



# Radiation Detection and Safety Limit Check for Predominantly Used Leaves in Traditional Medicine

Binu Abraham<sup>1</sup>, Purvee Bhardwaj<sup>1\*</sup>, and Sunil Kumar Garg<sup>2</sup>

<sup>1</sup>Department of Physics, Rabindranath Tagore University, Bhopal (MP), India, 462045

<sup>2</sup>Madhya Pradesh Council of Science & Technology, Bhopal (MP), India, 462045

Email: [purveebhardwaj@gmail.com](mailto:purveebhardwaj@gmail.com)

## Abstract

This investigation was directed to towards purely finding the radiation level in mango leaves in a small town in Maharashtra, namely Devlali. The process involved sun drying the sample for two days, crushing the leaves in a mixer and checking for radiation levels after placing in standardized container with an intention to maintain area of radiation, using a Geiger Muller(GM) tube. Further the GM tube was hovered over the sample area at the distance in observation. The process with the same samples was repeated after duration of 10 days to check for reduction in emission from the same. Due to the nature of the use of the mango leaves here, the radiation intensity was checked from small proximities. The conclusion drawn showed radiation very well within safety limits which imply yet another reason to follow and use herbal medicines from India.

**Keywords:** Radiation, Sample, Detection, Emission, Geiger Muller(GM).

**DOI Number:** [10.48047/nq.2022.20.22.NQ1037](https://doi.org/10.48047/nq.2022.20.22.NQ1037)

**2 NeuroQuantology2022;20(22):3654-3659**

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## 1. INTRODUCTION

Folk medicines have been utilizing traditional knowledge that has been passed over from generation to generation; in fact, they are associated with folk beliefs of large section of rural societies that we see today. The world health organization (WHO) defines traditional medicine as the “the sum total of the knowledge, skills and practices based on theories, belief, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness”. However, WHO maintains that “Inappropriate use of traditional medicines or practices can have negative or dangerous

effects and that further research is needed to ascertain the efficacy and safety.” “Herbal treatments are the most popular form of traditional medicine and 70% to 80% of the Asian and African region has used a form as primary health care. One third of the population lacks access to essential medicines and provision of safe and effective traditional and alternative remedies could become an important way of increasing access to health care services.” WHO further implemented a nine-year strategy to “support member states in developing proactive policies and implementing action plans that will strengthen the role traditional medicine plays in keeping populations healthy?”



Globally, the fraction of herbal medicines is starting to hold market because of the side effects of other lab prepared medicines [1]. Due to this it can be projected that the herbal market will be increasing on a larger scale. All of this calls for better research confirming safety from all dimensions as suggested by the WHO. A lot has changed since acquiring independence for India. An original article titled "current health scenario in rural India", published in Australian Journal of Rural Health in conjunction to international association of agricultural medicine and rural health and department of community medicine, Rural Medical college of Pravara Medical Trust, Maharashtra, India described the poor health conditions with elaborate statistics that causes these conditions to prevail. The underlying meaning being that health facilities due to several factors don't reach these citizens thus existence of traditional medicines that have been used in villages of India continue at the chance of healing or no healing. But, one good thing to notice is that these folk medicines have been used even before allopathy or homeopathy came to being in India and has roots to the herbs, leaves and roots acquired from their local area itself, which is easy for the practitioner to acquire.

One must note that positive health would mean a healthy metabolic activity, for that purpose any intake of medicines should ensure only healthy alterations in the absorption of nutrients by the body. Many of the herbal compositions done by these local practitioners use mango fruit skin, bark, roots, extracted oil, leaves largely because of the high nutritional value, which has been verified in various research works across various parts of the globe. Yet, these local practitioners have been using these since generations for the well-being of their family and the village they reside in.

The general perception with herbal remedies is that they are safe and has no or devoid of adverse effects. But this untrue and misleading as well. Herbal medicine has been showing a wide range of undesirable or adverse reactions some of which are capable of causing injuries of

varying orders and life-threatening conditions and death. The adverse reactions have been quoted in "the growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety" by Martins Ekor. There has been reports of varying kinds of reporting based on negative aspects. along with significant increase of worldwide usage, the safety of these medicines and its practitioners has been projected. So, unless a objective and fair understanding of the usage and cause of negative effects is presented, the rich culture of these many continents will be lost gradually. Some chief plants that are in usage around here are mango leaves, this work is motivated towards inspecting the radiation safety limit for mango leaves in particular. This would in turn assist in judging the negative effects of herbal medicines in a more objective manner.

The samples chosen are from 2km radius of the small town Devlali, Maharashtra. It may be noted that there are several villages namely Rauri, Aamgaon, Songaon in this proximity whose influences are seen with folk medicines still seen in Devlali as well. This work will attempt to check for radio activity levels in all mango leaves types used in this area and some more predominantly used leaves mentioned below, using a Geiger muller counter.

## 2. METHOD

The Geiger Muller (GM) counter has been used to study the measurement of all types of radiation in the present work. GM counter is a simple device designed to detection and measurement of radiation. Of the three types of radiation (alpha, beta and gamma), the alpha is the slowest and have the least penetration capability, meanwhile gamma has the maximum penetration capability. Again, beta particle and gamma rays can travel longer distances. Whilst alpha has a high ionizing capability, gamma and then beta can produce damage to tissue and cells of a living organism due to their sheer penetration. We used the GQ GMC 320 e-plus for the data accumulation here.

The leaf samples were collected from a 2 km radius extending into the rural area of Devlali,



Bhagur, Aamgaon, Songaon, Pandurli and Rauari villages. All these villages are not in the industrial belt, nor are they in the neighbourhood of one, hence there was no radiation that was considered from this end. Considering the nature of the usage of the samples in folk medicines, the mass of the samples was kept to 20grams, which is nearly 20-25 times of the quantity used in a herbal composition.

The study carried out under the title "Uptake of 241-Am from major Indian soils and its distribution in plants" N. Vyas and K.B. Mistry gives a description of Am-241 from three major Indian soils [2]. This concluded that Am-241 once absorbed from the soil was not immediately released into the nutrient solution. Apart from that the distribution of Am-241 once absorbed, showed its maximum concentration in the primary leaves i.e., the oldest tissue. Considering this the samples chosen were from the bottom of the tree/plant. This would help in pushing the barriers further to understand the samples.

The mango leaf samples have been titled as S1, S2, S3, S4 & S5. Meanwhile the second set of are different from each other and have been taken from within a 100m proximity, so as to have the same soil and environmental conditions. Each

to fine powder and sieved to have uniform granules of nearly 1mm. The powdered sample was placed in a cuboidal container with a 5cm x 5cm.

The background radiation count was taken for a time duration of two minutes. The samples were placed in an open area to allow the background radiation to be present while the readings are taken, so as to simulate natural conditions. The Geiger muller counter was lined up at a distance of 2cm (approx.) from the sample and hovered in the same plane and data was recorded again for a duration of two minutes. The mentioned protocol was followed for all samples. The mango leaf samples were maintained for further 10 days and checked for counts again. This process was repeated for other type of leaf samples that are widely used in herb compositions.

**3. RESULTS & DISCUSSION**

The samples used in this investigation are Tulsi (Holy basil), Ajwain leaves (Ugargandha (sansk.)), ajowan caraway, Daddapatre, Mango leaves, Anar leaves (pomegranate), Papaya leaves, Sadabahar leaves (periwinkle), Mogar leaves (arabian jasmine). The samples chosen were with the consideration that they have predominance in many compositions of

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Parameters	Background	Ajowan caraway (Ajwain) leaves	Arabian jasmine (mogara) leaves	Papaya leaves	Periwinkle (sadabahar) leaves	Pomegranate (Anar) leaves	Holy basil (tulsi) leaves
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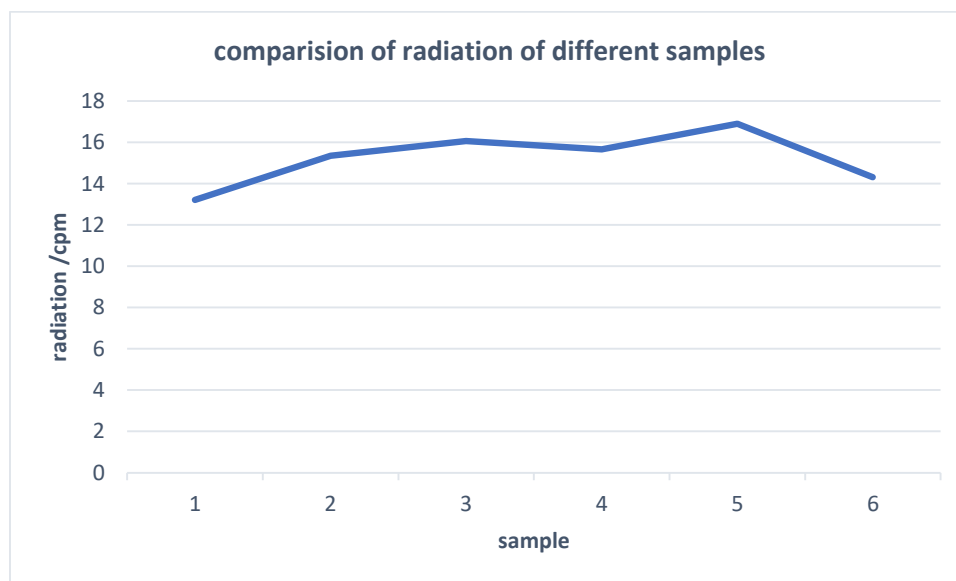
sample was washed in running water and sun-dried for two days. Further they were crushed

traditional medicine. These results are reported in Table-1.



Average counts per minute	15.157cpm(0.0864 uSv/h)	14.308cpm(0.0816 uSv/h)	15.348cpm(0.0875uSv/h)	16.067cpm(0.0916uSv/h)	15.667cpm(0.0893uSv/h)	16.892cpm(0.0963uSv/h)	13.211cpm(0.0753uSv/h)
Standard deviation	3.236	2.153	2.340	2.329	2.638	1.867	2.527

**Table-1**Different leaf samples taken



**Fig. 1** Comparisons of radiation of different samples

- 1) The radiation absorbed for these predominant leaves used for traditional medicines were found to lie between 0.0753uSv/h -0.0963uSv/h.
- 2) The standard deviations did not show high variation from the mean. Indicating a lack of high spiking radiation from any source mentioned above.
- 3) Tulsi (Holy Basil) showed the least radiation absorbing attributes.

- Numerous studies that at various levels show the clinical efficacy and safety in humans. The result shown here supports the same from the radiation point of view[3],[4],[5].
- 4) The lesser value in radiation confirms that Tulsi(Holy Basil) provides radio protective effects and is in sync many such researches carried out.

**Table-2** The mango leaf samples taken.

Parameters	Background	Sample 1(S1)	Sample 2(S2)	Sample 3(S3)	Sample 4(S4)	Sample 5(S5)
Average	15.157c	13.303cpm(0.07	13.733(0.	15.738cpm(0.08	15.853cpm(0.09	13.871cpm(



e	pm(	58uSv/h)	0782 uSv/h)	97uSv/h)	03uSv/h)	0.0791 uSv/h)
Standar d deviati on	3.236	4.447	4.258	5.147	3.947	4.829
After 10 days						
Averag e	14.328	11.891	12.000	13.437	14.205	10.071
Standar d deviati on	3.871	2.807	2.236	1.585	1.489	2.734

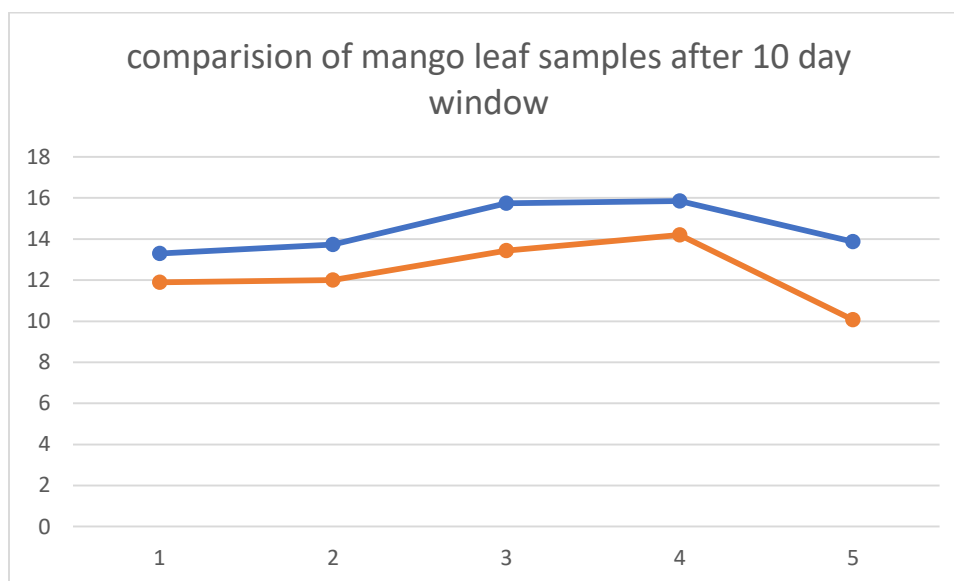


Fig. 2 Comparisons of mango leaf samples after 10 days

The figure 2 depicts the change in the radiation after 10 days. Samples showed changes ranging within 1.412 cpm-3.800 cpm. The sample 5 showed the maximum change in this period.

1) The samples S1, S2 and S5 showed a radio protection property, which implies that these may be preferred in preparing medicine compositions, unless its absolutely required to use the ones with high counts per minute.

2) Results after 10 days show dip in radiation level, which shows a possibility of elements that have a smaller half-life, yet this may need further analysis to identify the probable elements.

3) Again, referring to the work cited in [2], the radiation levels should have increased after absorbtion of elements like Am-241 from the soil. But since there was a dip in all samples it implies



there has been lack of presence of nuclides similar to Am-241 in the soil.

#### 4. CONCLUSION

The primary purpose of the evaluation was gaining insight into the existing initiatives of predominant leaves used as a traditional medicine. This purpose is well served when these medicinal leaves were used after collection from the local area of Devlali itself, the absorption of radiation from all sources put together were well within the limits when taken fresh, even though they were from the older part of the tree/plant. Yet, when it comes to using these for treating body parts that have been prescribed lower exposures by the AERB, it may be suggested that the leaves may be collected, maintained for at least 10 days before use, provided the chemical changes during this period is within the quality prescribed by other associated bodies, which may need further research. Further, Tulsi shows least absorption of radiation so the least harm can be expected via radiation levels, hence growing this at home fronts should be encouraged due to its other medicinal properties cited in many works.

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