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Making Youth Gardens Grow with Captured Rainwater . . . and Video

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Abstract: In the arid Southwest, water is a limiting resource. Rainwater harvesting is garnering favor, but many are unaware of the myriad uses for that water. Access to fresh, healthy food is also limited in many rural counties because the arid climate makes farming conditions difficult. Teaching youth gardening with rainwater increases the accessibility of local food and the importance of capturing water that might go unused. A series of videos made in youth and adult partnerships provides a tutorial for project duplication worldwide.

Introduction

President Obama's "Feed the Future" Guide outlines that the delivery of food aid is not enough to feed the hungry internationally. Steps must be in place to assure food security long term. With that goal in mind, growing a rainwater supported garden in the arid Southwest can be an avenue for providing fresh produce. Youth learn to install rainwater harvesting and drip irrigation systems, and gain a basic knowledge of plant germination and garden bed preparation. Furthermore, youth in the 4H20 Replenish project at Fort Huachuca Army Installation, sponsored by National 4-H Council and the Coca-Cola Foundation, learned technology skills as they created "how to" videos of each step in the implementation of the garden infrastructure, which can be a part of global education efforts.

Program

Arid conditions in the Southwest make it challenging to grow fresh food. Groundwater can be hundreds of feet below the surface and expensive to pump. Therefore, the use of rainwater harvesting and gravity drip irrigation systems can be the cornerstone of a financially feasible and sustainable, rural youth gardening experience. Gardening programs can create demonstration sites for public viewing and learning experiences for youth to design, create and maintain (Foerster & Barry, 2007).

To assure the sustainability of this and future gardening projects, local partnerships were garnered (Renquist, 2005), and educational videos were made. Daily, cameras were shared among participants, so by the time the outdoor garden plots were fully planted, dozens of hours of video had been saved in preparation for the work on the tutorial videos. Therefore, while the garden was busy growing, the youth and adult participants shifted their focus from constructing the garden infrastructure to creating a series of educational videos that would help others duplicate the project.

Participants prioritized important themes for films. The videos were story-boarded, and scripts were written and recorded as podcasts. Video, still photos, and Internet research combined to create films that educated about the science or skills in each process (Table 1).

Table 1.

Name and Site Location of Rainwater Harvesting Supported Gardening Project, Arizona

Name of Video	Site Location
Rainwater Harvesting	http://extension.arizona.edu/4h/content/video/rainwater-harvesting
Straw Bale Gardening Beds	http://extension.arizona.edu/4h/content/video/straw-bale-gardening
Sunken Bed	http://extension.arizona.edu/4h/content/video/sunken-bed-gardening
Measuring Water	http://extension.arizona.edu/4h/content/video/measuring-water-consumption
Plant Germination	http://extension.arizona.edu/4h/content/video/plant-germination-video
Drip Irrigation	http://extension.arizona.edu/4h/content/video/irrigation-system-news

Concluding the program, participants held a film premier at the Fort Huachuca Community Theater to share their videos with School Aged Services (youth in grades 1-5), parents, community members, and Middle School/Teen Program youth.

In southeastern Arizona, youth gardens are designed with rainwater collected from the roofs of gymnasiums, classrooms, and administrative buildings. Typically, one or more 2,500 gallon rainwater harvesting tanks are attached to drainpipes. The pipes are cut and refitted with PVC into the top of the rainwater tanks. A screening system keeps mosquitoes from laying eggs in the water. Tanks are black to resist algae growth.

Indoor grow lights germinate seeds for bedding plants, while outdoor garden beds are created. The 2009 project at Fort Huachuca Army Installation, Middle School/Teen Program (grades 6-12) used sunken beds as well as straw bale beds (straw bales used as a planting medium and are enhanced with nitrogen to increase nutrients) to provide control and variable plots. Soils in the area can be rocky and compacted, so amendment additions and rock removal are required. Straw bale gardens are an option for no-till gardening.

Once the gardening beds are prepared, PVC pipe runs in trenches from the bottom of the rainwater harvest tank to the garden beds. The Fort Huachuca system was designed to operate on gravity flow and utilized a low pound per square inch (psi) drip irrigation tape. In arid conditions, drip irrigation is 95% effective and reduces evaporation.

Bedding plants were planted in control and variable plots and were given equal amounts of water. However, the drip irrigation system was new to participants, and many questions arose with its use. A lesson was created that measured the square feet of roof that collected rain. It was multiplied by 0.623 to determine gallons, and then multiplied by an average rainfall. That total was divided by the four gutters on the building, which demonstrated how much rain would collect in one tank. Youth tested the drip system by timing the output over a 15-minute period and collecting water from one emitter in a pie plate.

Evaluation

The Arizona Life Skills Assessment Tool was used with 15 youth from the afterschool program in rural southeastern Arizona. Their responses are captured in Table 2. The assessment tool is a four point (1=low, 4=high) Likert Scale evaluation.

Table 2.
Life Skills Evaluation Results, Arizona

Because of participation in 4-H Garden Club, I am able to:	Before I participated	After I participated	Change
Wisely use the natural resources in my environment.	2.2	3.3	+1.1
Make healthy food choices.	2.5	3.3	+0.8
Choose activities that promote physical health and well being.	2.6	3.3	+0.7
Know the steps to germinate plants.	1.7	3.7	+2
Know how to collect rainwater for garden use.	1.9	3.7	+1.8
Averages	2.2	3.5	+1.3

Conclusion

Arid climates, local or international, call for creative gardening approaches. Creating rainwater-supported gardens allows for a naturally sustaining source of a precious limiting resource— water. Involving youth in building garden infrastructure teaches skills in rainwater harvesting, irrigation, as well as basic gardening. However, the extension of learning comes with the creation of the "how to" videos as community members as well as international educational opportunities abound through a film rather than text-based learning. Youth deepen their learning as they research and film the science base to the garden project for future duplication. Partnerships within the community sustain the project.

Extension is poised to lead communities to sustainable gardening programs through efforts already being undertaken throughout the nation via Master Gardener, 4-H Science, Expanded Foods and Nutrition Education Programs, school-based nutrition education programs, sustainability education, and community development efforts. It is the integration of these efforts and the addition of video technology that allow this type of programming to have widespread replication.

References

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