

Sustainable food production in Sweden – to grow and eat from perennial intercropping systems

Results from a participatory learning and action research project, 2012 - 2016

Main project aims were to provide practical and theoretical knowledge for the development of agroforestry systems in agricultural and subsistence farming and identify types of systems that could provide important contributions, as well as relevant combinations of species and varieties to be included.

The research group comprised 13 smallholders and two researchers with expertise in environmental science and in participatory methodologies.



Findings

- Edible forest gardens were found to work well on marginal lands
- Harvest from perennials was small and the level of ground cover low the first year of establishment, while annuals would easily be included
- From year three in the establishment "salads" from perennial leafy vegetables were available throughout the growing season
- In the Swedish climate an edible forest garden may not fully provide the bulk of energy, proteins and carbohydrates needed in a diet

Conclusion

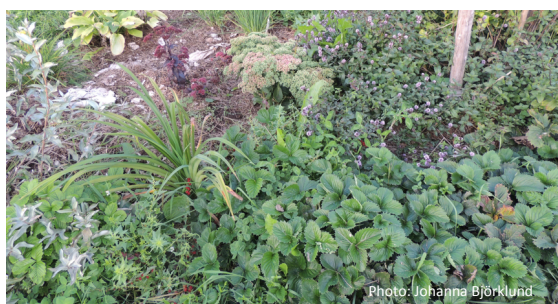
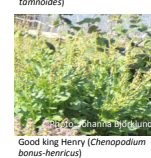
- The main benefits is production of vitamins and minerals in multiple layers with low levels of inputs, while at the same time increasing the amount of trees and bushes in the agri-cultural landscape contributing to generation of ecosystem services
- For forest gardens to give serious contribution to food production scaling issues without losing crucial ecosystem services will be of special concern
- Small-scale machinery for management and harvest need to be developed
- Availability of plants and useful varieties for edible forest gardens in temperate will be important
- More knowledge about harvest potential and nutritional values of different plants and varieties will be needed

Study sites & methods: One of the systems studied was edible forest gardens. Thirteen research sites (60 m²) with a common three dimensional design have been established.

Strata	Plants
Medium to large canopy trees (> 10 m)	alder (<i>Alnus glutinosa</i>)
Small trees and large shrubs (4-9 m)	apple trees (<i>Malus domestica</i>) and hazelnut (<i>Corylus avellana</i>)
Shrubs (<3m)	Siberian pea tree (<i>Caragana arborescens</i>), silverberry (<i>Elaeagnus commutata</i>), buckthorn (<i>Hippophae rhamnoides</i>), saskatoon (<i>Amelanchier alnifolia</i>), dwarf quince (<i>Chaenomeles japonica</i>)
Herbaceous perennials (< 3m)	garlic mustard (<i>Alliaria petiolata</i>), mentha (<i>Mentha</i> spp.), mallow (<i>Malva</i> spp.) and comfrey (<i>Symphytum uplandica</i>), daylilies (<i>Heemerocallis</i> spp.), anise hyssop (<i>Agastache Foeniculum</i>), sweet cicely (<i>Myrrhis odorata</i>), oregano (<i>Origanum vulgare</i>), good king Henry (<i>Chenopodium bonus-henricus</i>)
Climbers	vines (<i>Vitis vinifera</i>), Caucasian spinach (<i>Habitzia tamnoides</i>), arctic kiwi (<i>Actinida kolomikta</i>), blackberry (<i>Rubus laciniatus</i>)
Ground cover plants and creepers	strawberry (<i>Fragaria x ananassa</i>) and wild strawberry (<i>Fragaria vesca</i>), Welsh onion (<i>Allium fistulosum</i>)
Underground layer	common bistort (<i>Bistorta major</i> Gray)

Permanent sampling points, inside and outside of the research site, were established the year of plantation (2013). Initial vegetation and basic soil parameters were documented. In- and outputs, labour hours, photographic documentation at permanent point at set dates and a diary with notations on important observations were recorded.

All experiences have been well discussed in the group and conclusions drawn together.



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