**[Without pesticides](https://www.dawn.com/news/1876848/without-pesticides)**

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WE don’t need pesticides to grow healthy, nutritious and delicious food. Scientific research has established that healthy plants repel pests. “Insects only feed upon food that is considered unfit, nutritionally poor, dead or dying,” says entomologist Dr Thomas M. Dykstra. They cannot digest fully healthy plants. Their digestive systems cannot process the sugars locked up at certain stages of plant health.

Assessing a plant’s health level is simple. A small tool called Brix refractometer is required to measure the sugars in plant leaves. Even a layperson can use it easily. If it shows a leaf Brix level of six to eight per cent, aphids and scale insects lose interest in that plant. Sucking insects will not harm a plant with a leaf Brix ranging from seven to nine. Chewing insects can tolerate relatively complex sugars in the plant but they stop eating the plants when their Brix level reaches levels between nine and 11. Higher than 12, the leaves are difficult to chew and indigestible, and inedible for insects like grasshoppers. Between 12 and 20, plants are healthy and free of pest attacks. The food grown is nutrient-dense and fit for human consumption.

It is important to understand how nature helps plants achieve a level of health, which repels plant pests. Beneficial soil microbes play a pivotal role in building plant health. Microbiologist Dr Elaine Ingham explains their contribution in providing nutrients and the interactions and communication between plants and the tiny creatures invisible to the naked eye. In addition to providing a whole range of nutrients to plants on their demand, beneficial microbes under aerobic conditions cover the plant root system.

An oxygen-rich environment that helps them thrive poses a serious challenge to the survival of disease-causing microorganisms. Disease-causers flourish in anaerobic conditions. Beneficial microbes also protect all other plant surfaces. If beneficial microbes completely cover the plant surfaces, the disease-causing organisms will not have access to the plant tissue to harm it. They create a protective barrier. The beneficial microbes will out-compete the disease-causing organisms for space on the plant surfaces and food. Aerobic predators go for disease-causers and prey on them. Certain species of microbes produce antibiotics to chemically prevent competition from certain specific diseases or pests in their immediate surroundings. Plants whose surfaces, including root surfaces, are not covered and protected by beneficial microbes, contract diseases and become prey to insect pests.

The main thing is a living, healthy soil.

Ironically, the chemical pesticides used to kill pests and protect plants are major agents in killing the beneficial soil microbes that ensure plant health. Insecticides, fungicides and herbicides kill different categories of microbes. This massacre disrupts the intricate system of the endless supply of nutrients to plants that nature has put in place for us — free of cost — and creates an imbalance which paves the way for the disease-causers. Consequently, the current chemical-intensive commercial agriculture fails to achieve the Brix levels necessary to ensure plant health, thus making them vulnerable to pest attack.

Pre-Green Revolution evidence from the field affirms the scientific research. We have numerous stories from farmers of that period asserting that there were generally no real pest attacks before the Green Revolution. If there were minor attacks here and there, small-scale home remedies like wood ash did the trick. Old-growth forests also substantiate those stories. Pests don’t eat up plants and wipe out the forests because natural systems are at work there. Lu­­c­­­k-ily, we don’t use pestici­des there!

Scientific research has proven that if we avoid deep tillage, don’t use chemical pesticides and fertilisers, and create congenial conditions for beneficial microbes, we can once again have plants with robust health that repel the so-called pests and yield mouth-watering nutritious food.

We need to wean plants off pesticides immediately. If appropriate measures are taken to get the biology right for our plants and ensure that the food web in the soil is intact, we can reclaim soil health, have higher yields and decrease costs in the first growing season, says Dr Ingham.

The bottom line is a living, healthy soil. The United Nations recognises its centrality in ensuring food for the world population. Dec 5 is World Soil Day. It reminds us every year how critical it is to understand, manage, and care for this resource.

Regenerating our soils can free our farmers from the debt spiral, make our food poison-free, sequester carbon in the soil, help our environment become clean and safe, and protect people from malnutrition and disease.

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