# Use of Moringa Leaf Extract as an Effective and Easy Crop Growth Enhancer

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*In November 2015, ECHO staff member Dr. Tim Motis attended the First International Moringa Symposium in Manila, Philippines. There he met Dr. Basra, who has studied and promoted moringa extensively and who presented a talk with valuable information on moringa leaf extract. Basra's research on the use of moringa leaf extract to enhance crop yields builds upon and confirms findings by Nikolaus Foidl, whose pioneering work in this area was briefly summarized in EDN 68 (in 2000) in an article by Lowell Fuglie, one of the early promotors of moringa. Basra graciously agreed to share what he has learned about this topic with ECHO's network. Below are his responses to our questions.*

*Editors:* For those who are not aware of this concept, could you briefly describe what "moringa leaf extract" is and what it is used for?

**Basra:** Moringa leaves are rich in many compounds that can be helpful in promoting the growth of most plants. When moringa leaf extract (MLE) is applied at an optimized dose, it increases growth, alleviates biotic and abiotic stresses, and sometimes improves the quality and yield of the produce. Typically, MLE is applied to crop leaves as a foliar spray.

*Editors:* How did you learn about and become interested in studying moringa leaf extract?

**Basra:** I learned about MLE through Nikolaus Foidl and colleagues (Foidl *et al.* 2001), who first reported that moringa leaves are rich in many growth hormones, antioxidants and minerals, and that a diluted aqueous solution (made with tender moringa leaves) can increase yield of many crops by up to 20-35%.

*Editors:* Tell us about your research with this. What crops have you tried it on? Have you seen consistency in results?

**Basra:** During a stay at University of California, Riverside, I tested the MLE concept reported by Foidl and found that an aqueous extract of fresh moringa leaves, sprayed on cherry tomato, significantly increased the fruiting periods, number of fruits and final tomato yield. Then I analyzed the moringa leaves and found them to be rich in cytokinins (plant hormones that promote cell division) in the form of zeatin, along with high levels of total antioxidants, soluble proteins and potassium. After returning to Pakistan, I continued this research on a number of crops. An

extract from dried moringa leaves was also effective as a growth promoter. However, in most of the experiments, the maximum increase in yield was achieved with MLE from fresh/green leaves (comprising 3% of the weight of the water-based solution; a recipe for farmers is described later) used to prime the crop seeds (by soaking them in MLE for 8 hours before planting), and then also applied as a foliar spray at critical growth stages of the crop.

There are at least three different types of *Moringa oleifera* in Pakistan. They include two local types with white- or black-covered seeds, and an Indian-cultivated variety called 'PKM1'. Extracts of these three moringa sources were compared, and all were effective as growth promoters. However, the local landrace with a white seed cover performed better than others.
I tested the extract on a large number of crops, including maize, cotton, rice, wheat, canola, peas, carrot, radish, okra, spinach, citrus, range grasses, tomato, sunflower and sorghum. In all experiments, economic yields increased by 13 to 40%. I then evaluated foliar-applied MLE for its potential to boost the tolerance of various crops to different stresses such as salinity, drought and heat. The application of MLE successfully induced stress tolerance in most cases. Although results varied (with MLE used under different conditions, locations and crops), there was always increase in yield.

*Editors*: From what you have observed in Pakistan or elsewhere, have farmers adopted the use of moringa leaf extract?

**Basra:** This technology is being successfully adopted by many farmers, most of whom have small land holdings and limited access to proper fertilizers. Under such farming conditions, the increase in crop yield is even better (than in research plots that receive adequate fertilizer). Many progressive farmers (those most willing to try new ideas) have also adapted this technology. However, most farmers are reluctant to adopt it because of additional labor cost or unavailability of moringa.

*Editors:* How would you suggest that a farmer or development practitioner go about making and applying the extract? What ratio of leaves to water would one use, say, for application through a backpack sprayer?

**Basra:** For the farming community, I have developed a very simple method to make MLE and apply it to crops. Usually a 20-liter capacity backpack sprayer is used in Pakistan. Take one kilogram of fresh moringa leaves, wrap them in cheese cloth, and beat the cloth with a wooden stick to crush the leaves. The crushed leaves, still inside the cheese cloth, are used like a tea bag. MLE can be obtained by dipping the cloth-wrapped leaves many times in a water-filled backpack spray tank.
Alternatively, the crushed leaves in the cheese cloth can be submerged in the water and left to soak for 5 to 10 minutes. The resulting extract has the required dilution for priming or spraying. Three such tanks (3 kg fresh leaves in 60 liters of water) are sprayed on an acre (0.4 ha). This simple technology is working for many farmers.

*Editors:* Are factors such as application timing or age of moringa leaves important for success using MLE? Have you had to overcome challenges to succeed with MLE?

**Basra:** I recommend two to three sprays, at critical stages of a crop. A wheat crop, for example, could be sprayed at the tillering, booting and heading stages. When a crop is young, three 20-liter tanks of spray per acre will be sufficient. Use four tanks

per acre at the later growth stages.

The best time to spray is in the evening or early morning, especially in hot climates.

The effectiveness of MLE from the leaves of full-grown trees is almost the same as that from leaves of a multi-cut, densely-planted crop of moringa. However, an intensively-managed multi-cut plot of moringa lends itself well to repeated harvests of large quantities of moringa leaves.

Recently, I have been studying the effective shelf life of MLE, so that it can be marketed or used during times when fewer moringa leaves are available. I have noticed that the effectiveness of MLE declines after one month. It would be difficult to market MLE with only one month of effective shelf life. More research is needed to explore the effectiveness of dried moringa leaves as a source of aqueous extract. Dried leaves could potentially be stored for a period of time before making the extract.

*Editors:* What advice would you give to someone who is initially trying this out, to evaluate its potential for a given project area? Are there any publications, for example, that you would suggest for more in-depth reading?

**Basra:** I advise that they consider the health of moringa plants from which they are making extract. Remove any damaged and diseased plants from the field, and take only healthy moringa plants for leaf extract.

I regularly publish articles in local languages in newspapers and farmers' magazines, to share with farmers about the benefits and use of moringa, including use of MLE as a growth enhancer. I have also recorded many talks on radio and TV, and video clips are available on Facebook and YouTube.

*Editors:* If you are open to doing so, how should people contact you if they would like to correspond with questions?

**Basra:** I organize regular farmer field days to educate and motivate farmers to use MLE, and I provide literature in the local language. I have also established a Facebook page called "Moringa for Life," where this information is shared. Farmers regularly contact me by telephone or social media about the availability, benefits and use of moringa.

## References and further reading

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