# Polyculture Market Garden Study

## Introduction

The Polyculture Market Garden Study is one of the programs currently running at Balkan Ecology Project and is a multiyear study of a 0.5 acre (2000 $m^2$) market garden growing herbs, vegetables and perennial fruit and nuts in polycultures. The project's mission is to develop and promote practices that provide nutritious affordable food whilst enhancing biodiversity. The study aims to look at the productivity of a polyculture market garden, recording levels of biodiversity in the garden and looking at set up and running costs (in terms of finances and time) and outputs in terms of produce and income. This document will focus on the annual vegetable production within the market garden and the agroecological system used for this component, which has been designed to be replicated easily.

Balkan Ecology Project (www.balkep.org) is a family run, permaculture-inspired, grassroots project based in South Eastern Europe, Bulgaria. The Project invites participants with an interest to learn about ecological design and regenerative agriculture to help run the market garden. This usually involves an international team of about 5-10 people, within the age bracket of 20 to 50 years, from varying backgrounds. The local community is also involved in several ways. Balkan Ecology Project collaborates with other local environmental groups such as local farms and local enterprises that produce inputs as vermicompost, straw and other materials used to mulch and build soil.

## Description of the Agroecology system

Focusing on annual vegetable production, the system used and described below has been successfully replicated from the original site in our residential gardens to our market garden. The design can be scaled up and is suitable for similar climate zones. We first grew this polyculture in six raised beds, each with a size of 1m x 6m and approx. 30cm high with 50 cm paths between the beds.

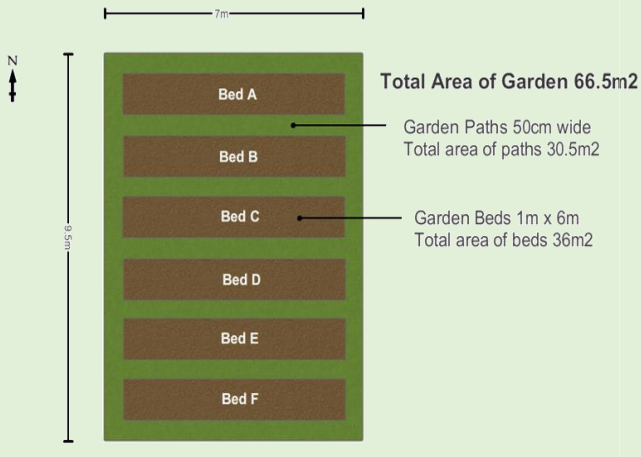


**Figure 1. Annual Vegetable and Herb Production, Path and Bed**

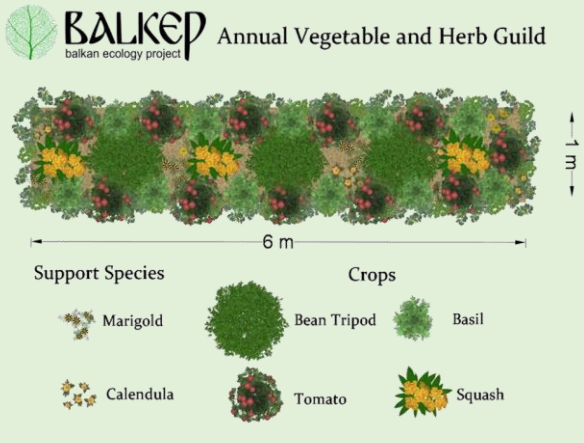


**Figure 2. The plant selection differs slightly from bed to bed, but all feature Tomatoes, Beans, Basil and Squash as main annual crops**

Case study provided by Paul Alfrey and Sophie Roberts from Balkep – Balkan ecology project
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**Table 1. Crop and cultivar list based on six raised beds, each bed 1m x 6m**

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|---|
| 11 x Tomato - Solanum lycopersicum 'Black Krim' |
| 11 x Tomato - Solanum lycopersicum 'Tigerealla' |
| 11 x Tomato - Solanum lycopersicum 'Mixed Saved Seed' |
| 11 x Tomato - Solanum lycopersicum 'Rozova Magia' |
| 11 x Tomato - Solanum lycopersicum 'Paulina F1' |
| 11 x Tomato - Solanum lycopersicum 'Citrina' |
| 66 x Basil - Ocimum basilcium 'Sweet Genovese' |
| 24 x Runner Beans - Phaseolus coccineus |
| 24 x French Beans - Phaseolus vulgaris 'Cobra' |
| 24 x French Beans - Phaseolus vulgaris 'Blue Bean' |
| 2 x Courgette - Cucurbita pepo 'Black Beauty' |
| 4 x Bush Scallops - Cucurbita pepo |
| 6 x Butternut Squash - Cucurbita pepo 'Waltham Butternut' |
| 12 x African Marigold - Tagetes erecta |
| 12 x French Marigold - Tagetes patula |
| 12 x Pot Marigold - Calendula officinalis |

Raised beds are a major part of our fertility strategy and over time retain water and nutrients very efficiently. 1-1.3 m wide beds surrounded by 50 cm paths allow easy access for harvesting everywhere in the beds without ever having to tread on the soil, and the paths are wide enough to take a lawnmower. The beds are laid out on contour, lengthwise running east to west. This provides the plants within the beds the maximum amount of sunlight and determines that rainfall will collect in the paths and permeate into the soil slowly rather than draining away. Of course, in wet soils the paths can be adjusted to drain water.

**Figure 4. The Annual Vegetable and Herb Polyculture beds in the residential gardens in mid spring**

**Figure 4. Creating the Annual Vegetable and Herb beds in natural gaps occurring within the larger design in the Market Garden**

The vegetable production area is surrounded by a diversity of perennial polycultures, with the purpose to build habitat and wild zones that assist pest control, crop pollination and general ecosystem health. They are positioned in the way that they receive at least 8 hours of sunlight per day and placed on contour lines, resulting in maximum water retention and favourable microclimatic conditions for the crops.

To form a bed the area should be cleared of all plants, which is best achieved by sheet mulching the season before. Pernicious perennials or tap rooted biennials should be dug out. After clearing the whole area, the bed shape is marked out with strings and 50 cm wide paths are dug out around the beds, the soil is applied to the surface of the planting area and thereby the initial rise of the bed is

Figure 5. Produce from the Polyculture Market Garden Study including Annual vegetable production

created. After, the beds should be forked well. If a hardpan is present, time and effort should be taken to eliminate it before planting. The depth and gradient of the paths can be altered to facilitate the required direction of water movement. Once mulched the stakes for tomatoes and beans are put into position. Large reliable germinating seeds such as beans and squash are sown directly into the beds by pulling back the mulch and sowing into the soil. The other plants are sown in pots and planted into the beds when they are approx. 15cm tall and when the weather is suitable. Any "weed" plants that grow around the edge of the beds are cut back before they set seed and are used as additional mulch throughout the year. Weeds that grow within the bed are treated the same way. Note that the weeds are not uprooted, but only cut to ground level. The roots are allowed to decay in the ground or left to regrow until they are again ready to "chop and drop". Around July the vegetable and herb plants are all well established with little room for weed plants to establish. The plants growing up in the pathways can be mown from time to time and spread onto the surface of the beds.

From July to October the beds mainly require irrigation and harvest. When harvest is finished the stakes are removed. None of the plant material is removed from the bed. What is left behind is cut into small pieces and applied to the surface as an overwinter mulch. At this stage, chickens can be integrated into the system by putting them on a floorless coop to let them eat weed seeds and to add manure. This can also be done at the beginning of the process, when the beds are being prepared.

Soil needs are met by several different methods of biological composting which are created on site. Mobile chicken pens are in use in the spring and autumn, and manure from rabbits and pigs are hot composted and further composted with worms (vermicompost) before being applied to the garden. Compost toilets are also in use.

Figure 6. The bottomless chicken coop is built to fit neatly over a portion of the vegetable bed

A mix of heirloom, commercial and F1 hybrid seeds are used for annual crops. Seeds are saved from plants showing favourable characteristics to build up good, local strains that are well suited to the local circumstances.

Specific questions and solutions being looked at are:

- How can we provide nutritious affordable food whilst enhancing biodiversity?
- How productive can polycultures be?
- How much time does it take to establish and manage such a garden?
- What income can be expected from running such a garden?
- How biodiverse can our food producing systems be and how can we measure this?

Skills for the setting up and management were acquired through local knowledge combined with personal research and hands on experience. Certain books/articles and authors were very useful and inspiring i.e Patrick Whitefield - Earth Care Manual - Martin Crawford's body of Agroforestry work and - Linda Woodrow - The Permaculture Home Garden.

**Political space**

Currently, we are not aware of any funding or subsidies existing for the methods we practice and for small scale farming. Even though small scale biologically cultivated polyculture gardens seem a practical, accessible and realistic way of providing a portion of clean affordable food for humans whilst preserving and promoting biological diversity in the environment.

## Outcomes of the practices

Some obvious results are:

- Food is provided for family food co-op and veggie box subscribers;
- Income is generated to support family and project growth;
- Growing body of data and models - freely available to the public;
- Rural economy is stimulated.

**Figure 7. Aesthetically pleasing Polycultures**

Our approach to food production has changed the reality of the people involved. Having seen the markets we are producing for, local people are switching to biological methods in order to supply these markets. Young people are getting inspiration and direct experience by coming to work at the project. Benefits of implementing the Agroecology system include: Clean food production, a healthy local environment, higher levels of biodiversity and contribution to the local economy. Non-monetary benefits include aesthetic appeal, creative opportunities and improved health from eating fresh and nutritious food.

The production and supply of produce has become a reliable source of clean food for the people involved and customers. Latest results suggest that clean food does indeed, provide better nutrition: http://research.ncl.ac.uk/nefg/QOF/page.php?page=1.

Bulgaria does not have serious problems with hunger. However, the loss of valuable traditional farming skills that have been held by families for years, are a concern. Native and rich habitats are being lost as land is cleared for monoculture production and by destructive agricultural methods that are being encouraged by the government.

## Message from farmer to farmers

*"If your goal is to provide healthy nutritious food, enhance biodiversity, stay out of debt and have a diverse work schedule then this is the farming for you."*

— Paul Alfrey, Balkan Ecology Project