

Alternative gardening where the soil is too salty

By Scientific American, adapted by Newsela staff on 02.09.15

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Bangladeshi women work at an agriculture field in Rangpur, 248 kilometers (155 miles), north of Dhaka, Bangladesh, Feb. 11, 2009. Photo: AP Photo/Pavel Rahman

KHULNA, Bangladesh — As storms have flooded the village of Chandipur with seawater, the soil there has become increasingly salty. As a result, farmland throughout the village has been ruined, and growing crops has become harder.

Chandipur is a village in southwestern Bangladesh and is regularly hit with extreme weather and flooding. The situation became particularly bad after Cyclone Aila in 2009, which brought storm surges that broke embankments and flooded farmland. After 2009, vegetable crops planted in the ground in Chandipur yielded only meager returns. Some failed completely.

For the past three years, however, hundreds of villagers have managed to grow crops in "vertical gardens." Vertical gardens consist of a variety of containers in backyards and on rooftops, packed with soil and crops. Vertical gardens can produce a lot of vegetables while taking up very little space. Also, they are protected from the harmful effects of flooding. They let farmers continue to cultivate vegetables despite the damage done to farmland.

Shakuri Rani Debnath, a resident of Chandipur in her 30s, says her vertical gardens generated nearly 440 pounds of fruits and vegetables this summer. These included pumpkins, squash, cauliflower, tomatoes, spinach and chili peppers.

Tough To Grow

Bangladesh is located at the delta of three of Asia's largest rivers, and most of the country is at or below sea level. Consequently, Bangladesh is prone to flooding and water-logging. The country experiences extreme weather, only made worse by climate change.

Rising sea levels and violent storms cause frequent flooding, and flooding brings salty water onto dry land. The salt then soaks into the soil, making it difficult to grow crops. The problem has been particularly severe in coastal areas along the surrounding rivers.

The loss of usable land is a pressing concern in Bangladesh, one of the world's most densely populated countries. There are about 156 million people in Bangladesh, almost half the population of the United States. Yet the people of Bangladesh live in an area about the size of Iowa. Growing enough food for all of those people is already a challenge in such a small country. It is made harder by the loss of land due to flooding. Moreover, Bangladesh's population will likely increase from some 156 million today to around 250 million by 2050, making the situation even more dire. Vertical gardens are a simple way that the poor can increase their food supply.

Climate Change Spawns Alternative Gardening

"There is no country with such population density where natural resources are stretched to their very limits," says Craig Meisner, the country director for Bangladesh at WorldFish, an international nonprofit organization headquartered in Malaysia. WorldFish has been building vertical gardens in southern Bangladesh, along with other means of coping with climate change.

Vertical gardens protect soil from being soaked with floodwater and becoming too salty as a result. So far, WorldFish is implementing vertical gardens only in Bangladesh, although examples of similar, local designs exist in other parts of the world. In theory, vertical gardens can work in salty soil in any area that gets heavy rainfall.

Working with local nonprofits, WorldFish trained about 200 villagers in four districts in southwestern Bangladesh to make vertical gardens. Others have copied their neighbors' designs after seeing how well they worked. WorldFish plans to expand the program to include 5,000 people over the next two years.

Harvest Soil, Fertilize And Grow

Growing the vertical gardens is relatively straightforward. Villagers harvest soil around November, and use it later during planting season. At this time of year, soil tends to be less salty because heavy rains from July to October wash salt away.

Villagers then put the soil into containers and mix it with fertilizer. To prevent water-logging, the containers are raised off the ground on bricks. They are also filled with brick chips that improve water circulation and drainage.

Small holes are cut into the sides where short-rooted vegetables such as Indian spinach and tomatoes can grow. Long-rooted vegetables such as gourds grow on top.

Small containers, which cost about \$1.30 to \$2.00 to build, can produce up to 17 1/2 pounds of vegetables in one season. Larger containers can produce more than 220 pounds of vegetables, at a cost of around \$11.50 to \$13.00 for materials and seeds. WorldFish provides seeds and some materials to villagers in the first year.

Fresh Garden Variety

Shobitha Debna, a 35-year-old mother in Chandipur, has a vertical garden that occupies just a corner of her dirt yard. Nevertheless, each season it produces hundreds of pounds of pumpkins, gourds, green beans, eggplant, beets, carrots, cauliflower, coriander, cabbage, green chili peppers and spinach. Another garden on her roof grows fat bottle gourds. The gourds grow from a few large, plastic containers that once held animal feed.

Vertical gardens like Debna's produce a lot of extra food, which goes a long way for the rural poor in Bangladesh, who eke out a living on a few dollars a day.

Debna says she used to grow just one or two kinds of vegetables, but now her vertical gardens grow a large variety. Finding enough fresh water for her new gardens is a challenge, she admits. Still, she is able to grow crops with soil that, not long ago, was too salty to be of any use.

Quiz

- 1 Which sentence from the article BEST explains the importance of the vertical gardens?
- (A) Shakuri Rani Debnath, a resident of Chandipur in her 30s, says her vertical gardens generated nearly 440 pounds of fruits and vegetables this summer.
 - (B) Larger containers can produce more than 220 pounds of vegetables, at a cost of around \$11.50 to \$13.00 for materials and seeds.
 - (C) Debna says she used to grow just one or two kinds of vegetables, but now her vertical gardens grow a large variety.
 - (D) Vertical gardens like Debna's produce a lot of extra food, which goes a long way for the rural poor in Bangladesh, who eke out a living on a few dollars a day.
- 2 Select the paragraph from the introduction [paragraphs 1-4] that describes a significant event that may have contributed to the popularity of the new vertical gardens.
- 3 Read the sentence from the last paragraph of the section "Tough To Grow."

Bangladesh's population will likely increase from some 156 million today to around 250 million by 2050, making the situation even more dire.

Which answer option BEST explains why the author includes this sentence in the article?

- (A) to identify the importance of the problem described in the article
- (B) to explain how Bangladesh will change in the coming decades
- (C) to compare Bangladesh's problems to those of other countries
- (D) to establish the size and importance of Bangladesh

Nevertheless, each season it produces hundreds of pounds of pumpkins, gourds, green beans, eggplant, beets, carrots, cauliflower, coriander, cabbage, green chili peppers and spinach.

Which answer option BEST explains how the sentence develops and refines the main idea of the article?

- (A) It describes the types of food that are popular in Bangladesh.
- (B) It describes the types of food that would not grow in salty soil.
- (C) It shows the versatility of the vertical gardens.
- (D) It shows the healthiness of the vertical gardens.

Answer Key

- 1 Which sentence from the article BEST explains the importance of the vertical gardens?
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 - (B) Larger containers can produce more than 220 pounds of vegetables, at a cost of around \$11.50 to \$13.00 for materials and seeds.
 - (C) Debna says she used to grow just one or two kinds of vegetables, but now her vertical gardens grow a large variety.
 - (D) **Vertical gardens like Debna's produce a lot of extra food, which goes a long way for the rural poor in Bangladesh, who eke out a living on a few dollars a day.**
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Paragraph 1:

Chandipur is a village in southwestern Bangladesh and is regularly hit with extreme weather and flooding. The situation became particularly bad after Cyclone Aila in 2009, which brought storm surges that broke embankments and flooded farmland. After 2009, vegetable crops planted in the ground in Chandipur yielded only meager returns. Some failed completely.

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