal of the expired and unused tablets is one of the major threats to the community. When such medicines are disposed after expiry or unused ones along with the regular household garbage, they finally end up in the open dumpsites and landfills, where they slowly break down and release their chemical composition into the nearby soils and plant system or to the wastes, posing a significant threat to the environment

(Khoshgoftarmanesh et al., 2011; Eggen and Lillo, 2012). The present study is aimed to evaluate the toxic effects of both expired and non-expired Paracip and Ranglim VG1 tablets on the plant system. The phytotoxicity refers to the harmful effects of the certain chemicals or environmental factors on the physiological processes of the plants. (Al-Farsi et al.,2017).

In the present study, the phytotoxic effects of the expired and non-expired Paracip and RanglimVG1 tablets were evaluated using *Trigonella foenum-graecum* (fenugreek) seeds. The Fenugreek, a member of the Fabaceae (legume) family, is extensively cultivated worldwide for its seeds and leaves, which hold significant culinary, medicinal and agricultural importance. It is an annual herbaceous plant with a hollow, upright stem and compound leaves, typically consisting of three to four oval-shaped leaflets attached to a short-pointed petiole. The plant is also valued for its nutritional and therapeutic properties, making it suitable for assessing the pharmaceutical-induced stress responses (Mahmoud Bahmani et al., 2016). In the present research, the uptake and translocation of both expired and non-expired paracip and ranglim in the roots and shoots of the fenugreek plants were quantified using LC/MS analysis. The findings are expected to provide insights into the potential environmental risks posed by the pharmaceutical contaminants and their influence on the plant growth and physiology.

MATERIALS AND METHODS

Chemical Composition of Paracip and Ranglim VG1

The Paracetamol tablet is N-Acetyl-para-Aminophenol, synthetic chemical compound produced by the acetylation of 4-aminophenol using acetic acid. The paracetamol includes calcium or magnesium stearate, cellulose, sodium benzoate, sodium lauryl sulphate, starch and sodium starch glycolate. The paracetamol is available in various trade names such as paracip, dolo, cetaponacetamol, anuphen, calpol, alvedon, 4-hydroxyacetanilide, N-(4- Hydroxyphenly) acetamide, 4-Acetamidophenol, panadol, tylenol, and so on. The paracetamol is soluble in water and solutions of alkali hydroxide but insoluble in diethyl ether. The structural formula of paracetamol is $C_8H_9NO_2$. Paracip was the brand name of the tablet.

The Ranglim VG1 tablet is a combination of three drugs and its compositions are as follows: Metformin hydrochloride is a crystalline compound with a molecular formula of $C_4H_{11}N_5 \bullet HCl$. Metformin is a first-line oral antidiabetic drug from the biguanide class, widely used in the management of type 2 diabetes mellitus. It lowers blood glucose primarily by reducing the hepatic glucose production, improving the peripheral insulin sensitivity and decreasing intestinal absorption of the glucose. Unlike many other antidiabetic agents, it does not usually cause hypoglycemia when used alone and may help with weight control, lipid profile improvement, and cardiovascular protection. The chemical composition of glimepiride is 1- [[p- [2-(3- ethyl-4-methyl-2-oxo-3-pyrroline-1 carboxamido) ethyl] phenyl] sulfonyl]-3-(trans-4-methylcyclohexyl) urea. Voglibose chemical composition is (1,3-dihydroxypropan-2-ylamino)-1 hydroxymethyl) cyclohexane-1,2,3,4-tetrol. The composition of Ranglim tablet is; metformin 500mg, glimepiride 1mg and 0.2mg of voglibose.

Collection of Soil Sample: From the nearby landfills, a composite soil samples were collected. The soil samples were taken from a depth of 0-15 cm. The collected soil was air dried, passed through 2mm sieve and stored for further analysis. The collected soil samples were subjected to the soil quality characterization. The analysis was conducted according to the standard manual [Standard Methodology of Soil Analysis by Arun Kumar Saha (2008), GKVK Manual (1999)]. The results were found to be with in the normal range of the soil quality standards. From the analysis, it was observed that, the pH value was found to be 7.35, electrical conductivity observed was 1.41 ds/m, calcium value was obtained to be 84.16 ppm and magnesium as 19.45 ppm. The organic carbon and chloride were found to be 0.66% and 0.532%. The available nitrogen was observed to be 163Kg/ha, potassium value of 251.4 Kg/ha, available phosphorus was found to be 79.42 Kg/ha and sulphates value of 26.68 ppm.

Experimental Set-up for Toxicity Study: For the experimental study, polythene pots with a capacity of 1kg was used. The fenugreek seeds (*Trigonella foenum-graecum*) were selected for the study considering its fast germination rate, short life cycle and sensitivity to the soil contaminants. The cleaned polyethene pots were filled with the processed soil and a trace amount of sand were added in order to facilitate the

easy movement of the water in the pots. The powdered expired and non-expired Paracip and ranglim tablets were mixed with the soil samples at the concentration of 1g, 5g and 10g. After that, about 50 fenugreek seeds were added to each pot. A tracer amount of water was added to all the treatments regularly in order to maintain the moisture level. For all the concentrations, two trials were maintained in order to get the accurate results. The treatments were kept for the observation for the germination of fenugreek seeds. In terms of several growth characteristics, the fenugreek plant's germination as well as its general growth and development were assessed. The percentage of germination index was calculated by using the following equation,

$$Germination\ Percentage\ (GI) = \frac{Total\ No.\ of\ Seedlings}{total\ no.of\ seeds\ added} X100$$

The experimental results were evaluated considering the parameters like; seed germination tests and morphometric measurements including root-shoot length and leaf counts. A centimetre scale was used to measure the lengths of the roots (from tip to collar) and shoots (from base to apex). Additionally, the number of leaves was observed and documented.

Extraction Procedure:

The mature plants were carefully uprooted and thoroughly rinsed with the tap water and then with the distilled water. The roots and shoots from each treatment were then separated and dried in a hot air oven at 50°C for 1–2 days. Once it is fully dried, the samples were finely powdered using a mortar and pestle and weighed separately. For the extraction, each powdered sample was mixed with a solvent composed of water and methanol [10 ml water and 10 ml methanol]. The mixture was sonicated for 1 hour and allow to stand for 24hours for complete extraction. Similarly, the expired and non-expired paracip and ranglim tablets (100mg each) were extracted in 25ml of water and 25ml of methanol using the sonication and settling conditions. The samples were subjected to quantitative analysis using Liquid Chromatography-Mass Spectrometry (LC-MS). Both the paracip and ranglim tablets standardization was performed in order to assess the absorption percentage of the expired and non-expired tablets residues in the roots and shoots of fenugreek plant in all the treatments

Quantitative Analysis via LC-MS

The supernatant liquid from the sample extracts was analyzed using LC-MS to quantify the paracip and ranglim residues in the root and shoot sample. The percentage of the drug absorbed by the plant was calculated using the formula:

$$\%\ Absorption = \frac{Area\ of\ Sample}{Area\ of\ Drug\ Standard} X\ \frac{Concentration\ of\ Drug\ Standard}{Concentration\ of\ Sample}\ X\ 100$$

This analysis provides a comparative perspective on the absorption and retention of residues from both expired and non-expired tablets in plant systems.

RESULTS AND DISCUSSION

Table 1. Results of Phytotoxicity Study of Paracip Tablets

Tablet concentration		No. of seeds Germinated	Germination Index (%)	Total No. of plants grown	Total Length of Root (cm)	Total Length of Shoot (cm)	Total No. of leaves	No. of Flowers and Pods
Control		**48**	**96**	**48**	**5.52**	**6.50**	**5.0**	**Nill**
Expired	**1g**	**41.5**	**83**	**36.5**	**7.68**	**14.01**	3.5	
	5g	34	68	29	7.10	13.26	2.6	
	10g	No Seeds were Germinated						
Non-expired	**1g**	**45.5**	**91**	**43**	**23.45**	**8.12**	**3.4**	
	5g	44.5	89.5	42	22.69	7.65	2.8	
	10g	22.5	45	17.5	22.28	6.96	2.2	

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

Note: The experimental results are the average values of two trails of each concentration


Expired Paracip Treatment


Non-Expired Paracip Treatment

During the present investigation, the experimental results of the phytotoxicity study of the expired and non-expired paracip tablets are presented in table 1. The obtained results were compared with a control. In the control, the total number of seeds germinated were found to be 48 out of 50 seeds, with the germination index of 96%. Among the total number of seeds that were added, 48 seeds were germinated and turned into root and shoot system. The total length of the root was found to be 5.52 cm and the total length of the shoot developed were found to be 6.50 cm. The total number of leaves were found to be 5. The flower and pods formation were found to be nil.

In the expired paracip treatment, with respect to various concentration, the observation is presented as follows: In 1g paracip treatment, out of 50 seeds, the average value for the seed germination was found to be 41.5 with a germination index of 83%. The total number of plants grown were found to be with an average value of 36.5. The average length of the root was found to be 7.68 cm and the total length of shoot was observed to be 14.01 cm. The average value for the total number of leaves in 1g paracip treatment was found to be 3.5. In case of 5g paracip treatment, the average value for the seeds germination was found to be 34 with a germination index of 68% and the total average number of plants grown were found to be 29. The average length of the root and shoot in 5g paracip treatment was found to be 7.10 cm and 13.26 cm. The average values for the total number of leaves were found to be 2.6. The flowers and pods formation were found to be absent in both 1g and 5g treatment. In case of 10g paracip treatment, because of high concentration, out of 50 seeds, the seed germination was found to be completely absent. This indicates that, at higher concentration of paracip, it will turn into toxic for germination of fenugreek seeds (Jing An et al., 2009).

Similarly, in the non-expired paracip treatment, with respect to various concentrations, it was observed as follows: In 1g concentration of paracip treatment, out of 50 seeds, the average value for the seeds germination was found to be 45.5 with a germination index of 91%. The total number of plants grown were found to be with an average value of 43. The average length of root and shoot developed were found to be 23.45 cm and 8.12 cm respectively and the average value for the total number of leaves were found to be 3.4. In case of 5g paracip treatment, out of 50 seeds, the average value for the seed germination was found to be 44.5 with a germination index of 89.5%. The total number of plants grown were found to be with an average value of 42. The average length of root was observed to be 22.69 cm and the total length of the shoot developed was found to be 7.65 cm, with an average number of leaves was found to be 2.8 in numbers. In case of 10g concentration of the non-expired paracip treatment, it was observed to be decrease in the seed germination as the concentration is high. Out of 50 seeds, the average value for the seed germination was found to be 22.5 with a germination index of 45%. The total number of plants grown were found to be with an average value of 17.5. The average length of root and shoot in 10g concentration was found to be 22.28 cm and 6.96 cm respectively. The average value for the total number of leaves was observed to be 2.2. In all the treatments, there was no formation of flowers and pods. In comparison with the expired and non-expired paracip treatments, it was found that, the maximum germination index and plants grown were observed in the non-expired treatment. This indicates the toxicity level of the expired paracip tablet on the fenugreek plants (Ocsana Opris et al., 2020).

Table 2. Results of LC/MS Study				
	Expired Paracip Treatment		Non-expired Paracip Treatment	
Samples	Peak Area	Percentage of Absorption (%)	Peak Area	Percentage of Absorption (%)
1g Root	5051.57	0.022	112.80	0.0038
5g Root	No Peak was Found	-	42.90	0.0017
10g Root	No seeds germinated	No seeds germinated	108.78	0.0045
1g Shoot	**20166.55**	**0.063**	**773.03**	**0.0052**
5g Shoot	No Peak was Found	-	299.43	0.0041
10g Shoot	No seeds germinated	No seeds germinated	249.55	0.0019

Table 2 represents the LC/MS analysis showing the percentage absorption of both the expired and non-expired paracip tablet in the fenugreek plants. The active pharmaceutical components in the paracip tablets exhibited a molecular weight of 152.2081 g/mol with the retention time of 1.71 mins (Figure 2). Figure 3 represents the expired paracip tablet standardization.

From the LC/MS data, it implies that, with respect to varied concentration in the root and shoot system, a variation in the percentage of absorption of the expired paracip was observed. In the expired paracip treatment, in 1g root samples, the percentage of absorption was found to be 0.022% and in 1g shoot samples, the percentage absorption was found to be 0.063% (figure 4 & 5). Whereas in case of 5g expired paracip treatment, in both root and shoot samples, the peak area was completely absent (Figure 6&7). Without the peak area, the percentage of absorption was not possible to find out in the expired paracip treatment.

Similarly, the figure 8 represents the non-expired paracip tablet standardization. From the LC/MS analysis, it was observed that, the minimum percentage absorption of non-expired paracip was found to be 0.0017 % in 5g root sample (Figure 11). The maximum percentage absorption was observed to be 0.0052% in 1g shoot sample (Figure 10). From the results, it was observed that, in comparison with both expired and non-expired treatments, the maximum percentage absorption of paracip tablets was found to be in non-expired treatment in shoot samples.

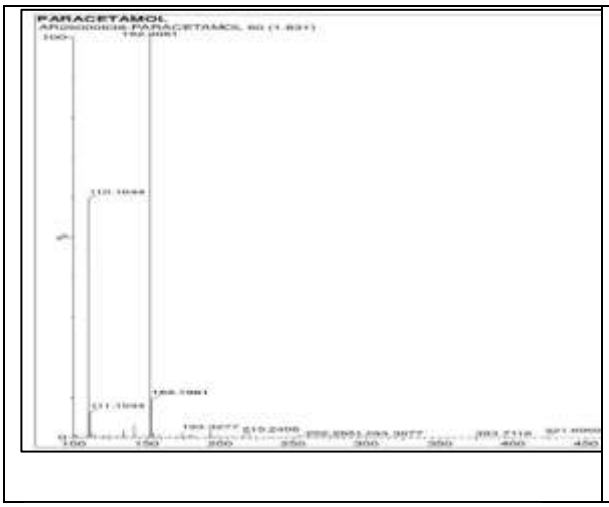

Figure 2. LC/MS Spectrum of Paracip Tablet's Molecular Weight

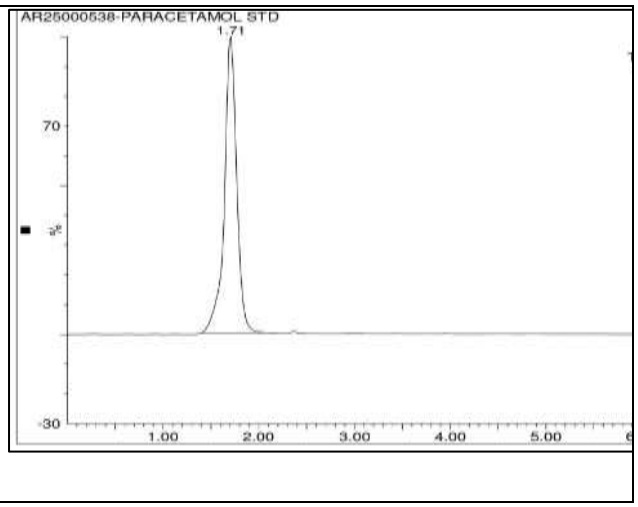

Figure 3. LC/MS Spectrum of Expired Paracip Standardization

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

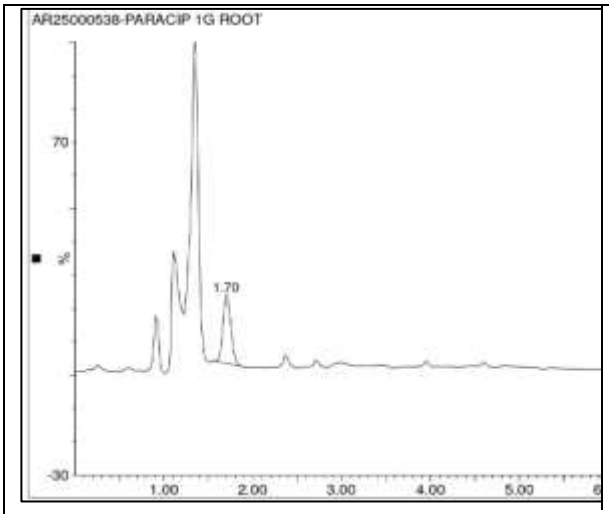

Figure 4. LC/MS Spectrum of Expired Paracip tablet with 1g concentration in Root

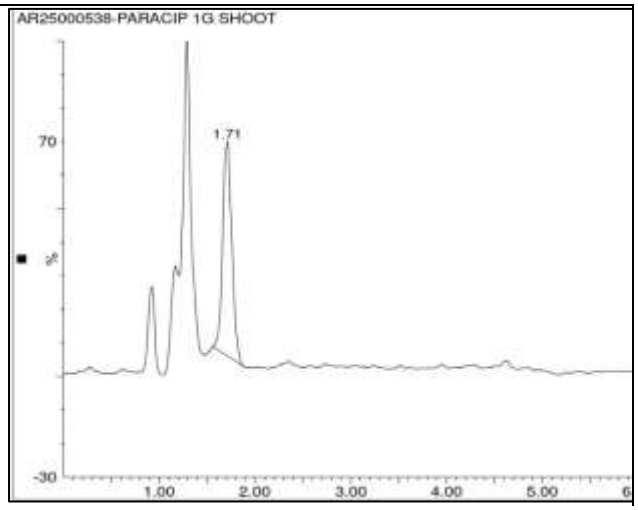

Figure 5. LC/MS Spectrum of Expired Paracip tablet with 1g concentration in Shoot

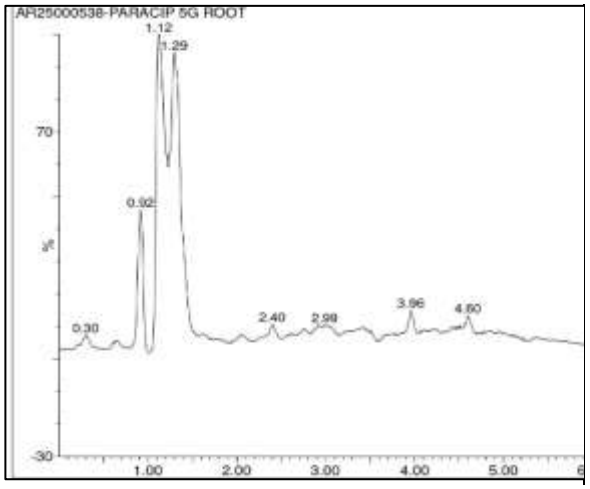

Figure 6. LC/MS Spectrum of Expired Paracip tablet with 5g concentration in

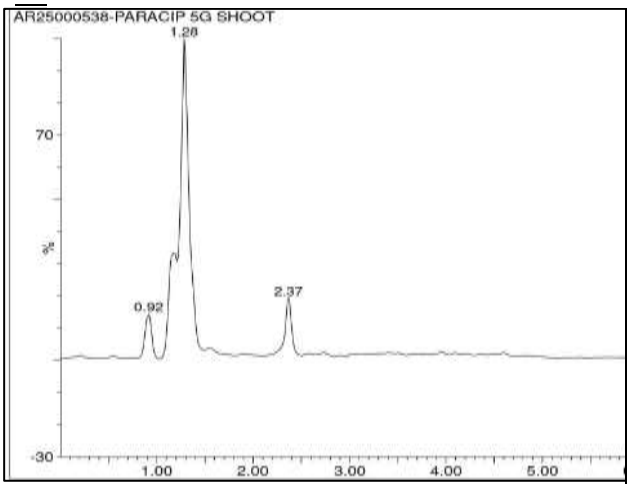

Figure 7. LC/MS Spectrum of Expired Paracip tablet with 5g concentration in

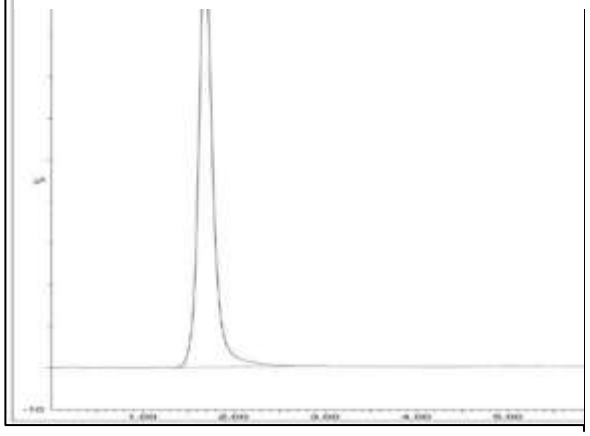

Figure 8. LC/MS Spectrum of Non-Expired Paracip Standardization

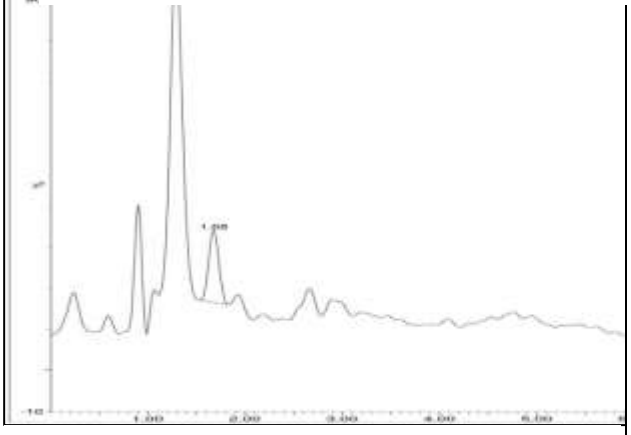

Figure 9. LC/MS Spectrum of Non-Expired Paracip tablet with 1g concentration in Root

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

Figure 10. LC/MS Spectrum of Non-Expired Paracip tablet with 1g concentration in Shoot Samples

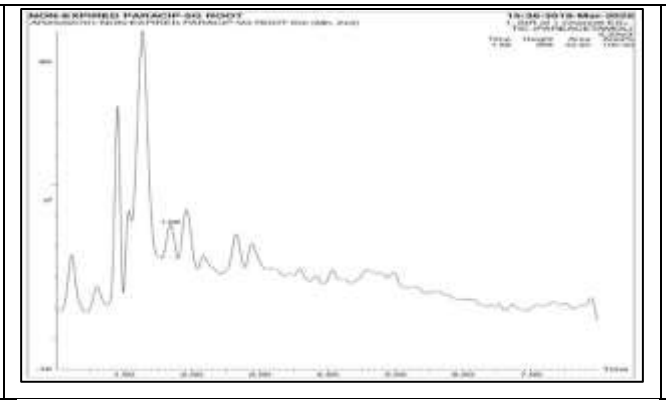

Figure 11. LC/MS Spectrum of Non-Expired Paracip tablet with 5g concentration in Root Samples

Figure 12. LC/MS Spectrum of Non-Expired Paracip tablet with 5g concentration in Shoot Samples

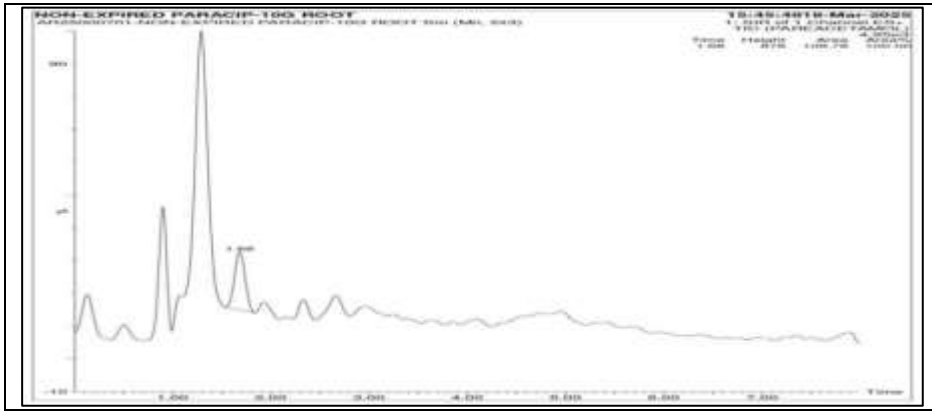

Figure 13. LC/MS Spectrum of Non-Expired Paracip tablet with 10g concentration in Root Samples

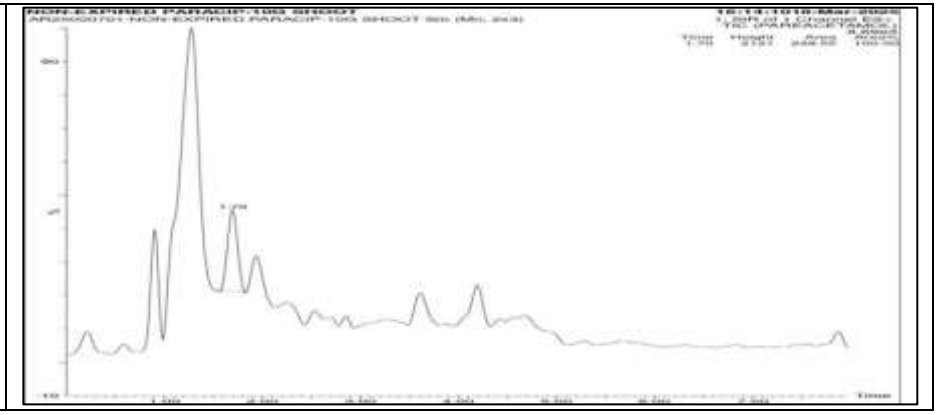

Figure 14. LC/MS Spectrum of Non-Expired Paracip tablet with 10g concentration in Shoot Samples

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

Table 3. Results of Phytotoxicity Study of Ranglim Tablets								
Tablet concentration		**No. of seeds Germinated**	**Germination Index (%)**	**Total No. of plants grown**	**Total Length of Root (cm)**	**Total Length of Shoot (cm)**	**Total No. of leaves**	**No. of Flowers and Pods**
Control		**48**	**96**	**48**	**5.5**	**6.5**	**5.0**	Nill
Expired	1g	41	82	37.5	3.55	6.76	2.5	
	5g	**43.5**	**89**	**40.5**	**4.10**	**7.25**	**2.6**	
	10g	42	84	**39.5**	3.90	7.02	2.4	
Non-expired	1g	45.5	91	43.5	6.82	10.73	3.5	
	5g	**47**	**94**	**44.5**	**7.87**	**11.44**	**3.6**	
	10g	46	92	41.5	7.15	11.04	3.3	

Note: The experimental results are the average values of two trails of each concentration

Expired Ranglim Treatment

Non-Expired Ranglim Treatment

During the present investigation, the experimental results of the phytotoxicity study of the expired and non-expired Ranglim VG1 tablets are presented in table 3.

In the expired ranglim VG1 treatment, with respect to various concentrations, the observation is presented as follows: In 1g ranglim treatment, out of 50 seeds, the average value for the seed germination was found to be 41 with a germination index of 82%. The total number of plants grown were found to be with an average value of 37.5. The average length of the root was found to be 3.55 cm and the total length of shoot was observed to be 6.76 cm. The average value for the total number of leaves in 1g ranglim treatment was found to be 2.5. In case of 5g ranglim treatment, the average number of seeds germinated was found to be 43.5 with a germination index of 89% and the average number of plants grown were found to be 40.5. The average length of the root and shoot in 5g ranglim treatment was found to be 4.10 cm and 7.25 cm. The average values for the total number of leaves were found to be 2.6. In case of 10g ranglim treatment, the average value for the seed germinated was found to be 42 with a germination index of 84% and the average number of plants grown were found to be 39.5. The average length of the root and shoot in 5g ranglim treatment was found to be 3.9 cm and 7.02 cm. The average values for the total number of leaves were found to be 2.4. In all the treatments, there was no formation of flowers and pods were observed (Hao Cui et al., 2016).

Similarly, in the non-expired ranglim treatment, with respect to various concentration, it was observed as follows: In 1g concentration of ranglim treatment, out of 50 seeds, the average value for the seed germination was found to be 45.5 with a germination index of 91%. The total number of plants grown were found to be with an average value of 43.5. The average length of root and shoot developed were found to be 6.82 cm and 10.73 cm respectively and the average number of leaves were found to be 3.5. In case of 5g ranglim treatment, out of 50 seeds, the average value for the seed germination was found to be 47 with a germination index of 94%. The average number of plants grown were found to be 44.5. The average length of root was observed to be 7.87 cm and the total length of shoot developed was found to be 11.44 cm, with an average number of leaves was found to be 3.6 in numbers. Whereas in case of 10g concentration of non-expired ranglim treatment, the average value for the seeds germination was found

to be 46 with a germination index of 92%. The total number of plants grown were found to be with an average value of 41.5. The average length of root and shoot in 10g concentration was found to be 7.15 cm and 11.04 cm respectively. The average number of leaves were observed to be 3.3. In all the treatments, there was no flowers and pods formation. In comparison with the expired and non-expired ranglim treatments, it was found that, the maximum germination index and plants grown were observed in the non-expired treatment. This indicates the toxicity level of the expired ranglim tablet on the fenugreek plants (Cui H., 2015).

Table 4. Results of LC/MS Study

	Expired Ranglim Treatment		**Non-expired Ranglim Treatment**	
Samples	**Peak Area**	**Percentage of Absorption (%)**	**Peak Area**	**Percentage of Absorption (%)**
1g Root	39225.93	0.87	714.62	0.28
5g Root	**239156.42**	**6.83**	**3222.51**	**1.27**
10g Root	8030.16	0.17	2266.84	0.67
1g Shoot	45856.32	0.28	736.54	0.102
5g Shoot	55560.10	0.93	1766.65	0.34
10g Shoot	132529.41	1.82	2268.89	0.248

The ranglim tablets has the combination of three drugs like, metformin, glimepiride and voglibose. Among all these combinations, in the present study, the higher percentage of absorption was recorded with metformin in the fenugreek plant samples. Since the other two drug contents present in the tablet was found to be lesser in dosage, it was not absorbed in the plant root and shoot system. Therefore, during the present study, from the LC/MS data, it was observed that, only the uptake of metformin content was observed in all the plant samples due to its higher concentration present in the tablet (Brett Nesporet al., 2020). Table 4 represents the LC/MS analysis showing the percentage absorption of both the expired and non-expired ranglim tablet in the fenugreek plants. The active pharmaceutical components in the ranglim tablets exhibited a molecular weight of metformin as 130.2292 g/mol with the retention time of 1.06 mins (Figure 15). Figure 16 represents the expired ranglim tablet standardization.

From the LC/MS data, it implies that, with respect to varied concentration in the root and shoot system, a variation in the percentage of absorption of expired ranglim was observed. In the expired ranglim treatment, the minimum percentage (0.17%) absorption of the expired tablet was observed in 10g concentration in the fenugreek root sample (Figure 20) and the maximum percentage (6.83%) absorption was found in 5g concentration of the expired ranglim treatment in the root sample (Figure 19).

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

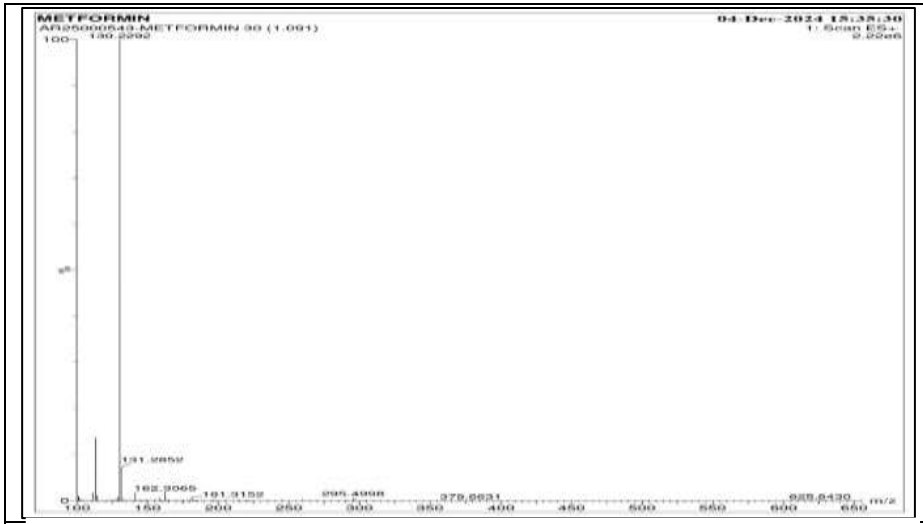

Figure 15. LC/MS Spectrum of Metformin Molecular Weight

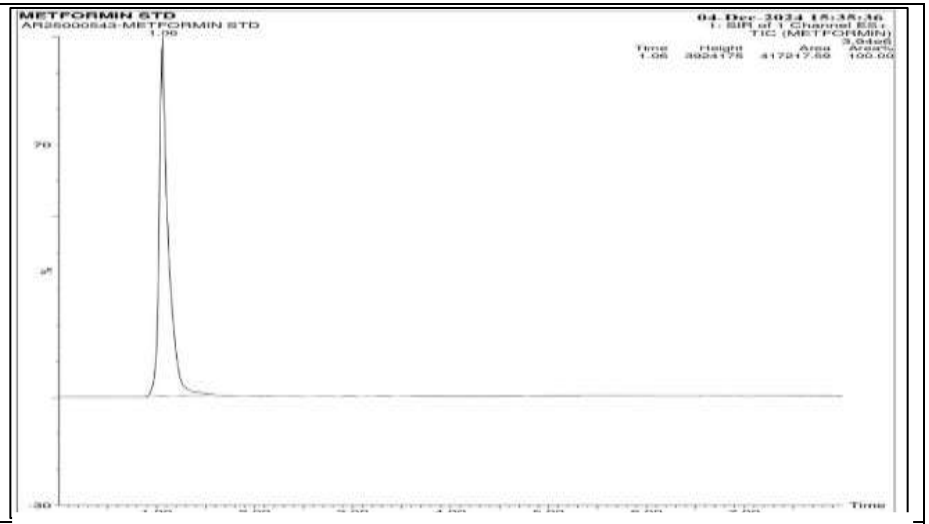

Figure 16. LC/MS Spectrum of Expired Ranglim Standardization

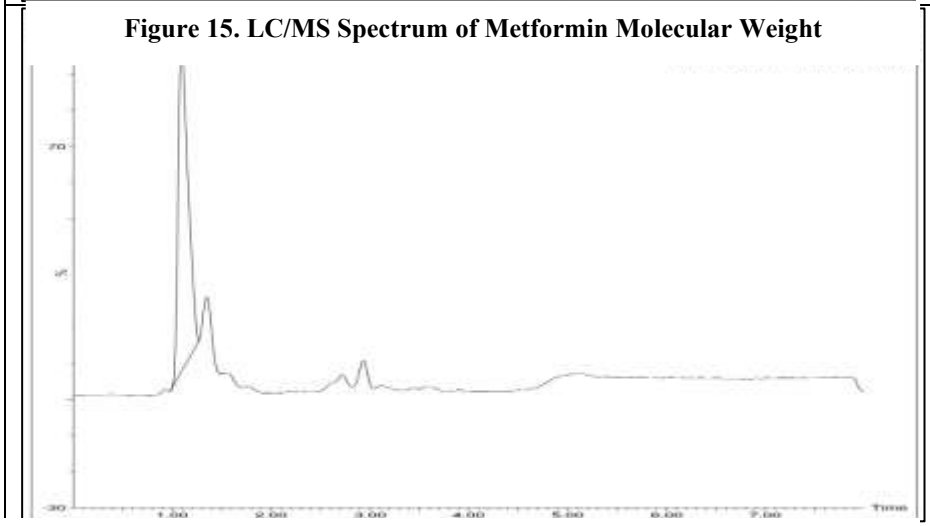

Figure 17. LC/MS Spectrum of Expired Ranglim tablet with 1g concentration in Root Samples

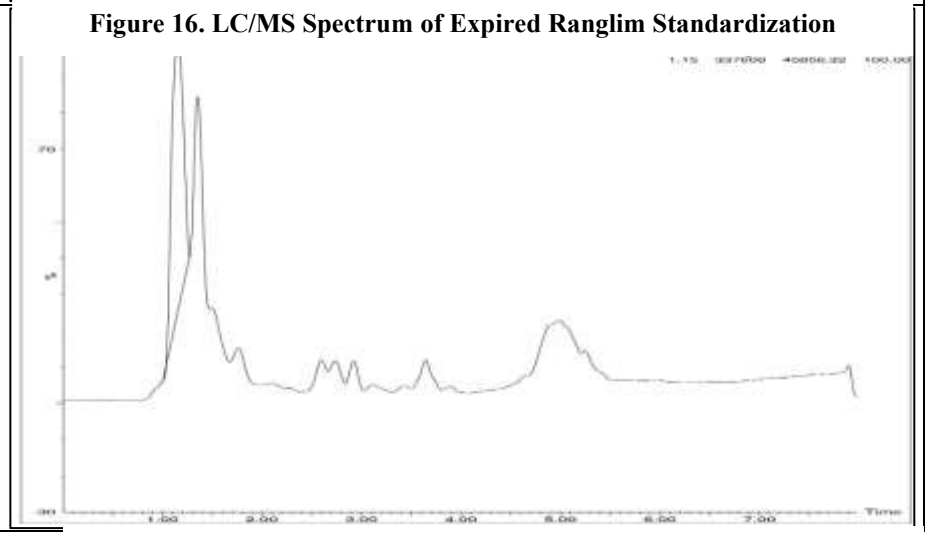

Figure 18. LC/MS Spectrum of Expired Ranglim tablet with 1g concentration in Shoot Samples

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

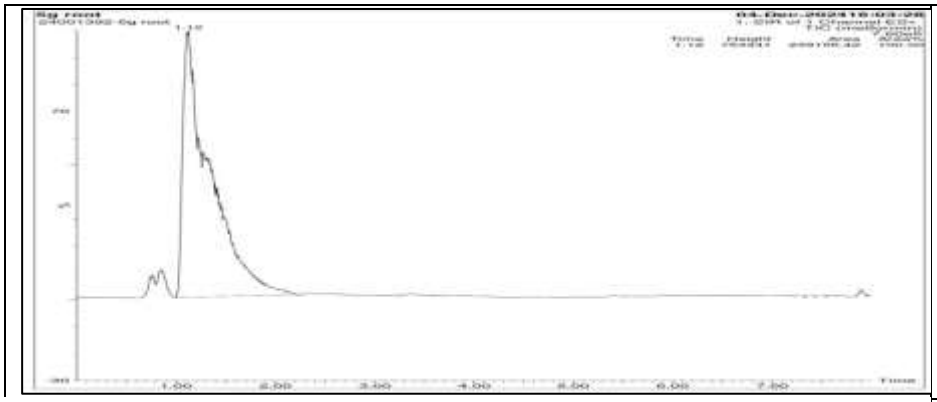

Figure 19. LC/MS Spectrum of Expired Ranglim tablet with 5g concentration in Root Samples

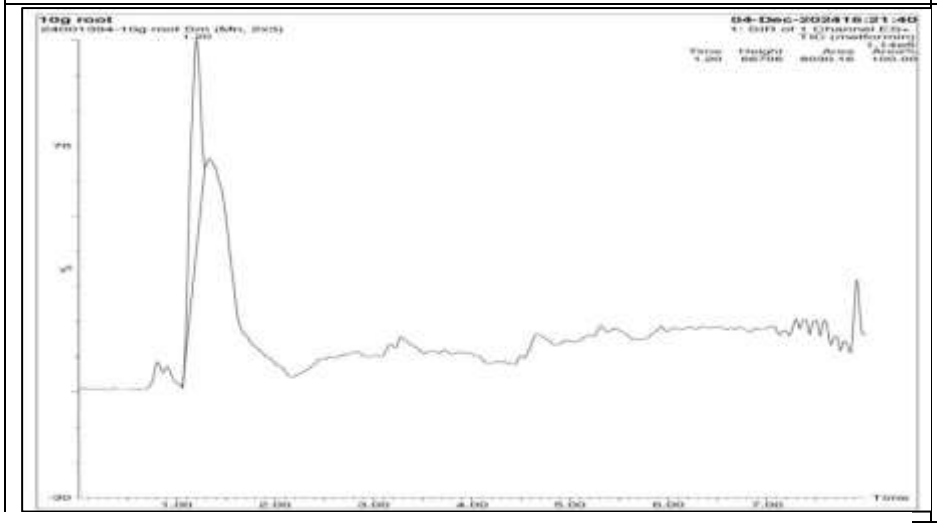

Figure 20. LC/MS Spectrum of Expired Ranglim tablet with 10g concentration in Root Samples

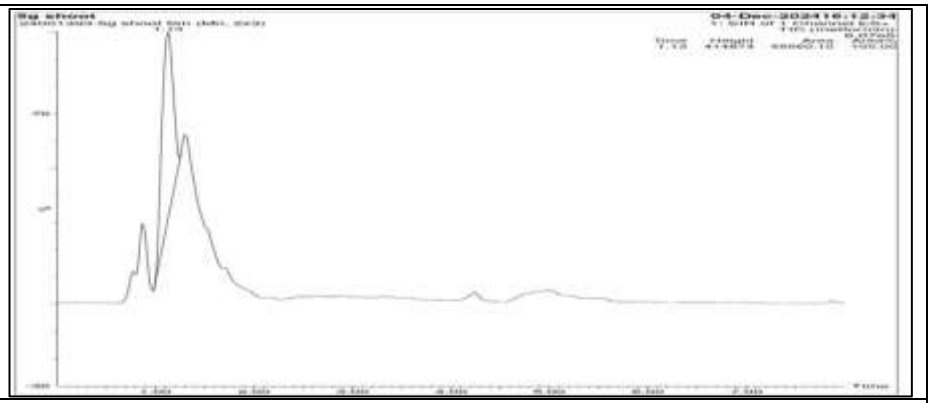

Figure 21. LC/MS Spectrum of Expired Ranglim tablet with 5g concentration in Shoot Samples

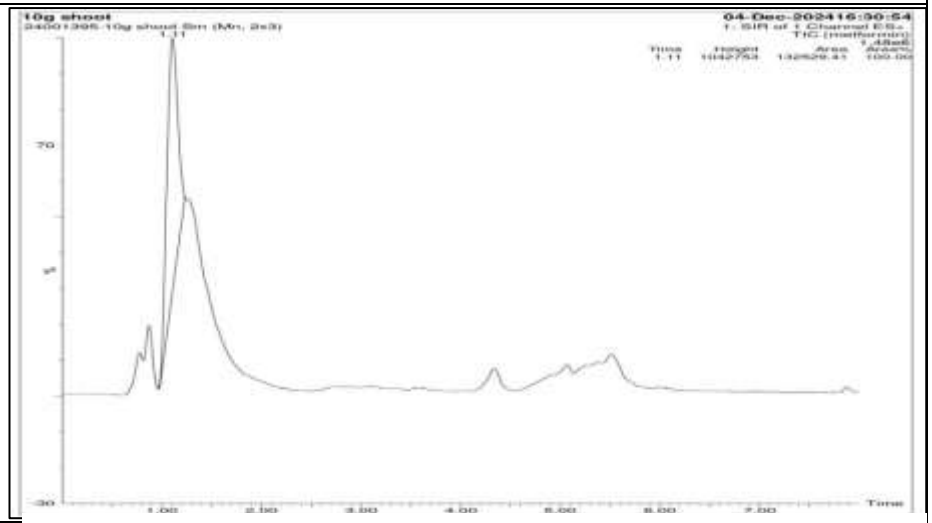

Figure 22. LC/MS Spectrum of Expired Ranglim tablet with 10g concentration in Shoot Samples

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

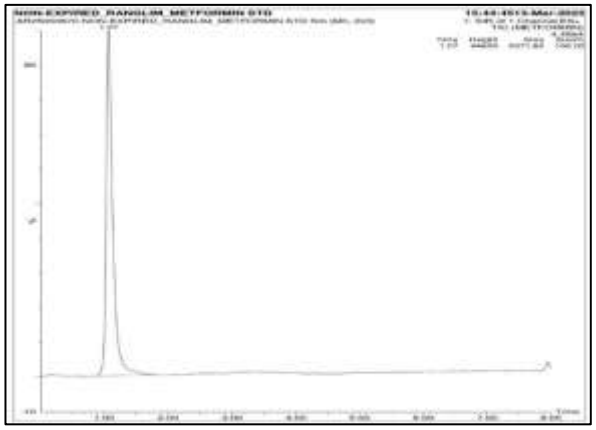

Figure 23. LC/MS Spectrum of Non-Expired Ranglim Standardization

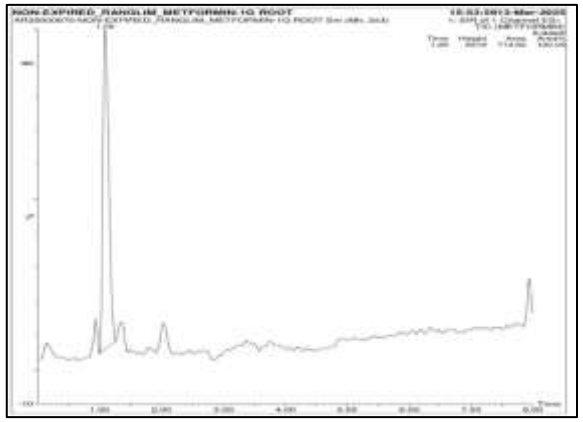

Figure 24. LC/MS Spectrum of Non-Expired Ranglim tablet with 1g concentration in Root

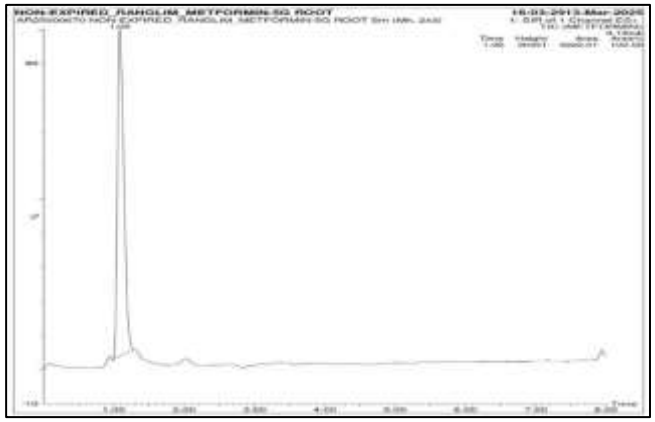

Figure 25. LC/MS Spectrum of Non-Expired Ranglim tablet with 5g concentration in Root

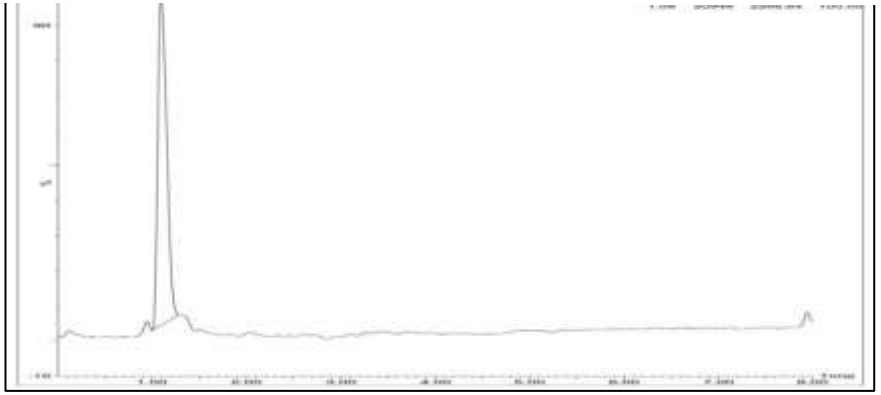

Figure 26. LC/MS Spectrum of Non-Expired Ranglim tablet with 10g concentration in Root Samples

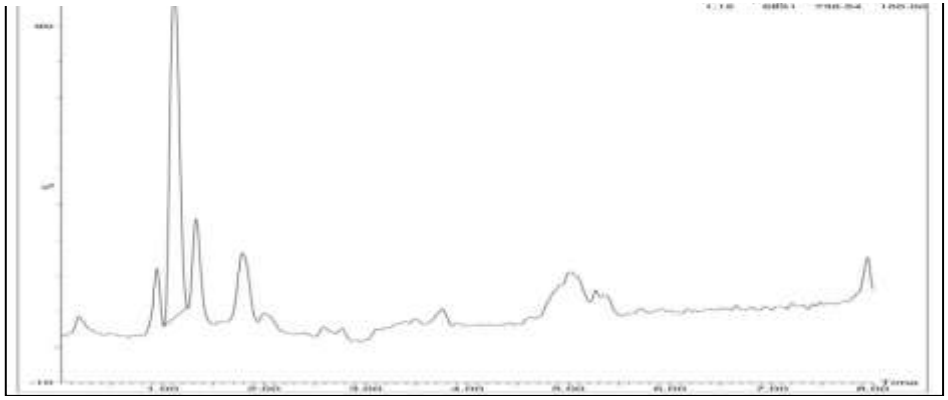

Figure 27. LC/MS Spectrum of Non-Expired Ranglim tablet with 1g concentration in Shoot Samples

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 7, 2025
https://www.theaspd.com/ijes.php

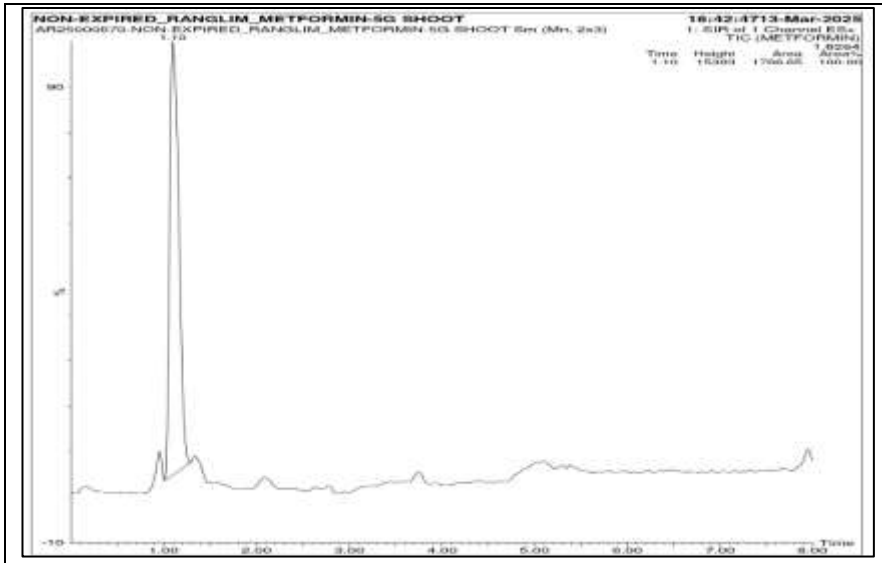

Figure 28. LC/MS Spectrum of Non-Expired Ranglim tablet with 5g concentration in Shoot Samples

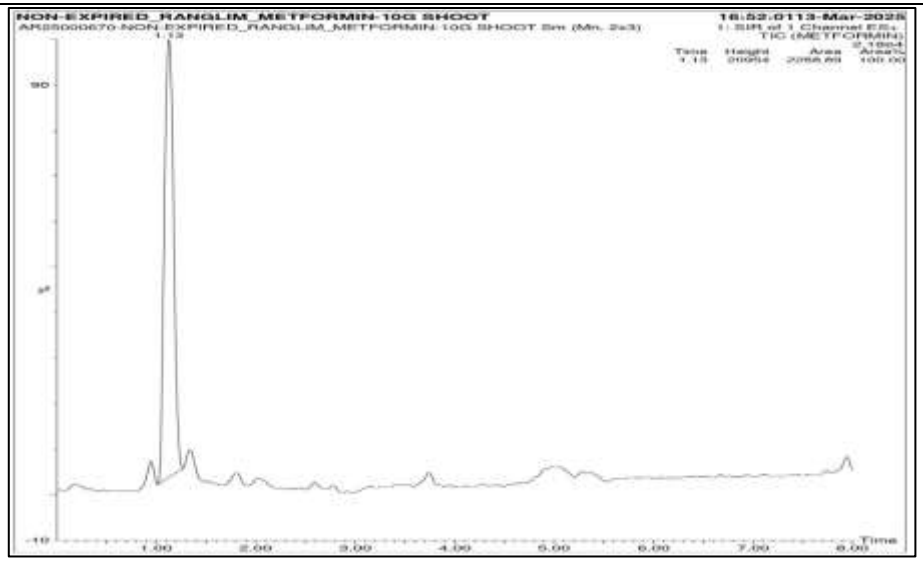

Figure 29. LC/MS Spectrum of Non-Expired Ranglim tablet with 10g concentration in Shoot Samples

Similarly, the figure 23 represents the non-expired ranglim tablet standardization. From the LC/MS analysis, it was observed that, the minimum percentage absorption of non-expired ranglim was found to be 0.102 % in 1g shoot sample (Figure 27). The maximum percentage absorption was observed to be 1.27% in 5g root sample (Figure 25). From the results, it was observed that, in comparison with both the treatments, the maximum percentage absorption of ranglim tablets was found to be in expired treatment in the root samples.

CONCLUSION:

From the study, it was found that, the significant effect of the expired and non-expired paracip and ranglim tablet on the growth and absorption patterns of the fenugreek plant was observed. The phytotoxic effect of the expired paracip tablet on the fenugreek plant was shown in 10g concentration, as the germination of seeds were found to be significantly nil. The results indicate that, the expired paracip tablet showed toxic impacts on the growth of a fenugreek plant, particularly in the higher concentrations. From the experimental results of LC/MS data, it was observed that, the plant shoot part consistently shows the higher peak area in the expired paracip treatment. The maximum percentage of the absorption was found in 1g concentration (0.063% - shoot sample) of the expired paracip in comparison with the other concentration. Similarly, in case of ranglim treatment, the maximum germination index was observed in non-expired ranglim treatment. The maximum percentage absorption of the metformin was observed in 5g concentration of both expired and non-expired ranglim treatment in root samples. Most of the drug compound is retained within the root system, with only limited transport to the aerial parts of the plant. The large-scale disposal of the expired paracip and ranglim tablets represents a significant risk to the soil health and overall physiological functions of the fenugreek plant. The elevated concentrations not only exhibit the phytotoxic effects but also lead to the compound's accumulation within the root system, thereby reducing the nutrient absorption and the plant development. Additionally, the potential leaching of these expired medicines into the groundwater and surface water raises concerns regarding the widespread environmental contamination. Therefore, implementing safe disposal strategies, such as controlled incineration or chemical neutralization, is essential to mitigate the ecological hazards.

Acknowledgement

I would like to thank JSS Academy of Higher Education and Research, for providing the financial support to carry out my research work.

REFERENCES:

- Kadam A, Patil S, Patil S, Tumkur A., 2016, "Pharmaceutical Waste Management an Overview", Indian J Pharm Pract., 9(1):2–8.
- Khoshgoftarmanesh, A.H. and Kalbasi, M., 2011., "Effect of municipal waste leachate on soil properties and growth and yield of rice", J of Communications in Soil Science and Plant Analysis., 33: 1-11.
- Trine Eggen and Cathrine Lillo., 2012, "Antidiabetic II Drug Metformin in Plants: Uptake and Translocation to Edible Parts of Cereals, Oily Seeds, Beans, Tomato, Squash, Carrots, and Potatoes", J of Agriculture and Food Chemistry., 60: 28: 6929-6935.
- Al-Farsi, R. S., Ahmed, M., Al-Busaidi, and Choudri, B. S., 2017., "Translocation of pharmaceuticals and personal care products (PPCPs) into plant tissues A Review", J of Emerging Contaminants., 3(4): 132–137.
- Mahmoud Bahmani, Hedayatollah Shirzad, Mahmoud Mirhosseini, Azadeh Mesripour and Mahmoud Rafieian Kopaei., 2015, "A review of ethnobotanical and therapeutic uses of fenugreek", J of Evidence-based complementary and Alternative Medicine., 21 (1), 53-62.
- Jing An, Qixing Zhou, Fuhong Sun, Lei Zhang., 2009, "Hazardous Materials, Ecotoxicological effects of paracetamol on seed germination and seedling development of wheat", J of Hazardous Materials., 169: 751-757.
- Ocsana Opris, Iidiko Lung, Maria-Loredana Soran, Lucian Copolovici., 2020, "Impact Assessment of Acetaminophen (paracetamol) on Phaseolus vulgaris L. and Triticum aestivum L. Plants", J of Revista de Chimie., 71 (3), 549-557.
- Hao Cui and Peter Schroder., 2016., "Uptake, translocation and possible biodegradation of the antidiabetic agent metformin by hydroponically grown Typhalatifolia", J of Hazardous Wastes., 308: 355-361.
- Cui, H., Hense, B.A., Müller, J. and Schroder, P., 2015, "Short term uptake and transport process for metformin in roots of Phragmites australis and Typha latifolia", J of Chemosphere., 134: 307-312.
- Brett Nespor, Anastasia Andrianova and Sean Pollack., 2020, "Metformin uptake and translocation in chickpeas: Determination using liquid chromatography-mass spectrometry", J of American Chemical Society., 5: 1789-1795.
- Huan Wang, Hao Xi, Linling Xu, Mingkang Jin, Wenlu Zhao, Huijun Liu., 2021, "Science of the Total Environment, Ecotoxicological effects, environmental fate and risks of pharmaceutical and personal Care products in the water environment: A review", J of Science Total Environment., 788 (147819): 1-18.

- Amean A. Yasir., 2017, " Environmental Impact of Pharmaceuticals and Personal care products", J of Global Pharma Technology., ISSN 0975-8542: 58-64.
- David Muriithi Nyagah, Aldress Njagi, Milcah Njoki Nyaga., 2020., "Pharmaceutical waste: overview, management and impact of improper disposal", J of PeerScientist., 3 (2), 1-12.
- Juying Li, Qingfu Ye, Jay Gan., 2014, "Degradation and transformation products of acetaminophen in soil", J of Water Resources., 49(14), 44-52.
- R. Sridharan, Jemimah D. Peter, P. Senthil Kumar, Veena Gayathri Krishnaswamy., 2022, "Acetaminophen degradation using bacterial strains isolated from winogradsky column and phytotoxicity analysis of dump site soil", J of Chemosphere., 286 (131570), 1-9.
- Christian Huber, Bernadett Bartha, Rudolf Harpaintner and Peter Schröder., 2009, "Metabolism of acetaminophen (paracetamol) in plants-two independent pathways result in the formation of a glutathione and a glucose conjugate", J of Environmental Science Pollution .,16: 206-213.
- Reda S, Enas Aljuhani, Rasha Felaly, Alaa M. Munshi., 2020, "Effect of expired paracetamol–Zn^{+2} system and its synergistic effect towards iron dissolution inhibition and green inhibition performance", J of Adhesion Science and Technology., 1-19.
- Laura J. Carter, Eleanor Harris, Mike Williams, Jim J. Ryan, Rai S. Kookana, and Alistair B. A. Boxall., 2021, "Fate and Uptake of Pharmaceuticals in Soil Plant Systems", J of Agriculture and Food Chemistry., 62: 816-825.
- Xu, Y., Yu, X., Xu, B., Peng, D., Guo, X., 2021, "Sorption of pharmaceuticals and personal care products on soil and soil components: Influencing factors and mechanisms", J of Sci. Total Environ., 753:141891.