Organic Vegetables: High Levels of Heavy Metals!

Organic vegetables fare no better than non-organic ones in tests

2 out of 9 organic samples had pesticide residues and 5 contaminated by heavy metals

Organic vegetables had higher levels of heavy metals than non-organic ones

Green, leafy vegetables like spinach and fenugreek are packed with goodness. They are low in calories and fat, great sources of vitamins, protein, dietary fibre and minerals (iron, calcium and nitrates), and are rich in phytochemicals.

In addition, if you are buying organic, you can rest assured that they will be free from pesticides and harmful elements. After all, organic vegetables are grown and harvested without the use of synthetic pesticides and fertilizers, growth hormones, antibiotics, genetically modified organisms, irradiation or artificial additives.

Consumer Education & Research Centre (CERC) tested organic samples of two commonly consumed leafy vegetables, spinach and fenugreek, from various sources for the presence of pesticides and heavy metals. To our alarm, CERC found that two samples out of nine contained pesticide residues and five had varying levels of heavy metals.

The presence of pesticide residues and heavy metals means organic vegetables are no more healthy and safe to consume compared to non-organic ones. Many synthetic pesticides and all heavy metals tend to be non-biodegradable and persistent. Accumulation in the body leads to adverse health effects.

Brands Tested

Spinach

- Paraj Organics
- Mangalam Organic Farm
- Big Basket (organic)
- Think Organic
- Vastrapur open market (organic)

- Big Basket (non-organic)
- Mahalaxmi Vegetables (non-organic)

Fenugreek

- Paraj Organics
- Mangalam Organic Farm
- Big Basket (organic)
- Think Organic
- Big Basket (non-organic)
- Mahalaxmi Vegetables (non-organic)

What CERC found

CERC tested five samples of organic spinach, four samples of organic fenugreek and two samples each of non-organic spinach and fenugreek. They were tested for 36 pesticides and three heavy metals – lead, copper and arsenic. The samples were tested against the values set by the Food Safety and Standards (Contaminants, Toxins & Residues) Regulations, 2011.

The sample of organic spinach and fenugreek procured from Mangalam Organic Farm showed the presence of trace levels of pesticide residues. Parathion methyl was detected in spinach (0.032 mg/kg) and fenugreek (0.073 mg/kg). Among the non-organic samples, the fenugreek sample from Big Basket showed trace levels of pesticide residues of chlorpyrifos (0.053 mg/kg). The two pesticides detected – chlorpyrifos and parathion methyl – belong to the organophosphate group.

Also, three out of five samples of organic spinach and two out of four of organic fenugreek had varying levels of heavy metals. None of the samples contained arsenic.

- Ironically, while one organic sample of spinach contained pesticide residues, both the non-organic samples were free of pesticides. One sample

of spinach (from Think Organic) had higher levels of lead and copper than the two non-organic samples. (See table for details)

In the case of fenugreek, the two organic samples (Think and Big Basket) that contained lead and copper, had much higher levels than the non-organic samples (Big Basket and Mahalaxmi Vegetables). The presence of heavy metals in both organic and non-organic vegetables are a matter of concern to consumers.

Certification mandatory for organic food

From July 2018, it will be illegal to sell organic food that is not appropriately labelled. The Food Safety and Standards Authority of India (FSSAI) has issued regulations that food companies selling organic produce have to get certified with either the National Programme for Organic Production (NPOP) or the Participatory Guarantee System for India (PGS-India). The product must also carry FSSAI's organic logo – Jaivik Bharat.

Why pesticide residues?

Rinsing reduces pesticides on the surface of vegetables, but it cannot remove those that are absorbed by the roots and make their way into the plant's tissue. Because of their large surface areas, leafy vegetables are likely to have high levels of pesticide residues.

Health implications: Over a long duration even microscopic quantities of pesticides can harm as they get accumulated in the body. Pesticide residues are particularly harmful for children, the elderly and those having chronic ailments like asthma.

Exposure to high levels of parathion methyl, even for short periods, may result in changes in the nervous system, leading to headaches, dizziness, confusion, blurred vision and difficulty in breathing. The United States Environmental Protection Agency (EPA) has banned the use of that insecticide on food crops commonly consumed by children. Chlorpyrifos has been linked to delays in learning, reduced physical coordination and behavioural problems in children.

Why heavy metals?

Heavy metal contamination may occur due to irrigation of agricultural land with wastewater contaminated with municipal wastes and industrial effluents. This leads to a build-up of metals at the sites. These metals get accumulated in the crops growing on the sites. The addition of inorganic fertilizers and metal based pesticides is another cause for heavy metal contamination.

Leafy and tuberous vegetables tend to accumulate higher concentration of heavy metals than grains and fruits.

Health implications: The intake of heavy metal-contaminated vegetables poses a threat to human health. Lead is a toxic metal, especially hazardous for children. It can accumulate in the body and harm almost every organ system. Hence, even low levels of exposure can be harmful. Very large single or long-term intakes of copper may cause male infertility. Exposure to copper can also damage the liver and immune system. Long-term exposure to arsenic from food can cause cancer and cardiovascular disease.

Test results: Organic Spinach and Fenugreek

SAMPLES PROCURED FROM	PESTICIDE RESIDUES[1] (mg/kg)		HEAVY METALS[2] (mg/kg)		
	Parathion methyl NMT[3] Nil	Chlorpyrifos NMT 0.05	Lead NMT 2.5	Copper NMT 30	Arsenic NMT 1.1
SPINACH					
Paraj Organics	ND[4]	ND	ND	ND	**ND**
Mangalam Organic Farm	0.032	ND	ND	ND	**ND**
Big Basket (organic)	ND	ND	0.07	1.43	**ND**
Think Organic	ND	ND	5.14	5.05	**ND**
Vastrapur open market (organic)	ND	ND	ND	6.27	**ND**
Big Basket (non-organic)	ND	ND	0.14	2.91	**ND**
Mahalaxmi Vegetables (non-organic)	ND	ND	0.11	2.14	**ND**
FENUGREEK					
Paraj Organics	ND	ND	ND	ND	**ND**
Mangalam Organic Farm	0.073	ND	ND	ND	**ND**
Big Basket (organic)	ND	ND	0.35	27.83	**ND**
Think Organic	ND	ND	5.14	4.59	**ND**
Big Basket (non-organic)	ND	0.053	0.10	1.93	**ND**
Mahalaxmi Vegetables (non-organic)	**ND**	**ND**	**0.08**	**1.97**	**ND**

NOTES

[1] and [2]Limits set as per the Food Safety and Standards (Contaminants, Toxins & Residues) Regulations, 2011 for conventional vegetables

[3] NMT= Not more than

[4] **ND = Not detected**

Price differential

Organic vegetables are much more expensive than non-organic ones. For instance, 1 kg of organic fenugreek procured from Big Basket cost Rs. 126, while 1 kg of non-organic fenugreek bought from the same seller cost Rs. 10! The organic variety was more than 12 times the price of the non-organic one.

Areas of action

- The Food Safety and Standards (Organic Foods) Regulations 2017 sets more stringent standards for insecticide residues in organic food. Similarly, there should be tighter standards for pesticide residues and heavy metals as well.
- These regulations give exemption for direct sales of organic produce by small farmers and producer organisations to the end-consumer. This exemption should be lifted.

- Steps should be taken by the government to sensitize farmers and vendors about the side-effects of using pesticides.
- Rigorous safety assessments should be undertaken by regulatory authorities about pesticide residues.
- The Indian National Programme for Organic Production (NPOP) should not just certify processes, but the final product as well.
- Regular monitoring of organic food quality, including that sold online, is necessary.

How to minimize pesticide residues

- As consumers, we do not have any control on the pesticides that are sprayed on fruits and vegetables in farms. But there are some quick techniques that can help us get rid of the residues to a large extent.
- Green leafy vegetables must be washed thoroughly. Washing with 2% of salt water will remove most of the contact pesticide residue that appears on the surface of vegetables and fruits.

- Certain pesticide residues can effectively be removed by blanching or treating with hot water or steam. It is important to thoroughly wash vegetables and fruits before blanching.
- Pesticides that appear on the surface of the fruits and vegetables can be removed by peeling.

Grahak Sathi's conclusion

The objective of the testing was to find out whether organic vegetables were safer to consume than non-organic ones. The testing proved that this is not so. That organic vegetables have higher nutritional value than non-organic ones is a matter of debate. Also, organic vegetables are much more expensive.

People want to make healthier choices and the Government must support them in this matter. It is vital that the regulatory authorities set standards and closely monitor the quality of organic produce.

Source: Grahak Sathi, February – March 2018, Volume 3, Number 5