School Gardens Manual

Guide on How to Plan, Establish & Maintain a School Garden

Banjul, The Gambia

With contributions from:
SAFMU, NaNA, the Horticultural Department of the MoA & FIOH
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Introduction

Nutrition and education form the foundation of every child’s health, growth, and development. Children who go to school hungry, or lack certain nutrients in their diets, do not learn as effectively as well-nourished children. Poor nutrition also negatively affects their physical abilities and their resistance to diseases and infections. This in turn affects their future health and productivity, income and the country’s potential for development.

Investing in nutrition and education is thus key to breaking the cycle of poverty. The Government of the Gambia (GoTG) and the World Food Programme (WFP) are committed to achieving Millennium Development Goals 1 and 2: to eradicate extreme hunger and poverty and achieve universal primary education. Together, they are implementing the Capacity Development Project 2012-2016, which in contrast to previous school feeding projects, aims not only to get school meals to young students, but to develop the capacity of the government to manage school feeding. Capacity will be built from central level down to school level to enable all to have a part in bringing healthy food to our children. In partnership with GoTG and other organizations (i.e. FAO, UNICEF, Concern Universal...), WFP will promote school gardens as a part of the current project.

School gardens are an excellent way to complement a school feeding programme, as they provide nutritious foods, allowing students to eat a well-balanced meal and improve their overall health. School gardens further contribute to a healthy school environment and provide a platform for learning about agriculture, nutrition and the environment. The experience thus promotes the physical, educational, social and environmental well-being of the entire community. School gardens are one of the twelve components of the Essential Package, which WFP is jointly implementing with UNICEF, education development partners, and national governments.

The manual serves as a resource for teachers, students, parents and communities to aid in setting up a school garden and keeping it operational. It aims to give context-specific information for The Gambia, while also drawing on best practices from around the world. It provides guidelines on garden planning, establishment, upkeep, nutrition, health, and hygiene, as well as tips and tricks on how to use the garden as a teaching aid and why gardening is important for the environment.

I hope that this manual will be a valuable tool in helping schools to establish or improve their gardens, with a view towards improving child nutrition and education outcomes.

Vitoria Ginja
Country Director
World Food Programme, The Gambia
Acknowledgements

This manual has been developed by World Food Programme (WFP) The Gambia in collaboration with the School Agriculture and Food Management Unit (SAFMU) of the Ministry of Basic and Secondary Education, the Horticulture Department of the Ministry of Agriculture and the National Nutrition Agency. It also draws on the Gambian Garden Manual developed by Peace Corps, The Gambia as well as input from volunteers. Resources on school gardening were shared from Concern Universal to aid in the latest edition of this manual. Many thanks are extended to these organizations for their valuable inputs.

Gratitude is also extended to the Food and Agriculture Organization (FAO) and Rural Finance Project (RFP), who jointly implemented The National School Garden Programme (2010-2012). They provided valuable input during the planning and organization of the training and manual.

Thank you to the schools included in the first two years of the school garden programme. It has been a pleasure to work with and learn from you all.
## Glossary of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCS</td>
<td>Basic Cycle School</td>
</tr>
<tr>
<td>CM</td>
<td>Cluster Monitor</td>
</tr>
<tr>
<td>ECDC</td>
<td>Early Childhood Development Center</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>FFE</td>
<td>Food for Education</td>
</tr>
<tr>
<td>FIOH</td>
<td>Future In Our Hands</td>
</tr>
<tr>
<td>FMC</td>
<td>Food Management Committee</td>
</tr>
<tr>
<td>GoTG</td>
<td>Government of the Gambia</td>
</tr>
<tr>
<td>LBS</td>
<td>Lower Basic School</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
</tr>
<tr>
<td>MoA</td>
<td>Ministry of Agriculture</td>
</tr>
<tr>
<td>MoBSE</td>
<td>Ministry of Basic and Secondary Education</td>
</tr>
<tr>
<td>NaNA</td>
<td>National Nutrition Agency</td>
</tr>
<tr>
<td>PTA</td>
<td>Parent Teacher Association</td>
</tr>
<tr>
<td>RED</td>
<td>Regional Educational Directorate</td>
</tr>
<tr>
<td>RFP</td>
<td>Rural Finance Project, Ministry of Agriculture</td>
</tr>
<tr>
<td>SAFMU</td>
<td>School Agriculture and Food Management Unit, Ministry of Basic and Secondary Education</td>
</tr>
<tr>
<td>SAU</td>
<td>School Agriculture Unit, Ministry of Basic and Secondary Education</td>
</tr>
<tr>
<td>SFP</td>
<td>School Feeding Programme</td>
</tr>
<tr>
<td>SMC</td>
<td>School Management Committee</td>
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<tr>
<td>WFP</td>
<td>World Food Programme</td>
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</tbody>
</table>
Why School Gardens?

These are some of the benefits that establishing a school garden provides for the school, the staff, students and community:

- **Nutritional**: improves children’s diet by supplementing school meals with vegetables and fruits that are rich in vitamins and minerals.
- **Educational**: reinforces theory with practice by teaching children about food production, natural resource management, health and nutrition, business skills and entrepreneurship, and provides an outdoor space for teaching and learning.
- **Environmental**: improves the school environment while creating environmental awareness and understanding.
- **Life Skills**: children learn how to plan, make decisions, take responsibility and collaborate with others.
- **Community**: brings together the school and the community.
Planning a School Garden
Planning a School Garden

Who Will Be Involved?

Before starting work on the garden, establish who will be involved and what their responsibilities will be. The school should already have a School Management Committee (SMC) and a Learner Welfare & School Environment sub-committee in place. One of this sub-committee’s key tasks is the management of the school feeding programme and the school garden or farm (see p. 42 of the SMC Manual, January 2008 edition).

The school Headmaster and Garden Master, if there already is one, should create enthusiasm for the project by sensitizing the community on the importance of school gardens as an educational tool and a nutritional supplement to WFP school meals. This sensitization could be done as a school or in coordination with the local Ministry of Agriculture and NaNA extension officers. Find individuals who are willing to commit time towards the planning and execution of a garden.

A Garden Master and Assistant Garden Master should be appointed. These should be people with some specialized knowledge of gardening and agriculture, and it is particularly useful if he/she is also a ‘people person’ who can encourage people, adults and children alike, to get excited about gardening.

These are some other people who can be involved in making the garden a success:

- School Head Master
- Agricultural, Home Economics, Science or any other teachers
- School caretaker
- Members of the PTA, SMC, Food Management Committee (FMC), School Environment & Learners’ Welfare Committee Members or Mothers’ Club
- School cooks
- Village Alkalo / Imam
- Extension workers from the Ministry of Agriculture and Ministry of Forestry
- Students
- Parents and any other interested community members
The more people that are involved, the less burden will fall on individuals. Getting the community to participate is also important in ensuring that gardening knowledge and training gets shared. This will prevent knowledge from being lost when a staff member leaves the school or community members move, thus ensuring the continuity and sustainability of the garden.

**What Will We Do?**

The Garden Master will have the most important role in planning, establishing and maintaining the garden. He/she should establish what needs to be done, delegate jobs and supervise the work conducted. However, there are also a multitude of other things that can be done for, in and around the garden. Here are some of the things that teachers, students, parents and community members can do to help make the garden a success:

- **Organize** community participation, a garden clean-up day or the sales of the garden’s extra produce;
- **Participate** in deciding what the garden will look like, what vegetables will be grown and how the garden will be integrated into the curriculum as well as the school meals;
- **Build** a garden shed, fence or wall;
- **Demonstrate / Train** people in gardening techniques, good nutrition or food hygiene and preparation (this is particularly useful in rural areas where many families already farm and a good way for school cooks to be involved);
- **Provide** seeds, tools, manure, materials for the compost heap, sticks / poles for fencing, recipes, etc;
- **Help** with digging, weeding, watering, clearing land or tending to the garden during holidays;
- **Encourage** children and other community members to participate in gardening activities and teachers to use the garden as a learning center.
Who Will Do What?

It is important to establish beforehand what everyone's roles and responsibilities will be. Garden Masters cannot do all the work by themselves. Similarly, children can do many small chores in the garden, but they are not a labor force. Gardening should first and foremost be a fun learning activity, where children learn how to take on responsibilities, make decisions, plan, organize and collaborate. If gardening is seen as a punishment, the whole activity will defeat its purpose.

Before starting, make a clear plan of who is responsible for what. There are many ways to go about this. Gardening can be done during class time or as an after school activity. Small groups of children can each tend to their own bed, or each grade can be responsible for one activity, such as tilling, watering or weeding the garden. Responsibilities can be rotated on a monthly or termly basis so that everyone gets to do different jobs and people do not get bored. Whatever the arrangement, make a schedule of activities and make sure people stick to it. It is particularly important that the garden does not get neglected during the holidays. Giving people incentives is a good way to make sure the work gets done (usually more so than giving out punishments if they don’t). See Using a School Garden as Teaching Aid: Tips & Tricks, p. 74.)
Making a Plan

"He who fails to plan is planning to fail." - Winston Churchill

Involve as many people as possible right from the planning stage. If people take part in the decision-making process it promotes ownership and people will be keener on investing time and energy in the garden. Brainstorm on:

- what the garden should look like, what will be grown,
- how it will be integrated into the curriculum and
- what will be done with the produce.

It is a good idea to have a meeting to sensitise the community and involve them in planning the garden.

Once you’ve decided on the key issues, make an action plan, identifying the people responsible and deadlines. This should include activities necessary for the establishment of the garden, but can also include long-term goals such as when you foresee the first harvest, or when you want to sell the first produce. Check your action plan often to assure that your activities are on schedule and you don’t forget anything. Make several copies of the action plan. Keep one in the garden record book and post one on the wall in the head teacher’s office. Post others where they are visible and can serve as a reminder of tasks.

Creating a timeline for larger events together with the children also teaches kids planning and gives them something to look forward to. Individual classes or smaller groups of students can create a weekly or monthly work schedule to plan what needs to be done in their own beds and in communal areas such as the nursery or compost heap.

The following examples should serve as templates for the formatting of your action plan, timeline and work schedule. You should modify activities, persons responsible and the schedule to suit your school.
## Sample Action Plan

<table>
<thead>
<tr>
<th>Activity</th>
<th>Persons Responsible</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decide on a variety of vegetables to grow in garden</td>
<td>Garden Master, School Cooks, Garden Club</td>
<td>10 September 2013</td>
</tr>
<tr>
<td>Create map of garden lay-out</td>
<td>Garden Master, Agricultural Sciences teacher, Grade 5 students</td>
<td>12 September 2013</td>
</tr>
<tr>
<td>Organize a teacher work session to cooperate on making lesson plans that incorporate the garden into the curriculum</td>
<td>Head Master, Garden Master, teachers for all grade 1-6 classes, Agricultural Sciences, Science &amp; Maths teachers</td>
<td>26 September 2013</td>
</tr>
<tr>
<td>Inspect and repair fence around garden</td>
<td>Garden Master, community members</td>
<td>1 October 2013</td>
</tr>
<tr>
<td>Prepare seedboxes</td>
<td>Agricultural Sciences teacher, Grades 3-4</td>
<td>1 October 2013</td>
</tr>
<tr>
<td>Prepare nursery beds</td>
<td>Agricultural Sciences teacher, Grade 6</td>
<td>3 October 2013</td>
</tr>
<tr>
<td>Water nursery bed daily</td>
<td>Grade 5 students</td>
<td>1 October 2013 until outplanting</td>
</tr>
<tr>
<td>Bring materials for compost heap</td>
<td>All children, community members</td>
<td>4 October 2013</td>
</tr>
<tr>
<td>Start compost heap</td>
<td>Agricultural Sciences teacher, Ministry of Agriculture Extension Worker, grade 6 students</td>
<td>6 October 2013</td>
</tr>
<tr>
<td>Remove weeds from nursery bed</td>
<td>Garden master, grade 3 students</td>
<td>8 October 2013</td>
</tr>
<tr>
<td>Planting of seeds in seedboxes &amp; nursery</td>
<td>Garden Master, Grades 3-4</td>
<td>9 October 2013</td>
</tr>
</tbody>
</table>
### Sample Timeline

<table>
<thead>
<tr>
<th>Action</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fencing Garden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation of Seedbox &amp; Nursery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation of Garden Beds</td>
<td></td>
<td></td>
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<tr>
<td>Composting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvesting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales of Produce</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sample Weekly Work Schedule

<table>
<thead>
<tr>
<th>Weekly Work Schedule Green Team, Grade 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week: April 14-18, 2014</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checking &amp; Recording</td>
<td>Measure Plant Growth - Ali</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communal Work</td>
<td>Turn Compost - Lamin</td>
<td></td>
<td></td>
<td>Fix Fence - Momodou &amp; Isatou</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class Work</td>
<td></td>
<td></td>
<td></td>
<td>Class Display on Garden Bugs &amp; Insects - Ali</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Where Can We Go for Help?

When it comes to gardening, you are not alone! There are a multitude of people and institutions you can contact for tips, advice or if you’ve encountered some problems along the way.

- **School Staff**: agricultural science, math, home economics and business studies teachers are an easy first point of reference for any issues pertaining to gardening, nutrition, food hygiene, preparation and conservation, marketing sales and accounting. School caretakers usually know more about the school environment than any other school staff and have lots of practical know-how.

- **Home gardens near the school**: identify well-managed home and community gardens near the school and ask the owners for help. They will probably be more than willing to offer advice, show children around, demonstrate gardening techniques or even donate seeds, seedlings or compost materials.

- **Agriculture extension workers**: a source of technical information and support for the school garden. They are great resources for answers to questions on pest control, choosing vegetables to grow, and any agricultural issues.

- **Agricultural businesses**: identify businesses in your area and ask if they would be willing to show students around or give a talk at the school. E.g. Alkharafi Vegetable Garden in Kafuta, Kanilai Farm, etc.

- **Farmers & Market Garden Centers**: such centers are often happy to allow children to visit, give information or demonstrations on horticultural techniques, marketing, food storage and conservation, or even to contribute seeds and lend out tools.

- **Youth Clubs**: persuade youth organizations such as your local scouts or sports club to lend a hand in cleaning the garden or doing other heavy-duty work.

- **Local Shops, Markets & Vendors**: these can provide an outlet for your fresh produce or provide useful advice on sales and marketing.

- **Local Council/ Water Authorities**: the Department of Water Resources, Area Council or other local authorities can help the school build a well, install running water, offer advice on implementing an irrigation system or help with rainwater collection.
• **Forestry personnel:** Foresters can help to advise on live fencing and tree nurseries for your garden.

• **Regional Public Sector Services:** your regional environmental focal point, community development officer or other service providers can give relevant technical information and offer advice on possible trainings being offered in your area.

• **Health Service:** your regional health team, and particularly the nutrition focal point, can give advice on children’s nutrition needs, the nutritional values of certain foods and offer guidance on school meals and what nutritious vegetables you might want to plant.

• **Specialized NGO’s:** NGO’s may be able to help with funding, supplies or expertise in a wide variety of areas such as agriculture or education. E.g. Concern Universal, Catholic Relief Services, Association of Farmers, Educators and Traders (AFET), Volunteer Services Overseas (VSO), Locust Emergence Project, etc.

• **Local Charities & Churches:** appeal to smaller local charities for financial or in-kind aid, for instance with garden tools or fencing. E.g. Anglican and Methodist Churches, Jammeh Foundation for Peace, Dakar-Banjul Plymouth, etc.

• **Companies & Firms:** larger businesses are sometimes willing to donate some money in exchange for some good publicity. E.g. Africell, Comium, Standard Chartered Bank, Trust Bank, etc.

• **The Media & Publicity Outlets:** contact newspapers, radio and TV to publicize your garden’s accomplishments or appeal for help in attaining a specific goal. Public places such as market centers, a local mosque or clinic can also be used to hang up posters advertising a produce sale or other garden event.

• **Alkali, District Chiefs & Governors:** important local politicians can often help give your garden some publicity or get your in touch with other persons or institutions that may be of some help.

• **Research Centers:** these can provide technical information or advice.

• **Regional Educational Directorates & SAFMU:** The REDs & SAFMU (best contacted through your Cluster Monitor) are always available to offer technical support, advice or other general information. At the very least they will be able to point you in the right direction for where to get specialized help.
Establishing a School Garden
Establishing a School Garden

Choosing a Site

A vegetable garden should be an essential part of every school. This is a piece of land where crops are intensively cultivated in the smallest space available. Unsuitable land near the school should not be abandoned for a distant piece of land where the soil appears to be more suitable. In such a situation, every attempt should be made by teachers and students to improve the land available and make good use of it.

A properly organized garden offers an opportunity for developing children’s minds and giving students healthy outdoor exercise which often eliminates classroom boredom. When organized properly, school gardens are also an excellent teaching and learning resources.

The following points will contribute to the successful selection of a suitable site for gardening:

1. **Water**: There should be an adequate supply of water in or near (less than 100m) the area selected for a garden either from a well, hand pump or tap. Open wells should not be used as they can be dangerous for children.

2. **Level Site**: The site must be leveled using appropriate garden tools.

3. **Fertile Soil**: The soil selected must be potentially fertile for an increased produce yield. The best soil for gardening is loam, which is a combination of sand, clay and silt with a high content of decomposed organic matter. This type of soil has a number of advantages such as its high nutritional value for plant growth, and its water-retaining capacity.

4. **Quality Seeds**: The quality of seeds determines to a large extent the yield a gardener is likely to get. Viable seeds give an optimum number of plants per hectare.

5. **Exposure to Wind and Sun**: The garden should not be exposed to strong winds as they are bad for seedlings. Similarly, avoid areas with dense shade as this weakens seedlings. If the garden is established in a windy area, put up wind breaks.
6. **Proximity to the School:** The garden should be reasonably close to the school so that children don’t have to walk too far to conduct garden activities, and to be able to closely monitor for insects, diseases and rodents. It is also useful if it is near a main road to facilitate transportation.

**Garden Size**

A school garden should be big enough to accommodate the needs of the school’s pupils and should thus take into account the school’s enrolment. Similarly, it should also not be so big as to become unmanageable. It is always better to start small and expand once teachers, students and community members have gained gardening experience. Stakeholders will also be more motivated to put in the work the garden needs when they see how successful a small garden can be.

It is recommended that every 3 pupils share a bed of 1 x 5m = 5 m². Allowance should be made for about 50 cm. of space between beds, so calculate 1.5 x 5.5 = 8.25 m² for every 3 students. This means that a garden of 20 x 20m = 400 m² can accommodate about 48 beds (400 / 8.25 = 48.48) and 144 students (48 x 3 = 144). Similarly, a garden of 50 x 50m = 2500 m² can accommodate about 303 beds (2500 / 8.25 = 303.03) and 909 pupils (303 x 3 = 909). On top of this, also take into account approximately a 10% buffer for a possible increase in school enrolment.

**Example:**

If a school has a roll of 580, you need about 194 beds (580 / 3 = 193.3) to accommodate all the children. Each bed plus footpaths is 8.25 m², so the school would need approximately 1600 m² of space (194 x 8.25 = 1600.5) to suit its current enrolment. An extra 10% can be added to allow for expansion (1600 x 0.1 = 160), bringing the total to 1760 m². This is equal to a plot of land of 44 x 40m = 1760 m².

If the space or resources that your school has available are smaller than the recommended amount, this should not be a cause for concern. More than 3 children can be assigned to one bed and a smaller garden can still be incredibly valuable in providing nutritional supplements and as a learning resource. However, 20 x 20m should be taken as a minimum size if the garden is to function as a proper learning resource.
Garden Lay-out

Once the gardening site has been selected, you must estimate the quantity of vegetables you want to grow and decide on the kinds of vegetables you want to produce. (See ‘What Vegetables Should We Grow?’ on p. 55 for a list of vegetables and their nutritional components). The position of beds and a plan that allows rotation of crops must be considered. Plan everything properly from the beginning and introduce improved gardening techniques where possible. Ensure proper spacing, plan a space for a live fence and choose adequate sites for the compost heap / pit and the nursery bed in the garden. If you plan on planting trees, such as Nitrogen Fixing Trees or fodder, interest people in the idea from the start.

Nitrogen Fixing Trees (NFTs) benefit other forms of life, and thus your garden, by boosting soil fertility and restoring nutrient cycling. They can also provide food, wind protection, shade, animal fodder, fuel wood, a living fence and timber. Some examples of NFTs are Lucena, Pigeon Pea, and any Acacia. You can ask your local agricultural extension worker for more information.

Before starting, measure the land and create a scale map on paper. This can also be a fun activity for children to be involved in. Younger children can draw ‘before & after’ pictures of what the site looks like now and what they think it should look like afterwards. Older children can measure the garden and reproduce a map to scale for their math class.

Make sure to discuss with stakeholders what plans you have, what the garden should look like and what is best to grow before a final choice is made. The children should be involved in this discussion; it is, after all, their garden!
**Gardening Calendar**

It is important to choose the right vegetables that are appropriate for cool and warm season weather. The following is a list of vegetables according to which season / term they can be grown. Contact your local agricultural extension worker for more details and advice. When choosing your vegetables also consider which vegetables should be grown for their nutritional value (See What Vegetables Should We Grow? p. 55)

<table>
<thead>
<tr>
<th></th>
<th>1st Term: Sept.-Dec. Cool Season</th>
<th>2nd Term: Jan.-April Warm Season</th>
<th>3rd Term: April-July Warm Season</th>
<th>Summer Holidays: July-Sept. Wet Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td></td>
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<tr>
<td>Beetroot</td>
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<tr>
<td>Bitter Tomato</td>
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<td></td>
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<tr>
<td>Broccoli</td>
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<td>Cauliflower</td>
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<td>Corn</td>
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<tr>
<td>Cowpea</td>
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<tr>
<td>Cucumber</td>
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<tr>
<td>Garden Egg</td>
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<tr>
<td>Irish Potato</td>
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<tr>
<td>Leek</td>
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<td>Lettuce</td>
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<tr>
<td>Okra</td>
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<tr>
<td>Onion</td>
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<tr>
<td>Parsley</td>
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<tr>
<td>Peas</td>
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<tr>
<td>Pepper</td>
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<tr>
<td>Pumpkin</td>
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<tr>
<td>Soya Bean</td>
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<td></td>
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</tr>
<tr>
<td>Spinach</td>
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<tr>
<td>Squash</td>
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<tr>
<td>Sweet Corn</td>
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<td>Sweet Potato</td>
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<tr>
<td>Tomato</td>
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</tr>
<tr>
<td>Turnip</td>
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<td></td>
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<tr>
<td>Watermelon</td>
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A Sample Garden Plan

<table>
<thead>
<tr>
<th>Carrot</th>
<th>Tomato</th>
<th>Cabbage</th>
<th>Carrot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden Eggs</td>
<td>Beet</td>
<td>Radish</td>
<td></td>
</tr>
<tr>
<td>Lettuce</td>
<td>Onions</td>
<td>Greens</td>
<td></td>
</tr>
<tr>
<td>Hot Pepper</td>
<td>Cucumber</td>
<td>Bitter</td>
<td>Tomatoes</td>
</tr>
<tr>
<td>Beans</td>
<td>Sorrel</td>
<td>Sweet</td>
<td>Pepper</td>
</tr>
<tr>
<td>Tomato</td>
<td>Carrot</td>
<td>Garden</td>
<td>Eggs</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Onions</td>
<td>Radish</td>
<td></td>
</tr>
<tr>
<td>Cucumber</td>
<td>Lettuce</td>
<td>Hot</td>
<td>Pepper</td>
</tr>
</tbody>
</table>

A convenient width for a vegetable bed is 1m and length can be anywhere from 3-5m. The distance between the bed paths can range from 30 – 50 cm. The approved plan should be kept to serve as a guide while making measurements during the actual work of laying out the garden. Long pointed pickets and larger number of short ones about 30 cm long will be needed for setting the permanent boundary lines. The construction of straight garden paths makes a garden look tidy and neat.

Live Fencing

Live fencing is the use of trees and shrubs to create an animal-proof barrier. A live fence can help to reduce pressure on the environment by replacing dead wood fencing with live materials. Additionally many live fence species have multiple uses such as food, fuel wood, fodder, poles, medicine, other raw materials, etc.

The challenge of live fences is that they require significant maintenance. Watering during establishment, pruning, reinforcing with dead material, and periodic replanting may be necessary. Pruning of most live fencing species can be an unpleasant job since they are extremely thorny;
There are four main types of live fencing:

- living fence posts
- thorny hedges,
- sisal,
- Impenetrable barriers

Living fence posts act as permanent posts to which barbed wire can be attached. The benefit of living fence posts is that they won’t need to be replaced like posts made from dead wood which attract termites and dry out. Many trees such as Moringa, Cassia and Parkinsonia are ideal for this kind of fence because they are quick growing and very strong. These trees also help enrich the soil which is benefits both orchards and gardens.

A thorny hedge, makes a good fence when planted a half meter apart. As the trees grow the branches should be braided together. This creates a thick and strong thorny fence that is impenetrable by livestock. For this type of fence, it is best to use a fast growing, thorny, short tree. Most types of Acacia work very well. Also Mesquite, Parkinsonia, Bauhinia rufiscens, Jatropha, Euphorbia and Bougainvillea work well. A mixture of these trees could also be planted.

Sisal is a sharp, low-growing plant. If planted in the rainy season and kept free of weeds and grasses, it will be effective as a live fence within two years. The sisal plants should be spaced a half meter apart.

Still another approach is to plant certain species at very close spacing to create a wall or impenetrable barrier. The species chosen must be able to deal with the close competition. Jatropha or Euphorbia has been used traditionally in this fashion. The non-thorny species may be especially useful around compounds or other places where thorns are undesirable.

There are some things to keep in mind about live fence establishment and maintenance, namely watering, weeding, and pruning. Most species can be adequately established if out planted before early August. Watering may double the growth rate and is often worth the effort. Weeds are vicious competitors that can stunt or kill the live fence. Weeding is especially important during the first rainy season and should not be
Also be sure to protect the fence with a firebreak during the dry season. Thorny species must be regularly pruned to create a dense, impenetrable barrier. The best time to do major yearly pruning of established plants is during dormancy, to inflict as little stress as possible. In The Gambia, it is optimal to prune live fence species a month or two before the rains, when they are dormant but will soon be actively growing.
Windbreaks:

Windbreaks are strips of vegetation planted for the specific purpose of decreasing wind speed to protect soils, crops and communities. Excessive wind can decrease the productivity of crops by impairing flower pollination (i.e.: cashew and mango) or by increasing water stress from evaporation and transpiration. Limiting wind speed increases crop productivity and decreases wind erosion. It can also create a microclimate protected from extreme temperatures.

A good windbreak should slow the wind but not entirely block it. The most effective planting scheme involves a row or two of low shrubs placed on the windward side and two or three rows of taller trees placed on the inside.

Planting a windbreak takes up space that could be used for crops which could sometimes be discouraging. However, windbreaks protect the crops and help them to have a higher yield. Also with carefully chosen species, they may provide other useful products such as medicine, animal fodder, fuel wood, food, or timber.

Shade:

Trees are useful in providing shade for humans, crops and animals. The temperature under a tree is much cooler than in the sun. By having trees for shade, children can get more work done in the garden. Many plants in the garden benefit from shade in addition to the young seedlings in a tree nursery. Most trees filter the sunlight to the plants below rather that blocking the sun entirely which allows the plants to get enough sunlight to grow.
Reforestation:

As in many places all over the world, the forests and the trees of The Gambia are disappearing. Trees and forests are essential to life in The Gambia. It is important that every citizen plant trees and support the rebuilding and protection of the forests. When building a tree nursery, it is necessary to think about this issue. Every school with a tree nursery should include some trees that will be planted around the garden. These trees can include any species that is common in the bush presently, but also plant trees that used to be common but now are scarce. Bush Mango and Silk Cotton are all trees that are often removed from the forest and rarely replanted. These are slow growing trees, but they have an important role to play in our live fencing and reforestation in The Gambia. The types of trees that people use in the area should also be considered.

Garden Equipment and Tools

In every school garden, pupils must be provided with suitable tools to carry out the required activities. Make sure to select appropriate tools for them, considering both the strength and size of the students and the tools. Also discuss safe use of the tools with the children before they take to gardening and establish a set of ground rules for use. The following is the recommended basic package of tools needed to start a garden:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rake</td>
<td>1</td>
</tr>
<tr>
<td>Garden Spade</td>
<td>1</td>
</tr>
<tr>
<td>Garden Fork</td>
<td>1</td>
</tr>
<tr>
<td>Pick Axe</td>
<td>1</td>
</tr>
<tr>
<td>Tape Measure 100 Metres</td>
<td>1</td>
</tr>
<tr>
<td>Cutlass</td>
<td>1</td>
</tr>
<tr>
<td>Hand Fork</td>
<td>2</td>
</tr>
<tr>
<td>Hand Trowel</td>
<td>2</td>
</tr>
<tr>
<td>Scale</td>
<td>1</td>
</tr>
</tbody>
</table>

Caring for tools is extremely important. Rusty tools tend to make work much harder. After use, tools must be cleaned, rubbed dry and treated with a little grease or used motor oil. Be sure to keep the tools safe in a small store.

On top of the tools provided for in the basic gardening package of the National School Garden Programme, most tools can also be made locally in the school or in the village blacksmith workshops. Be creative with your resources. For instance, all it takes to make a watering can is an old oil jug with a few holes poked into it!
Seedling Production

Some vegetable crops require the production of seedlings in nursery beds before they can be transplanted into main beds or fields. This is because these seeds are still too small and delicate to be planted directly into permanent beds. Where a small quantity of seedlings is required, they can be raised in seed-boxes. Where larger quantities are required, they are raised in nursery beds.

Recommended spacing and whether seeds should be sown in a seed box and nursery bed or directly in a permanent bed:

<table>
<thead>
<tr>
<th>Seed Box</th>
<th>Nursery Bed</th>
<th>Directly in Permanent Bed</th>
<th>Planting Depth (cm)</th>
<th>Distance Between Plants (cm.)</th>
<th>Distance Between Rows (cm.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td></td>
<td></td>
<td>2.5</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Bitter Tomato</td>
<td></td>
<td></td>
<td>0.6</td>
<td>40-65</td>
<td>40-80</td>
</tr>
<tr>
<td>Cabbage</td>
<td></td>
<td></td>
<td>0.6</td>
<td>40-60</td>
<td>60-90</td>
</tr>
<tr>
<td>Carrot</td>
<td></td>
<td></td>
<td>0.5</td>
<td>3</td>
<td>15-20</td>
</tr>
<tr>
<td>Cassava</td>
<td></td>
<td></td>
<td>8-10</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Cucumber</td>
<td></td>
<td></td>
<td>2</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Garden Egg</td>
<td></td>
<td></td>
<td>0.6</td>
<td>40-60</td>
<td>60-100</td>
</tr>
<tr>
<td>Green Beans</td>
<td></td>
<td></td>
<td>2.5-3.5</td>
<td>58</td>
<td>45-60</td>
</tr>
<tr>
<td>Hot Pepper</td>
<td></td>
<td></td>
<td>0.6</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Irish Potato</td>
<td></td>
<td></td>
<td>10</td>
<td>30-45</td>
<td>60-90</td>
</tr>
<tr>
<td>Lettuce</td>
<td></td>
<td></td>
<td>0.6</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Okra</td>
<td></td>
<td></td>
<td>15</td>
<td>45-50</td>
<td>60-65</td>
</tr>
<tr>
<td>Onion</td>
<td></td>
<td></td>
<td>0.6</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Pumpkin, Squash</td>
<td></td>
<td></td>
<td>25</td>
<td>60-120</td>
<td>150-300</td>
</tr>
<tr>
<td>Sorrel</td>
<td></td>
<td></td>
<td>1.3</td>
<td>30-45</td>
<td>45-60</td>
</tr>
<tr>
<td>Sweet Pepper</td>
<td></td>
<td></td>
<td>0.6</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Sweet Potato</td>
<td></td>
<td></td>
<td>7.5-12.5</td>
<td>30-45</td>
<td>90-120</td>
</tr>
<tr>
<td>Tomato</td>
<td></td>
<td></td>
<td>0.6</td>
<td>50-60</td>
<td>50-100</td>
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</table>

Seed Boxes

A seed-box can be any sort of container made of wood, plastic or even metal, so long as it is properly made and contains adequate drainage holes at the bottom of the box.

First, place a layer of small stones, followed by a layer of dry grass, into the seed-box,
then fill it with the finest loam soil. This soil is usually top soil. If your soil is sandy, it should be mixed with well rotted organic matter or compost. Once the soil has been put in the seed-boxes, it should be watered when dry. The soil in the seed-box should then be sterilized with hot boiling water to destroy harmful weed seeds and soil organisms which can cause plant diseases.

It is important that the seed box spends a large part of the day in the shade, especially upcountry where it gets very hot during the day. The box should receive shade between 11:00 am and 4:00 pm. The best solution is to plant trees, which offer light shade and simultaneously enrich the soil. You can also place the box on a verandah or under a nursery shed at its eastern end. Ideally, the boxes should be placed on a surface where they can be placed both in the shade and in the sun, as required by the weather.

In the seed box, make drills across the soil with a blunt stick about the size of a pencil. Drills should be 1.5 cm deep and not less than 8 cm apart. Then sow the seeds in the drilled holes and allow even distribution of the soil with a watering can. Label the box with the name of the plant and the date of sowing.

Care should be taken while watering the seed box as over-watering induces waterlog. Only water when the soil appears dry. In preparation for transplanting, the seedlings should be somewhat ‘hardened off,’ i.e. the amount of water they are given should be decreased as the time for transplanting approaches.

**Planting out**

Once the seedlings have sprouted to a height of about 5 cm. and are strong enough to be transplanted to permanent beds they can be taken from the seed boxes to the nursery beds. Here they should be planted with wider spacing to allow the developing seedlings to continue their growth. The best time to transplant is usually in the evening and not in the morning or during the heat of the day. Mix compost manure with the soil before transplanting your seedlings. After planting, use a watering can to water the plants.
Nursery management

Nursery management begins with proper seed bed preparation to give the seeds the required optimum conditions for germination. Demarcate the nursery with pegs dividing the different seed beds. Follow the same method of sowing as described for the seed boxes, taking care that each different kind of seed is sown according to its requirements, and drilled to the correct depth and properly spaced.

If the nursery beds are exposed to the sun, they should be mulched. Mulching conserves moisture, keeps the soil temperature down, inhibits weed growth and lessens erosion damage by placing a protective layer over the soil. A variety of mulches can be used, depending on the local environment, including leaves, grass clippings, hay, straw, shredded bark, sawdust, shells, wood chips, shredded newspaper, cardboard, manure, etc. Decayed leaves or other organic matter are generally best as they can also simultaneously act as a composting system. Remove the mulch as soon as the seeds begin to germinate.

You may also consider having the nursery in an area of dappled shade (shade from trees with high branches and sparse leaves, still allowing some sunlight through), in order to protect the seedlings from direct sunrays. However, this may not be necessary during the cool months of December and January, especially in Western Division.

Watering of the nursery beds must be carried out regularly to prevent the seeds from rotting and should be done during early morning or late evening to prevent evaporation. As soon as the seeds begin to germinate the mulch or shade should be removed. Thin out the seedlings where they are over-crowded to prevent spindly growth. The thinned out seedlings can be transplanted into the new nursery boxes or nursery beds until they are ready for transplanting to the field. Fertilizer such as farm yard manure (FYM) and/or compost manure are to be applied as recommended for each crop and incorporated into the soil.
Weeds & Pests

Weeds should never be tolerated in the seed boxes or nursery beds and must be removed immediately to prevent competition with the vegetables. Any seedling found to be diseased must also be removed quickly and destroyed. The persons looking after the nursery should be particularly on alert for pests. Any larvae, eggs or adult insect found must be handpicked and killed. (See the section on Pest Control Methods, p. 45 for more information.)

Transplanting

The stage at which seedlings are transplanted to their permanent beds differs from crop to crop, but should generally be done as soon as they are big enough for handling, anywhere between 5-8 cm. In some cases it can be done as soon as six weeks after sowing. In general, transplanting early on in the plant’s development is better than waiting until it is too big. Transplanting is best done during the evening and not in the morning or during the day when the sun is hot. Transplanting in the evening will give the plants over 12 hours to recover from shock before they are exposed to the heat of the sun.

When transplanting, the seedling should be lifted from the box or bed with a trowel. Care must be taken to avoid damaging the root system. The seed boxes and nursery beds should be watered heavily about half an hour before lifting. This will enable you to remove the plant with a ball of soil around the root system. A hole should be prepared on the permanent bed for each plant prior to lifting so that minimum time is wasted between removal and planting. Watering the vegetables regularly in the mornings and evenings should continue for 1-2 weeks after transplanting.
Maintaining the Garden
Maintaining the Garden

**Tillage**

Tillage involves digging, ploughing, ripping or turning soil to provide appropriate conditions for crops to grow. It is an essential operation in preparing the land for planting, as it eliminates weeds, aerates the soil and helps micro-organisms grow, thus maintaining soil fertility. It will also allow for water and roots to penetrate the soil more easily.

Deep tillage is done from about 20-30 cm. After turning the earth, the soil should be allowed to weather for two weeks while big clods are broken down. During this period organic matter (cow dung or compost) should be added. If your garden site is in a low and wet area, raise the beds slightly. If the area is high and dry, sunken beds should be constructed as they help to retain moisture. Sunken beds are about 15 cm. deep, although sometimes the sides of the bed are built up above the surface.

You can also already add a natural pesticide to the soil while digging beds, such as wood ash or neem leaf powder, as this will help fight against termites and bugs. (See the section on Organic Pesticides, p. 46)

**Spacing**

Use a garden line or tape measure to ensure proper spacing between plants and to line them up on the bed. The roots of seedlings should be allowed to spread naturally in the hole. It is important to make sure that they are not twisted or coiled as this will cause retarded growth. Use both hands to firm the soil around the root system of the transplanted seedling, taking care not to damage it. (Take care to follow the spacing advice in the chart on p. 28)

**Watering Beds**

It is crucial that watering the beds is done adequately and at regular intervals. Seeds / seedlings should be watered as soon as they are sown or transplanted. After this, watering should be done twice a day, in the mornings and evenings to allow for
maximum infiltration and minimum evaporation. In general, plants should receive 5 mm of water during each watering, though this obviously differs per crop. The top 20 cm. of the bed should be kept moist.

Water the plants close to the roots to avoid splashing the leaves. Also water the beds gradually so that the water does not run off, but rather soaks into the ground. If water is simply dumped on the bed it can cause the bed to erode, the seeds to be flooded and the plants to be injured by the sheer force of the water. Use a watering can or make one out of an old oil jug by poking holes into it.

Keeping gardens adequately watered is often where school gardens fail, particularly when there is nobody to take responsibility for the garden during school holidays. That is why it is crucial to decide on a watering schedule beforehand and stick to it. Also make sure that if the garden has a lock on the gate, the key is present when the garden is set to be watered. If all the teachers leave during the holidays, appoint a community member or one of the older, responsible children to be in charge. It would be a shame to lose all your vegetable crops simply because the plants didn’t receive enough water during the holidays!

**Manures**

It is important that the garden gets a regular supply of organic matter in the form of manure. Manure can be farm yard manure (FYM), green manure or compost manure. Compost manure is the most common form of manure and easiest to obtain for a garden. (See the section on Compost-Making, p. 38 for more information.) Animal manure can be obtained from herds, sheep and goat pens or poultry houses. A green manure crop can be planted in the garden during the rainy season and ploughed just before the end of the rains when there is enough moisture for decomposition.

High temperatures in the tropics encourage rapid breakdown of organic matter in the soil. This has made many types of tropical soils deficient in organic matter, particularly the well-drained, sandy soils. The Gambia is no exception and there is no amount of organic matter applied in a garden which can last for more than one year.
Seed Collection and Storage

One of the benefits of gardening is that, if done right, the garden can be self-sustaining. One need not rely on buying seedlings if you know how to properly collect and store the seeds that are produced in the garden itself.

The most important, and overlooked, fact about seeds is that they are alive. Metabolic activities are continuous throughout the life of a seed. This is why you must always protect seeds from moisture, heat, animals and insects.

These are some general tips on seed collection and storage for later use in the garden:

1. Collect seeds from multiple, healthy plants. Look at the entire plant from which you are collecting seeds.
2. Label when collecting. Be as thorough as possible and include name, variety, date, location, etc.
3. Timing is important, as seeds that are collected too early will not contain enough stored nutrition:
   a. Fleshy fruits (tomatoes, eggplant, pepper, etc.): Collect seeds when fruit is slightly overripe, but make sure it is not rotting.
   b. Seed crops (the seed is the edible part of the plant, e.g. corn, beans, etc.): These have a large time frame to collect the seed. Collect when it has dried on the plant; further drying may still be required.
   c. Plants that shatter readily (lettuce, onions, okra, etc.): These seeds disperse when mature, so you have to be ready to collect them. Daily observation may be required; a ventilated bag can also work to catch dispersing seeds.
   d. Onions are biennial, which means they take two years to complete their biological cycle. Collect the first year plants just as they start to bulb and hang them in a dry place until the next planting season. Replant the small bulbs and these will produce seeds. If you’re planting onions for seeds, sow in February, so that you will harvest close to the rainy season and have less time to store the seeds.
4. Once collected, wash and dry seeds. Large seeds need 5-6 days of drying, small seeds need 3-4 days. Seeds should be dried in the shade. Store only thoroughly dried seeds and once dried, do not allow seeds to become damp again.

5. Fleshy, pulpy seeds (especially tomato) can be fermented in water for a few days after collection to reduce bacterial canker. This will also help remove all of the pulp, which is very important before storage.

6. Keep the storage area as cool and dry as possible.


8. Check stored seeds often for fungus and insect damage. It is also a good idea to periodically open airtight containers to release water vapor coming off stored seeds.
Compost-Making & Pest Control
Compost-Making

During training sessions, this section is treated as a practical one, where the required materials, for composting (mentioned below) are made available in advance, for demonstrations. It is recommended that all trainees should fully participate in the practical exercise.

Introduction

In The Gambia, the sustainable upkeep of the country’s tropical soil is currently a point of concern, as drought in the last decade and deforestation, combined with the extensive and continuous use of farmlands has rendered the country’s fertile soils quite poor. Compost-making is thus the ideal way to conserve the fertility of a garden’s soil to enhance crop quality, production and productivity.

Compost is organic matter such as crop residues or manure that has been well decomposed in either a pile or pit and is well on its way to becoming humus. Compost is largely the result of the activities of various micro-organisms: bacteria, fungi, protozoa, algae, as well as earthworms and insects. These organisms feed on the materials and gradually convert them into humus.

The use of compost is not only a means of fertilizing soil, but also improves soil structure, texture, circulation of water, air and nutrients. Compost added to sandy soils increases its water retention capacity. This means that water stays in the soil longer and thus remains available to plants for a longer period, which is particularly useful during drought periods. A good soil structure can better resist the impact of rain and wind and a soil medium with adequate organic matter is less sensitive to erosion.

Principles of Composting

1. Materials

Good compost needs mixed organic materials, micro-organisms, a little soil and water. Any sort of non-woody plant material, crop residue (maize stalks, ground nut hay), vegetable remains, food left-overs, or chicken or livestock manure can be used. Do not use the faeces of humans, dogs or cats, as they are likely to contain parasites and avoid infected vegetable and plant waste. Stones, thin pottery, pieces of metal, wire, plastic bottles, sheet plastics, rubber, nylon and other man-made fibers, as well as hard thorns and roots should also be removed.
In building compost, moisture within the materials is very important. A moisture content below 30% will slow down the biological reactions in the compost heap. At the same time, too high of a water content will cause water log, preventing the movement of air within the heap. Optimum moisture content is 50-60%. Thus care must be taken to ensure adequate water supply throughout. This can be done through the following.

1. Supply the heap with adequate water initially and supplement at the required times during the compost process.
2. Build your heap above ground during rainy season.
3. Build your heaps under shade/tree.

2. Types
There are two types of compost piles: heaps or pits. A heap is an above ground pile that works well in the wet season, allowing run off. A below ground pit reduces water loss by evaporation, and is well suited for dry season composting. In both cases, make the compost in the shade, or cover with straw or palm leaves. During dry season composting, two pits can be dug next to each other so that the compost can be easily and effectively turned (and aerated) by moving it periodically from one pit to the other.

3. Aeration
Adequate air supply to all parts of the compost is necessary to supply oxygen for the organisms and to flush out the CO2 produced. Inadequate air will kill the essential organisms, causing acidic preservation of the compost and producing bad odours.

The materials should be shredded in order to provide more surface area. Proper air circulation can be achieved by turning the material regularly by hand. Optimum turning of materials also helps to break up larger pieces of material, exposing fresh surfaces to attack by the organisms and ensuring that most of the materials are subjected to the highest temperature reached within the heap.
4. Nutrients

The provision of nitrogen for cell proteins is also important for the composting process. It is the most important nutrient, and in general, if sufficient nitrogen is available in the organic matter most other nutrients will also be available in adequate quantities.

In The Gambia’s environmental situation fresh green wastes such as weeds could be used with animal refuse. Nitrogen may also be added to compost heaps in the form of organic fertilizers such as bone meal, oil cakes and dried blood. Inorganic nitrogen fertilizers such as urea and ammonium nitrate may also be used. In order to maximize the nutrient content of the product compost it is important to reduce serious leaching from the heap by protecting it against heavy rain and water logging.

5. Temperature

High temperatures help in accelerating the decomposition of organic materials. This is because the beneficial micro-organisms are active at temperatures between 60 - 70°C. During decomposition some of the energy released by the breakdown of materials gives off heat and this causes a rise in temperature.

**Composting Methods**

Several methods are used to build compost. The method used would generally depend upon the following:

1. The environmental situation surrounding you
2. The type of waste available, whether they are easy to breakdown and contain many pathogens
3. The quantity of materials required for the process
4. The allowable cost in terms of time labour, equipment and space
5. What the compost will be used for
1. Pit Method

The pit method entails building the compost in layers and is repeated to a convenient height. The dimensions of the heap could be 2m x 2m x 1m height (4m³). The layers of the compost could be built in the following manner:

**Layer 1 (at the base of the pit)**
- Topsoil at the base
- Green leaves, weeds, plant and succulent dried grasses (finely chopped)
- Small quantities of chemical fertilizer (Urea)
- Kitchen waste
- Fish bone
- Rice and groundnut waste
- Ash or lime could be added

**Layer 2**
- Sawdust
- Wood ash

**Layer 3**
- Chicken manure
- Sheep manure
- Cattle manure
- Goat manure

**Layer 4**
- Topsoil
- Water

The building of layers should be done quickly and the layers can be repeated until you reach the height envisaged. The first turning of the heap should be done after 2-3 weeks. Turning aids the aerobic bacteria in the decomposition process. A second turning is done 3 weeks after the first turning and it may even be necessary to turn the heap over again for a third time. Maturation of the compost takes about 3-6 months.
depending on the environment and the material used. Watering the heap every third day is important because this encourages the growth of bacteria. The watering should not be too wet to saturation level. The compost is ready once it has reached a semi-rotted state where the materials are no longer distinguishable.

Moisture tests are important and are done by putting a bundle of straw in the heap. If after 5 minutes the straw feels dumpy then the moisture level is good but if it is still dry then the moisture is too low.

Temperature tests are done by putting a stick in the centre of the heap about 5 days after completing the compost heap or after the final turning over. Leave the stick for 5-10 minutes, then remove it and feel it immediately. If the warmth of the stick is higher than normal body temperature (37°C) then decomposition is taking place. The ideal temperature for the heap is 60-70°C.

2. Quick Method

Materials
- Millet husk, rice straw or saw dust – 10 bags (500kg)
- Animal manure – 10 bags
- Top soil – 100 kg.
- Vinegar – 0.5 litre
- Sugar – 0.5 kg.
- Urea – 1 kg.
- Water – 20-40 liters (as a start and add more as required)

Method
1. Mix the millet husk or other waste with the animal manure and topsoil
2. Sprinkle the solution of vinegar, sugar, urea and water on the mixture
3. Add extra water to make it moist. Press the mixture with your hand, when it is wet then the moisture content is enough
4. Place the mixture under the shade and cover the compost with plastic bags for 7-10 days and it will be ready for harvest.
Note

- Top soil contains some humus, which helps decomposition go faster
- Vinegar also contains acids, which helps the organisms to do their work. If you don’t have vinegar, water from sour milk or water in which rice has been washed (not cooked) can be used
- Urea helps decomposition go faster and contains nitrogen, which can dissolve easily; chicken manure can replace urea.

Pest Control

For training purposes, this module is a practical one that requires demonstrations, with the full participation of the groups being trained, therefore all materials to be made available in advance. Samples of plants affected by the different types of pest groups should also be presented, if possible.

Agents Responsible for Crop Losses

Numerous factors are responsible for influencing the growth of vegetable crops, both favourably and adversely. Unsuitable environmental conditions are sometimes responsible for physiological disorders leading to poor plant growth. These include a shortage or excess of water, imbalance of nutritional elements, excessive heat, unsuitable soil reactions, etc. Aside from these environmental factors, there are five main pest groups: viral, fungal, bacterial, insecticidal and animal.

Viruses are spread by insects (aphids, leafhoppers, whitefly, thrips and nematodes) and humans (e.g. grafting with a dirty knife). All parts of the plant can be susceptible to viruses. Symptoms caused by viruses include small fruit yields and/or poor quality fruits, spotting or wilting of leaves, yellow and green discolorations on the leaves, general spotting on leaves, and dwarfed leaves or curling under of leaves.

The solution to many viruses is death. If the plants are in the seedling or very young stage, start over and make sure your seed stock is from a good source. Try weed control, removing excess debris and cleaning garden tools. Proper spacing will reduce stress on plants and make them less vulnerable to attack. Removing the harvestable part of the plant as soon as it’s ripe and burning infected plant material will also cut down on attacks.
**Fungi** are spread through nearly all possible vectors. The most harmful fungi are parasitic. The fungi family includes blights, moulds, mildews, rusts and mushrooms (which do not damage vegetables).

Good sanitation and crop rotation can prevent most fungus attacks. However, if one occurs try using either a bleach, garlic or soap solution.

**Bacteria** are microscopic organisms that can be found in the air, water, soil and any other imaginable place. Some are good and some are bad.

There are three main effects of bad bacteria on plants: rots, wilting and galls. Rots attack the leaves, stems, branches and tubers of the plant. Infected parts appear to be soft and slimy. Wilting causes the plant to look like it is dying. Galls appear as overgrowths in a specific part of the plant.

Insects can attack four main parts of a plant:
- **Roots** are attacked by nematodes and root maggots.
- **Stems** are attacked by borers, aphids, stalk-yed fly and mealy bugs.
- **Leaves** are attacked by aphids, grasshoppers, locusts, thrips, caterpillars, cutworms, leaf miners and white flies.
- **Fruit** is attacked by fruit flies and squash bugs.
- **Seedlings** can also be attacked by army worms, leaf beetles, cutworms and hairy caterpillars.

**Managing Crop Losses**

The protection of vegetable crops should be essentially **preventive**. This requires frequent phytosanitary inspection to discover the start of attacks and to manage their development by the most appropriate means. There are multiple ways to manage such attacks. Before considering the use of any organic or inorganic pesticide, consider using traditional cultural techniques. Cultural techniques are economical, easy to apply and will not expose any danger to the farmers, the consumer and the environment.
These techniques include:

- Playing with the date of sowing or planting
- The establishment of a well planned crop rotation pattern
- The selection of a good garden site, for example an area with well drained soil
- The use of resistant varieties of vegetables either to the vector or the pathogen
- The use of fresh water supply for irrigation
- The use of quality, healthy seeds or seedlings as planting materials
- Timely application of fertilizer at the recommended dose
- Carrying out regular weed control
- Hand picking of caterpillars and crossing them when they are found in the garden in small quantities
- Application of adequate organic fertilizer
- At the end of each vegetable growing season all crop residues should be uprooted, dried and burnt

**Pest Control Methods**

If unfortunately, after using the cultural practices mentioned above, damages to crops still occur, one can resort to the use of pesticides, bearing in mind that pesticides can cause damages to the farmer himself, his family, the consumer and the environment.

**Pesticides** are chemicals used to prevent, control or destroy pests. They include:

- Chemical growth regulators used to regulate plant growth
- Chemical repellents used to repel pests
- Chemicals that kill the pest upon contact

Pesticides are grouped according to their chemical nature. The major groups are:

1. Plant-derived organic pesticides
2. Inorganic pesticides
3. Synthetic pesticides

When using pest control methods in vegetable production preference should be given to the use of organic or plant-derived pesticides or botanicals.
Only when cultural techniques have been applied and plant-derived pesticides have failed to solve the pest problem in the garden, one can consider using synthetic pesticides judiciously. In using the synthetic pesticides we should select those that are least persistent, such as oregano phosphates, carbamates and pyrethrinoids, which are particularly effective. When using any pesticide, ensure that the proper application techniques are followed before and during use:

1. Know the pest and the problem it causes
2. Select the right pesticide to control that pest
3. Use the right spraying equipment with the right nozzle and the correct calibration
4. Respect the recommended dose
5. Localize the application (treating only the infested area)
6. Use proper protection when applying pesticides
7. Keep children out of the garden for at least 24 hours after applying a synthetic pesticide.
8. Avoid preventive treatment

Organic Pesticides

1. Castor bean
   Pests: Moles, rats, burrowing/digging rodents
   Method: Plant the plants around the garden, they act as a natural repellent.

2. Eucalyptus
   Pests: Bean beetle, potato tuber moth.
   Method: Take the leaves of the eucalyptus and dry in the shade, then crumble into a powder. Use it to sprinkle on to wounded plants and reapply every few days.

3. Flour
   Pests: Aphids, caterpillars, red spider mites, thrips and whiteflies
   Method 1: Mix two cups (200g) of white flour with 10 liters of water. Spray on infested plants in the early morning. As the sun dries out the flour mixture, mites, aphides, eggs of caterpillars, etc. will be encrusted and killed.

   Method 2: Stir together 1 cup of sour milk, 8 cups of fine white flour and 50 liters of water. Spray onto affected crops including underside of leaves. Destroys the adults as well as the eggs and larva of mites, thrips and whiteflies.
4. Garlic (*Allium sativum*)

**Pests:** Aphids, armyworms, cabbage worms, false codling moth, kharpa beetle, mildew, red spider mites, rust, ticks, wireworms  

**Method 1:** Plant garlic throughout the garden as a natural deterrent.  

**Method 2:** Take a handful of finely chopped or grated garlic (100g or 7-10 cloves) and soak for 24 hours in enough oil to cover all of the garlic (1/2 spoonful). Add this to 500 ml of soapy water and mix well. Strain out garlic and dilute to 101 (about 20 parts). Sprinkle solution on affected areas and on leaves and stem.  

**Method 3:** Mix 3 garlic cloves, 3 large onions and 8g of laundry soap with 4 teaspoons (40g) of red pepper powder. Stir mixture into 10 liters of water and allow to sit for 24 hours. Filter and spray on vegetables infested with mites.

5. Hot Pepper (*Capsicum Frutescens*)

**Pests:** Ants, aphids, caterpillars, cabbage looper, cabbage worms, cucumber mosaic virus, cucumber ring spot virus, tobacco mosaic virus, weevils  

**Method 1:** Take one handful of hot pepper, pound it into a paste and add it to 2 litres of soapy water, leaving it to sit for a day. Dilute it to 5 liters solution before use, then sprinkle directly onto leaves. Apply a more concentrated solution when treating for viruses.  

**Method 2:** Take half a handful of peppers, one handful each of mint leaves and onion tops and add to 1 liter of soapy water. Leave for one day and then dilute ½ cup strained solution to a liter of water.

6. Mahogany (*Khaya senegalensis*)

**Pests:** beetles, caterpillars  

**Method:** Soak two handfuls of fresh bark overnight in five liters of water. Strain the solution, dilute with five more liters of water, and spra
7. Neem (Azadirachta indica A. Juss)

**Pests:** Aphids, armyworm, borers, brown plant hopper, cabbage looper, cabbage worm, cricket, corn earworm, cucumber beetle, cutworm, diamondback moth, flea beetle, fruit fly, grasshopper, leafhopper jassids, leaf miner, locust, mealy bugs, milkweed bug, nematodes (root knot), scales, (red) spider mite, termite, tomato fruit worm, tomato leaf spot fungus, whiteflies

**Characteristics:** apply in the evening for highest effectiveness as the active ingredient breaks down in sunlight; doesn’t affect bees.

**Method 1—Aqueous Extracts (Pulverized neem seeds):** (a) Pulverize 500g (three double handfuls) of neem seeds into a paste. Thoroughly mix the paste with 10 litres of water and leave to sit overnight (12-24 hours), filter and spray on affected plants. (b) Mix 20 match boxes of neem powder for each 10 liters of water. Wrap the paste in a cloth which is then suspended in the water for 12-24 hours, squeezed to remove excess liquid, and removed from the water. Apply to plants with a sprayer or hand brush shaken over plants. Repeat treatment every 10 days and 15 days or weekly in gardens with high pest infestation.

**Method 2—Fresh Neem Fruit:** Shred and crush 2 kg. of neem fruit and add 1 liter of water. Allow this mixture to sit overnight. Add more water, to make the total amount of water 15 litres, and spray on affected plants.

**Method 3—Neem Leaves:** Pound 1.5 kg. of fresh neem leaves into a paste, mix the paste with 1 liter of water and add 5g of laundry soap. Allow this mixture to sit overnight, squeeze to mix the paste and soap thoroughly. Filter the water and add more water, to make the total amount of water 10 litres, and spray.

**Method 4—Leaf (only for prevention, not treatment):** Put neem leaves into a bucket until it is 1/4–1/3 full. Fill the remainder of the bucket with water. (You may use old laundry water if you wish.) Cover the bucket and let sit for 1 week. After 1 week, remove leaves. Apply the liquid to plants using a sprayer, neem branches or local broom.

8. Papaya (Carica Papaya)

**Pests:** Fungicide against powdery mildews

**Method:** Take 1 kg. of finely yellow and dried leaves, put it in 1 liter of water and shake it well. Let it sit for a few hours, then strain or squeeze through a cloth. Dilute it with 4 liters of soapy water, then spray / sprinkle on plant leaves, stem, fruit.
9. **Tobacco (Nicotiana Tabacum)**

**Pests:** Aphids, borers, cabbage worms, caterpillars, leaf curl virus, leaf miners, mites, rust, scaling insects, trips, weevils

**Method:** Take 250g of tobacco, half a handful of soap shavings and 4 liters of water. Then simmer the mixture for 30 minutes to get the base. For every 1 litre of the mixture, add 4 litres of water and spray onto leaves. (Do not spray peppers, tomatoes, eggplants and potato plants with this mixture because it can transfer viral diseases).

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10. **Wood Ash**

**Pests:** Effective against most pests, specifically borers, caterpillars, chewing insects, leaf miners

**Characteristics:** May raise pH of soil if used excessively. Is a good source of potassium for soil.

**Method 1:** Dust leaves of garden plants lightly with wood ash to kill soft-bodied or sucking insects such as aphids, caterpillars, grasshoppers, red spider mites, termites, thrips, whiteflies.

**Method 2:** Spread ash thickly around plants and as mulch over the soil to deter nematodes, weevils, slugs, snails, cutworms and other insects.

**Method 3:** Make a solution made from 2 cups of wood ash and 1 cup of powdered lime mixed with 4 litres of water. Particularly effective against cucumber beetles and maggots.

**Method 4:** When cutting potatoes for planting, dip each portion in wood ash before planting to protect against insect attacks.

**Method 5:** Mix 6 teaspoons of kerosene with 1 kg of wood ash. Apply as dust over vegetables twice weekly in the early morning or late evening to effectively prevent attacks from sucking types of insects. It is less effective once the plants are already infested.

**Method 6:** To control fungal diseases such as mildew, odium and rust, as well as various pests and their eggs or larvae, mix one heaped tablespoon of wood ash overnight. Filter this solution and add one cup of milk. Dilute this again with water at a 1:3 ratio before spraying.
Nutrition, Health & Hygiene in School Gardens
Nutrition, Health & Hygiene in School Gardens

Why is Nutrition Important?

Good nutrition is critical for a child's physical and mental growth and development. School children need plenty of good food, as their energy and nutrient needs are particularly high in relation to their size. Children who have a diet rich in nutrients—including proteins, vitamins and minerals—can learn better because the foods they eat provide the body with the energy it needs to function and helps it to store information in the brain. The foods that children eat when they are young will help to determine whether they become smart, healthy and productive adults. This is why improving children's nutrition is one of the biggest benefits, and in fact the main goal, of keeping a school garden.

What happens if school-age children do not eat well?

- They grow more slowly than well-nourished children
- They have little energy to play, study or do physical work
- They have short attention spans and do not do as well in school
- Their educational achievements may be poor and they may drop out of school early
- Poor nutrition during childhood not only decreases individual potential; in the long term it can also adversely affect the development of communities and nations.

Nutrients can be divided into many different categories but here we'll divide them into Go foods, Grow foods, and Glow foods. This is in addition to the main carbohydrates and starches, found in rice and coos. Go foods provide energy, and include groundnuts and oil. Grow foods builds the body through protein, and include meats and vegetables such as beans, cassava and sorrel. Glow foods provide vitamins and minerals and help protect against diseases, and can be found in fruits and vegetables.
WFP Provides children with four staple foods in its school feeding programme. These are their main nutritional components and why they are important.

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>• Carbohydrate</td>
<td>• Builds muscles&lt;br&gt;• Provides healthy skin and hair&lt;br&gt;• Gives clearer eyesight&lt;br&gt;• Nourishes the heart and lungs&lt;br&gt;• Nourishes the brain, tendons, nervous system, etc.</td>
</tr>
<tr>
<td></td>
<td>• Little bit of protein – superior quality and better utilized by the body&lt;br&gt;• Fibers&lt;br&gt;• Minerals and vitamins</td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td>• Cholesterol lowering fiber&lt;br&gt;• Minerals and vitamins&lt;br&gt;• Proteins&lt;br&gt;• Fatty Acids&lt;br&gt;• Amino Acids</td>
<td>• Manages blood sugar&lt;br&gt;• Reduces the risk of certain health conditions</td>
</tr>
<tr>
<td>Iodised Salt</td>
<td>• Iodine and thyroxine</td>
<td>• Mental and physical development of children&lt;br&gt;• Increases the appetite&lt;br&gt;• Increases the IQ</td>
</tr>
<tr>
<td>Vegetable Oil</td>
<td>• Fatty acid</td>
<td>• Aids in the easy passage of food&lt;br&gt;• Eases digestion&lt;br&gt;• Essential for the utilization of vitamins</td>
</tr>
</tbody>
</table>
Which Nutrients are important and why?
School Gardens serve as the sustainable way to complement these the food bowl staples with fruit and vegetables with important vitamins that are often lacking in the school food bowl in The Gambia. Below are some key nutrients and why they are essential to the body:

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Sources</th>
<th>Properties</th>
<th>Deficiencies Caused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>Animals • Plants • Fish</td>
<td>• Needed for growth and development • Needed for fighting illnesses • Needed for muscle maintenance • Source of energy • Needed for healthy blood supply</td>
<td>• Lack of growth • Lack of ability to fight disease • Lack of energy needed to do work</td>
</tr>
<tr>
<td>Iron</td>
<td>Beef • Dark green, leafy vegetables • Beans • Eggs</td>
<td>• Needed for healthy blood • Keeps up oxygen levels, thus maintaining adequate energy levels • Women need more because of menstruation • Pregnant women need more to supply the foetus</td>
<td>• Death to pregnant women caused from anaemia and loss of blood • Fatigue, resulting in low productivity in daily activities • Anaemia • Paleness under eyelids and in gums</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Carrots • Pumpkin • Orangesweet potatoes • Eggs</td>
<td>• Needed for good eyesight • Needed for healthy skin and hair energy levels • Helps immune system fight illness, especially respiratory</td>
<td>• Blindness, first occurring as night blindness • Glaucoma and cataracts • Eye disorders such as xerophthalmia, bitot's spots, corneal ulcers and trachoma • Susceptibility to infections, especially of the skin and respiratory tract • Children have increased chance of dying from Vitamin A related diseases • Unhealthy, scaly skin</td>
</tr>
</tbody>
</table>
Which Nutrients are important and why continued:

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Sources</th>
<th>Properties</th>
<th>Deficiencies Caused</th>
</tr>
</thead>
<tbody>
<tr>
<td>B Vitamins</td>
<td>• Meat • Cereals • Milk</td>
<td>• Helps release energy from other foods</td>
<td>• Poor growth • Skin problems • Mental health problems • Body weakness</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>• Citrus Fruits</td>
<td>• Required for the absorption of other nutrients</td>
<td>• Scurvy • Slow healing of wounds • Bleeding of gums</td>
</tr>
<tr>
<td>Calcium</td>
<td>• Milk • Milk products</td>
<td>• Helps build bones and teeth, which are made primarily of calcium • Helps make muscles do their work</td>
<td>• Muscle weakness, spasms and seizures • Osteoporosis(adults) • Bone fractures</td>
</tr>
<tr>
<td>Potassium</td>
<td>• Vegetables • Bananas</td>
<td>• Important in nerve transmission, general body function</td>
<td>• Weakness, fatigue • Impaired growth • Weak memory • Prone to heart problems such as hypertension</td>
</tr>
<tr>
<td>Iodine</td>
<td>• Iodized salt</td>
<td>• A component of hormones and enzymes</td>
<td>• Goitre • Cretinism(mental retardation)</td>
</tr>
</tbody>
</table>
What Vegetables Should We Grow?

The following is a list of local vegetables and some of their nutritional components. ** denotes a good source, *** a very good source and **** an excellent source. Adding any of these vegetables to a school meal helps children get the nutrients they need in their daily diet.

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Protein</th>
<th>Iron</th>
<th>Vitamin A</th>
<th>B Vitamins</th>
<th>Vitamin C</th>
<th>Calcium</th>
<th>Potassium</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td>****</td>
<td>**</td>
<td>****</td>
<td>***</td>
<td>**</td>
<td></td>
<td></td>
<td>Good source of fiber</td>
</tr>
<tr>
<td>Bitter Tomato</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td>Very good source of fiber</td>
</tr>
<tr>
<td>Cabbage</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td>Generally a good source of minerals</td>
</tr>
<tr>
<td>Carrots</td>
<td></td>
<td>****</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td></td>
<td>An excellent source of carbohydrates and fiber. The root is a source of B vitamins, but most nutrients are in the leaves.</td>
</tr>
<tr>
<td>Cassava</td>
<td>**</td>
<td>**</td>
<td>***</td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td>Good source of fibre</td>
</tr>
<tr>
<td>Cucumber</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td>Generally a good source of minerals</td>
</tr>
<tr>
<td>Garden Egg</td>
<td>**</td>
<td>**</td>
<td></td>
<td>***</td>
<td></td>
<td>**</td>
<td></td>
<td>Also a good source of Vitamin K</td>
</tr>
<tr>
<td>Green Beans</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td></td>
<td>**</td>
<td></td>
<td>Also a good source of Vitamin K</td>
</tr>
<tr>
<td>Green Leafy Vegetables</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>Includes the leaves from the sweet potato, cassava, garden egg, pumpkin, papaya, beebob, moringa and basil. Also a good source of folic acid and fiber.</td>
</tr>
<tr>
<td>Hot Pepper</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td>**</td>
<td>**</td>
<td></td>
<td>Potassium and calcium contained in the potato skin. Also an excellent source of carbohydrates.</td>
</tr>
<tr>
<td>Irish Potatoes</td>
<td></td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Lettuce</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td>Good source of fiber</td>
</tr>
<tr>
<td>Okra</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td>Good source of fiber</td>
</tr>
<tr>
<td>Onion</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td>Good source of fiber</td>
</tr>
<tr>
<td>Pigeon Peas</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>Pumpkin, Squash</td>
<td>**</td>
<td>****</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td></td>
<td></td>
<td>Includes bush zucchini squash. Also a good source of zinc and phosphorous.</td>
</tr>
<tr>
<td>Sorrel</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>****</td>
<td>**</td>
<td></td>
<td></td>
<td>Most vitamin C is contained in the flower but most other nutrients are in the leaves.</td>
</tr>
<tr>
<td>Sweet Pepper</td>
<td>**</td>
<td>**</td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td>Also a good source of vitamin C</td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>***</td>
<td>**</td>
<td></td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td>Also a good source of carbohydrate and folic acid</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>***</td>
<td>**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Healthy, Balanced Diet

A healthy, balanced diet provides a person with the correct amounts of food energy, macro- and micro-nutrients that he/she needs every day. A balanced diet should consist of at least all food groups over three meals a day, plus snacks, which are composed of a variety of different types of foods in varying proportions. Too little or too much of certain foods can be harmful to the body, but you can never eat too many fruits or vegetables! That’s why maintaining a school garden is a feasible way to provide children with daily fresh fruits and vegetables that are rich in those nutrients that children need to grow and prosper.

A good meal should contain:
1. A staple food (grains and tubers)
2. Other foods that may be made into a sauce, stew or relish. These should include:
   - Legumes and/or animal-derived foods;
   - At least one vegetable and fruit
   - Some fat or oil (but not too much) to increase the energy desired and improve taste of food..

It is important to eat fruits with a meal (or as a snack) and to drink plenty of water during the day. Avoid drinking tea or coffee until 1-2 hours after a meal (when food will have left the stomach) as these reduce the absorption of nutrition from food.
Use the food pyramid as a guide to good food combinations. Try to eat from all of the food groups at every meal but eat more from the bottom 3 groups of the food pyramid and only a small amount from the top group. Also be sure to get plenty of exercise and drink at least 8 glasses of safe water every day.

**Teaching Children about nutrition**

*The Food Guide for Gambians Over the Age of 5* is a good tool for teaching about nutrition. If possible, have a copy posted in the classroom or copy one onto the chalkboard.
Possible Class Activity:

1. Display the Food Pyramid and ask the class what foods they eat each day. There are no right or wrong answers, and everyone can participate. Write these foods on the board.
2. Look at the list the children have made. Ask if there is any group of foods which they don’t eat as often as recommended. Note their answers. How can a garden help? Write down their suggestions.

These are some of the reasons school gardens can make a real difference to children’s health. Discuss them with the class and ask the children what they think. Gardens:

- Give children nutrient-rich fresh vegetables and fruits that are lacking in their diet;
- Show children how to grow, prepare and eat them;
- Encourage families to grow them too;
- Help children to understand what makes a good diet;
- Help children learn to like nutritious, home-grown foods;
- Show children the link between what they grow, what they eat, and how they feel.

Vitamin A, iodine, and iron are often lacking in the diets of people of The Gambia. When discussing nutrition, emphasize in particular those foods which provide Vitamin A and iron, and encourage the use of iodized salt. Iodized salt provides the iodine needed to prevent goiter and mental retardation.

**Keeping Food Safe and Clean**

The food we grow in our gardens should not only provide us with needed nutrients, but must be safe to eat. If germs (such as harmful micro-organisms) and parasites get into our foods and drinks they may make us sick with diarrhoea and vomiting. Children and weak people are the most likely to get sick.
Most food-borne illnesses can be prevented by following a few basic and simple rules of hygiene that aim to:

- Prevent germs from reaching foods and drinks by covering cooked foods. Many germs come from human or animal faeces. These germs can get into foods from dirty hands, flies and other insects, mice and animals, and dirty utensils. Water supplies which are not protected from contamination can also cause illness.
- Prevent germs from multiplying in foods. Germs grow fastest in food that is warm and wet (e.g. porridge) especially if it contains sugar or animal protein, such as milk.
- Separate raw and cooked foods.

Personal Hygiene

- **Wash hands with clean water and soap (or ashes):**
  - After going to the toilet, cleaning a baby’s bottom, or anytime hands may have come into contact with faeces;
  - Before and after preparing food and eating;
  - Before feeding a child or sick person.
- Dry hands by shaking and rubbing them together or using a clean cloth that is only for this purpose.
- Avoid coughing or spitting near food or water.
- Cover any cuts on hands to prevent contaminating food
- Use a covered latrine and keep it clean and free of flies
- Clean up animal faeces near cooking areas.

Clean and safe water

- **Use water that comes from a safe source or is boiled before drinking**
- If water is not safe, boil rapidly for one minute before using
- Use clean, covered containers to collect and store water

Buying and storing food

- **Cover foods to keep them clean and safe**
- Buy fresh meat or fish on the day you will eat them
- Cover raw and cooked foods to protect them from insects, rodents and dust
- Store fresh and cooked foods in a cool place or refrigerator if available
• Keep flour, grains and legumes in a dry, cool place protected from pests
• Use leftovers at the next meal unless refrigerated. Store covered and reheat them until steaming and hot all the way through.

Preparing food
• Keep raw meat, poultry and fish fseparately from other foods
• Use clean, washed dishes and utensils to store, prepare, serve and eat food
• Prepare food where there is less dust
• Wash vegetables and fruits with clean water
• Wash surfaces touched by raw meat, fish or poultry with hot water and soap
• Do not eat raw or cracked eggs
• Boil milk unless it has come from a safe source. Soured milk may be safer than fresh milk
• Cook food thoroughly, especially meat, poultry, seafood and eggs
School Gardens & the Environment
School Gardens & the Environment

**Why is Preserving the Environment Important?**
Humans have an enormous impact on the environment. Everything we do consumes energy, uses natural resources or produces waste, whether it’s using firewood or coal for cooking, using water to wash ourselves or disposing of the plastic bags and containers that we store our food in. In the long run, such activities can harm the environment and damage ecosystems, sometimes permanently. For instance, we cannot endlessly cut down trees to clear land for building sites or to use its wood for firewood or building materials, because sooner or later we may have cut down the whole forest.

Endlessly using our environment and the resources it provides us with, without any regard for the consequences, can thus cause environmental degradation. This can have a variety of effects on our way of living: the soil we use for agriculture may become less fertile, the water we drink can become polluted and certain types of plants and animals may become extinct.

Yet we depend on the environment to be able to live. The trees around us produce the oxygen that we breathe, fertile soil produces the food we eat and drinking clean water means that we do not become ill with diseases. That is why it’s important to minimize, to the extent possible, our impact on the environment and to preserve the earth for future generations. One of the best ways in which you can protect the environment is to practice organic farming.

**What is Organic Farming?**

Organic farming is a form of agriculture which uses completely natural methods to maintain soil productivity and control pests and diseases. These methods include using natural manures, compost, regular crop rotation and biological pest control, rather than relying on commercial agro-chemicals such as fertilizers and pesticides. Such chemical
products can, in the long run, cause more harm than they do good, killing not only the pests they target but also forms of life that are beneficial to the land, polluting water, depleting the soil’s nutrients and eventually landing in our food. By practicing organic farming, you maintain the health of the soil, the food that it produces and eventually also the people that eat the food. It is a true win-win situation.

**How Will Organic Farming Benefit the Environment?**

In essence, organic farming maintains the environment’s natural balance. By using only natural farming techniques you will enhance soil structures by maintaining its nutrient content and minimize water losses. This makes the soil more resistant to floods, droughts and land degradation processes. Organic farming also ensures continued biodiversity by preserving seed and crop diversity and allowing crops to build up a natural resistance to pests and diseases. Overall, less energy is spent per unit of land and the organic matter that is built up in the soil and the plants stores carbon, thus reducing greenhouse gases and even mitigating climate change.

**Why is Organic Farming Beneficial in The Gambia?**

- It is sustainable because there is abundant natural manure in The Gambia
- It is freely affordable in small villages and communities and can help schools and communities save money
- It is environmentally friendly and does not pollute the country’s soil structure, water or atmosphere
- It does not kill beneficial animals such as butterflies and bees
- It does not pose health hazards to people, animals and plants
- It can enhance agricultural production and productivity in The Gambia
- It does not create dependency on external agencies like chemical fertilizers
What Else Can I Do?

There are many other things, large and small, that you can do in the garden, at school or at home to protect the environment!

- **Avoid chemicals and pesticides:** for all the reasons listed above, this is one of the easiest and most effective things you can do for the environment.
- **Plant trees:** trees produce oxygen, clean the soil and the air and fight soil erosion.
- **Use Live Fencing:** it adds natural manure to the soil and can produce food and timber (See section on Live Fencing, p. 22).
- **Use waste from the garden and kitchen as compost:** this will both reduce the amount of waste you produce and improve your garden’s soil, allowing you to grow healthier vegetables (see Compost-making, p. 34).
- **Save Water:** water your garden either in the early morning or in the evening and avoid watering when it’s very hot or windy, as this causes a lot of the water to be lost through evaporation.
- **Collect Rainwater:** during the wet season it’s easy to collect rainwater using barrels or buckets, which can then be reused in the garden.
- **Use plants in your garden that are indigenous to that area:** because indigenous plants are adapted to local conditions they need less maintenance, less watering and are less susceptible to pests and diseases. They also thrive even in more extreme local weather conditions (heat, dryness, rain) and complement other local plants.
- **Recycle:** you can make seed-boxes out of old containers, make watering cans by poking holes into a used oil drum and use old bottles as plant containers (see next section).
- **Collect and Store Seeds:** saving seeds instead of buying them saves energy in production and transport and is much cheaper (see Seed Collection and Storage, p. 35).
- **Produce local, buy local, eat local:** eat the food that you produce and buy other foods that are produced locally. It’s cheaper and saves an enormous amount of energy spent on transporting food.

In short, gardens can be good for the environment, healthy, sustainable and economical!
How to Recycle in the Garden

There are many things that would normally be thrown away that can be reused in a garden. Using recycled materials as plant containers extends the items’ life, minimizes waste and adds a lot of personality to the garden! Plus, it’s a fun activity for children to cut up old containers and see where they can be used in the garden. If you use your imagination, the sky is the limit! There are just two things that are important when recycling containers in your garden:

- Make sure that the container is completely clean before you use it, otherwise residue bacteria could kill your seeds or plants. Use a high-pressure hose or some dish washer fluid or bleach and water.
- Ensure that the container has proper drainage for the water to exit by poking holes in the bottom.

Plastic pots retain moisture well and are therefore excellent for planting seeds and for use in the nursery. These are some things you could use:

- The bottom half of a plastic bottle
- Yoghurt cups
- Plastic drinking cups
- Broken buckets or watering cans
- Old oil jugs cut in half
- Paper wax milk or juice cartons also work well (and are biodegradable!)

You can also use plastic lids to place on top of the containers; this keeps seeds warm and moist during germination.

Here are a few more tips:

- Wooden crates and wicker baskets also make great plant holders. Since they are not waterproof, line them with some fabric or an old plastic bag or mat before filling them with soil.
- Rubber tires make excellent vegetable planters and can be placed anywhere since they take up very little space
- Old tins and cans (Nescafe tins, or milk or vetable cans) can be used for small plants and flowers
- Used oil jugs (such as the ones that WFP oil comes in) can be used as watering cans by poking holes in the top.
- Old plastic bags and test booklet bags make good poly-pots for the tree nursery.
Record-Keeper
Record-Keeping

Introduction

Keeping written accounts of the activities that are conducted in the school garden is important for monitoring the school garden’s progress and for knowing whether you are achieving your goals. It helps you look back at what has been achieved so far and make plans for the future. Garden records also serve as a basis for the termly reports you will have to send to the School Agriculture and Food Management Unit (SAFMU), and are important for handing over gardening activities if the Garden Master leaves the school and someone else takes over.

It is advisable to keep a garden book, diary or folder where all the information regarding the school garden is kept in one place. Records can be kept on a multitude of things, depending on what your initial objectives were and where your interests lie. Some examples are the dates of sowing, transplanting and harvesting; which activities are conducted when; plant growth; crop yields per vegetable; amount of produce consumed and sold; and money spent and received.

It is primarily the Garden Master’s responsibility to keep accurate records and fill in reports. However, older children can also help with this and even do it as part of one of their subjects. For them it serves as an important educational exercise as it teaches children the importance of maintaining records and keeping track of progress; plus it aids in transparency! (Also see Using School Gardens as a Teaching Aid: Tips & Tricks, p. 73)

This is why keeping garden records is important:

- Helps in recalling what has been done and what progress has been made
- Serves as a source of information
- Ensures transparency within the school and towards outsiders
- Facilitates reporting and information sharing with other stakeholders
- Enables the farmer to know the amount of profit or loss made
- Enables assessment of the garden or farm’s different enterprises
• May aid in obtaining loans from financial institutions
• Aid in budgeting and planning for future development
• Builds up students’ habits of keeping track of progress and finances
• Produces something to show parents, visitors, pupils and other interested parties
• Makes students aware of the significance of events

Types of Garden Records

There are two main types of farm records: production and financial records.

1. Production Records are records that show what has been pumped into the garden in terms of labor, seeds, etc. and the output that it has yielded. Following are some examples of production records:

<table>
<thead>
<tr>
<th>Crops Grown in the Garden / Farm</th>
<th>Size of Bed</th>
<th>Number of Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td>1 x 5m</td>
<td>36</td>
</tr>
<tr>
<td>Carrot</td>
<td>1 x 3m</td>
<td>500</td>
</tr>
<tr>
<td>Sweet Potato</td>
<td>1 x 5m (2 beds)</td>
<td>20</td>
</tr>
<tr>
<td>Bitter Tomato</td>
<td>1 x 5m (2 beds)</td>
<td>50</td>
</tr>
<tr>
<td>Garden Egg</td>
<td>1 x 3m</td>
<td>10</td>
</tr>
<tr>
<td>Cassava</td>
<td>8 x 8m</td>
<td>64</td>
</tr>
<tr>
<td>Pepper</td>
<td>1 x 3m</td>
<td>15</td>
</tr>
</tbody>
</table>
### Tool Inventory

<table>
<thead>
<tr>
<th>Tool</th>
<th>Quantity in March 2010</th>
<th>Quantity in Sept. 2010</th>
<th>Losses</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelbarrow</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Hand trowel</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>1 was lost, 1 broke while digging in the garden</td>
</tr>
<tr>
<td>Cutlass</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Watering Can</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>Handle broke off</td>
</tr>
</tbody>
</table>

### Garden Activities

These are records of day-to-day activities carried out in the garden and can be as detailed or to-the-point as suits your needs.

<table>
<thead>
<tr>
<th>Date</th>
<th>Garden Activities Carried Out</th>
<th>Person(s) Responsible</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd March 2010</td>
<td>Preparation of the seed boxes &amp; nursery</td>
<td>Binta Touray (Gr.4) Lamin Ceesay (Gr.5)</td>
<td>8 seed boxes prepared</td>
</tr>
<tr>
<td>5th March 2010</td>
<td>Planting of seedlings in seed boxes &amp; nursery</td>
<td>Isatou Camara (Gr.2) Momodou Jallow (Gr.6)</td>
<td>Planted in seed boxes: onion, lettuce, pepper, sorrel, tomato, garden egg Planted in nursery: cabbage, Irish potato, sweet pepper</td>
</tr>
<tr>
<td>5th March 2010</td>
<td>Measuring, demarcation &amp; tillage of garden beds</td>
<td>Essa Fatajo (Garden Master) Ibrahim Khan (Gr. 6) Fatou Dammeh (Gr.6)</td>
<td>10 beds of 1x 5 m prepared</td>
</tr>
<tr>
<td>8th March 2010</td>
<td>Weeding &amp; Watering of seed boxes &amp; nursery</td>
<td>Binta Touray (Gr.4) Isatou Camara (Gr.2)</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Crop Production: This keeps track of what crops have been harvested and whether they were consumed or sold.

<table>
<thead>
<tr>
<th>Date</th>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit Price (D)</th>
<th>Income (+)</th>
<th>Expenses (–)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 / 4 / 10</td>
<td>Bitter tomato</td>
<td>5 kg.</td>
<td>D 50 / kg.</td>
<td>D 250</td>
<td></td>
</tr>
<tr>
<td>30 / 4 / 10</td>
<td>Carrot</td>
<td>70 kg.</td>
<td>D 20 / kg.</td>
<td>D 1400</td>
<td></td>
</tr>
<tr>
<td>10 / 5 / 10</td>
<td>Fish &amp; condiments</td>
<td>10 fish,</td>
<td></td>
<td></td>
<td>D 300</td>
</tr>
<tr>
<td></td>
<td>for school meals</td>
<td>500 g condiments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 / 5 / 10</td>
<td>School notebooks</td>
<td>50</td>
<td>D 10</td>
<td>D 500</td>
<td></td>
</tr>
<tr>
<td>12 / 5 / 10</td>
<td>Pencils</td>
<td>200</td>
<td>D 5</td>
<td>D 1000</td>
<td></td>
</tr>
<tr>
<td>11 / 9 / 10</td>
<td>Cassava</td>
<td>30 kg.</td>
<td>D 25 / kg.</td>
<td>D 750</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>D 2400</strong></td>
<td><strong>D 1800</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Balance (Income – Expenses)</strong></td>
<td></td>
<td><strong>D 600</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is up to the school to determine the records to keep and how detailed to prepare them. However, it is necessary to at least keep records of crop production as you will also need to report on this in the termly report to SAFMU.

2. Financial Records are records of the garden’s cash flow, both income from crop sales and expenses spent on goods or services. If the total income made from the garden is greater than total expenditures, the account will have a net profit. However, if expenditures are greater than income, the account will have a net loss.

It is advisable to have a gardening account that is kept separate from other school finances to ensure transparency. Not keeping records can cause suspicion among stakeholders about what is happening with the income from the school garden. You will also need to provide financial records in the termly report to SAFMU.
If you are planning on selling part of the garden’s produce, establish beforehand what you will do with the profit. Of course it is best if the garden’s proceeds are pumped back into the garden or into things which aid in improving children’s nutrition. For instance, you can buy seeds, garden tools, fencing materials, or meat, fish and condiments to further complement school meals. Of course proceeds can also be used towards general school maintenance, such as buying books, learning materials, or repairing furniture and renovating buildings.

<table>
<thead>
<tr>
<th>Date</th>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit Price (D)</th>
<th>Income (+)</th>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 / 4 / 10</td>
<td>Bitter tomato</td>
<td>5 kg.</td>
<td>D 50 / kg.</td>
<td>D 250</td>
<td></td>
</tr>
<tr>
<td>30 / 4 / 10</td>
<td>Carrot</td>
<td>70 kg.</td>
<td>D 20 / kg.</td>
<td>D 1400</td>
<td></td>
</tr>
<tr>
<td>10 / 5 / 10</td>
<td>Fish &amp; condiments for school meals</td>
<td>10 fish, 500 g</td>
<td></td>
<td>D 300</td>
<td></td>
</tr>
<tr>
<td>12 / 5 / 10</td>
<td>School notebooks</td>
<td>50</td>
<td>D 10</td>
<td>D 500</td>
<td></td>
</tr>
<tr>
<td>12 / 5 / 10</td>
<td>Pencils</td>
<td>200</td>
<td>D 5</td>
<td>D 1000</td>
<td></td>
</tr>
<tr>
<td>11 / 9 / 10</td>
<td>Cassava</td>
<td>30 kg.</td>
<td>D 25 / kg.</td>
<td>D 750</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>Balance (Income – Expenses)</strong></td>
<td></td>
<td>D 2400</td>
<td>D 600</td>
<td></td>
</tr>
</tbody>
</table>

**Evaluation**

It is a good idea to evaluate the garden’s progress every so often. Evaluation serves to reflect on what you have achieved so far, what you have learned, and what this implies for the future. Ask yourself some of the following questions:

- What has happened so far?
- What have we achieved?
- Did we meet all of our objectives?
- What went well?
- What problems or obstacles did we encounter?
- And most importantly, **What did we learn?**
You can learn as much from failures as you can from success (if not more!) so don’t be afraid to discuss problems that you have had along the way. Everyone should be involved in this activity, including the children. You can make it a fun brainstorming activity where each child has to say something that went well and something that didn’t. Let past experiences serve as a learning experience for future planning and activities!

**Reporting**

Because your school is included in the National School Garden Programme, you will be required to send in a termly report documenting what has been achieved in the garden that term. The report serves to inform relevant stakeholders about how children and the school as a whole have benefited from gardening (produce consumed in the school and income generated), but also to take stock of what problems schools have encountered.

The head teacher should sign and submit the report no later than two weeks after the end of term to their Cluster Monitor, who will double check the information and also sign the form. The Cluster Monitor will ensure that it gets to the Regional Educational Directorate, and eventually SAFMU.

See Annex II, p. 76 for the Termly Reporting Format.
Using School Gardens as a Teaching Aid: Tips & Tricks
Using School Gardens as a Teaching Aid: Tips & Tricks

Keep Kids Motivated

One of the most important things in working with children in a school garden is to keep them motivated. You can do this by making sure that gardening is not seen as a chore but as a fun activity. If children see garden work as a chore, they will resent the time they spend working in the garden. This means they will not learn as much from the experience and the garden will defeat its purpose. Gardening should thus never be used as a form of punishment. One of the best things you can do to motivate children is to set the right example. If you show kids that gardening can be fun and that agricultural work and manual labor are not something to be looked down on, kids will copy this attitude. When planning garden activities always keep in the back of your mind: “If I were a kid, would I want to do that?”

Be Patient

A lot of garden planning and work may go more quickly and efficiently if it is done by adults. However, this defeats the purpose of using the garden as a learning tool. Take the time to explain and discuss garden issues with children and let them participate in decision-making. Don’t just dictate what you think or know is right. When children participate they will enjoy themselves and learn much more, making the experience all the more valuable for it.

Make it Interactive

Children learn better when they are engaged on many different levels. In this regard, gardens can be a valuable resource in almost all academic subjects:

- **Math:** Use the rows and beds in the gardens to teach children how to measure, draw accurate scaled maps or how to do their times tables
- **Science:** Have children do experiments where they observe and record plant growth, map out eco-systems, observe insects and other garden animals
• **Art:** Children can draw the garden and make creative, colorful signs to label the different beds or the garden produce when it is sold

• **English:** The garden can be a great source of inspiration in writing

• **Health:** The garden is an excellent way to integrate nutrition, health & hygiene in the school curriculum. (See Nutrition, Health & Hygiene in School Gardens, p. 50 for more information)

This does not mean that garden activities should be limited to schoolwork. Have children share their knowledge with outsiders. They can take interested visitors on guided tours or do ‘homework’ by teaching their families what they have learned in the garden and implementing it in their home gardens if they have one. You can also have children suggest a fun activity, class or learning exercise that they would like to see done in the garden.

**Teach Life Skills**

One of the great things about gardens is that they can encourage holistic child development. These are some things you can do to teach children important life skills such as planning, making decisions, taking responsibility and working in groups:

• Ensure that children are involved on every level of the garden’s planning and decision-making. Have them brainstorm about what the garden should look like and what vegetables should be grown, involve them in meetings with the garden club or community and let them have a say in final decisions.

• Promote group work and garden ownership by giving small groups of children their own bed to care for (‘our garden, my patch’). You can also incorporate an element of competition here (see next section).

• Instead of having one large compost heap, give each grade the responsibility of creating and maintaining one smaller compost heap. This is also a great place to conduct small science experiments.

• Give children small responsibilities that make them feel like they are contributing and give them a sense of pride (though make sure that they don’t do work that is too heavy for them). They can measure beds, plant seeds, look for materials to add to the compost heap, care for equipment, water plants, monitor plant growth,
harvest produce, etc.

- Give older children the responsibility of being in charge when the school is closed during holidays or when gardening work is done after school hours.

Make it Competitive
Friendly competition is very healthy and fun and can be an extra motivation for kids to do their best. Here are some ideas for incorporating a competitive element in the garden:

- If small groups of children or classes each have their own bed, have them compete with each other: Who has the nicest looking bed? Which bed produces the highest yield? Which bed made the most money? etc. Give out awards accordingly at the end of the term or academic year.

- Have gender competitions where boys do the watering and other ‘women’s chores’ and girls have to get dirty. This also encourages children to think outside the box.

- Organize a friendly competition with other schools in the area for Best Garden. You can have multiple categories such as: most aesthetic, best management, most community involvement, most/tastiest produce, nicest meals made with garden produce, etc. Have a ceremony and party where awards are given out and lots of vegetables are eaten.

Integrate Business & Financial Skills
Particularly for older children, school gardens are a great way of learning valuable business and financial skills. You can have children:

- Maintain the records of what crops are grown, which activities are conducted, what is harvested, what is consumed in the school and what is sold. Particularly if children are the ones doing most of the garden work, they should record when they work and what they do in the garden.

- Keep records of income and expenses, calculate profits (or losses) and help manage the money. This serves as an excellent math exercise. Make sure to help them and double-check everything.

- If you are selling part of your produce, have children think about pricing and marketing: What have we spent on this produce in terms of money and labor? What is the demand for this product? How much would a customer be willing to
pay? What does my competition charge? What is a fair price to ask? etc.

- If children do most of the garden work, it might be extra motivational for them to receive half of the proceeds from their beds. This teaches them financial responsibility and the rewards of hard work.

**Celebrate**

Celebrate the school’s achievements when it comes to the garden! There is no better incentive for children to do garden activities. For instance, use the proceeds from the garden’s produce to throw a party or have a ‘Harvest Party’ where children get to taste all the different vegetables from the garden. This is also a great opportunity to give out awards for the different competitions.
Closing Remarks

This School Garden Manual is meant to cover the fundamentals of establishing and maintaining a school garden. It cannot, however, cover every topic that may be relevant to your situation and location. That is why it’s important to seek out help from professionals or other knowledgeable individuals who can further help you with technical expertise, should you require it. WFP hopes that this manual will be of use to your school and that your garden will prosper, providing school children with a delicious supplement to their daily lunch whilst improving their health, nutrition and education. Good luck!
Annex 1: Contact List

<table>
<thead>
<tr>
<th>Region</th>
<th>School Agriculture Focal Point</th>
<th>NaNA Field Officer</th>
<th>Agricultural Extension Worker</th>
<th>Peace Corps Volunteer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Western Region</strong></td>
<td>Ousainou Jobe 9937461</td>
<td>Malang Jannuh 9947868</td>
<td>Ousman Ceesay 9922501</td>
<td></td>
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<tr>
<td><strong>North Bank Region</strong></td>
<td>Amadou Cham 7915250</td>
<td>Amadou Jallow 6241295</td>
<td>Batch Samba Njie 3648337</td>
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<tr>
<td><strong>Lower River Region</strong></td>
<td>Musa Bah 9932643</td>
<td>Dodou Sowe 6503650</td>
<td>Omar Sanneh</td>
<td></td>
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<tr>
<td><strong>Central River Region</strong></td>
<td>Alhagie Sanneh 7125524</td>
<td>Alpha Mballow 9904919</td>
<td>Sisawo Mameh 7311997</td>
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<tr>
<td><strong>Upper River Region</strong></td>
<td>Samba Bah</td>
<td>Saikou Dammeh 9926520</td>
<td>Ebou Lowe 7373168</td>
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</tr>
<tr>
<td><strong>WFP Programme</strong></td>
<td></td>
<td></td>
<td></td>
<td>Phone: 4494782 Fax: 4494784</td>
</tr>
</tbody>
</table>


# SCHOOL GARDEN TERMLY REPORT
The Gambia National School Garden Programme
Ministry of Basic & Secondary Education

## 1. School Information
- **School Name:**
- **Cluster:**
- **Region:**
- **School Year:**
- **Term:**
- **Reporting Date:**

## 2. Enrolment

<table>
<thead>
<tr>
<th>Year</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
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## Farm / Garden
- **Size (m²):**

## School
- **ECDC:**
- **LBS / BCS:**
- **Madrasah:**

## 2. Harvest Records

<table>
<thead>
<tr>
<th>Date</th>
<th>Crop Grown</th>
<th>Quantity Harvested (kg.)</th>
<th>Quantity Consumed in School (kg.)</th>
<th>Quantity Sold (kg.)</th>
<th>Remarks</th>
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</table>

**World Food Programme**
### 3. Cash Flow

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Income (+)</th>
<th>Expense (-)</th>
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</table>

**Balance at the end of the month (Income - Expense) TOTAL**

4. Comments / Observations (facilitating factors, obstacles encountered, gaps in knowledge / tools. Justification of expenses, etc.): 

---

**Head Teacher's Name:**

I hereby certify receipt of form from the Head Teacher and confirm that the form has been verified.

**Cluster Monitor's Name:**

<table>
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<tr>
<th>Signature</th>
<th>Date</th>
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**Head Teacher's Name:**

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Bibliography


International Federation of Organic Agricultural Movements (IFOAM).


