Flower strips on the field margin of an orchard (Mathias D'Hooghe)

Flower strips on field margins to attract beneficial insects (Belgium)

DESCRIPTION

Field margins in agricultural areas are sown with specific flowers to attract insects which help combating pests of crops and livestock and reduce the need for pesticides.

Flower strips on field margins have been established in the centre of Belgium in the region 'Pajottenland'. The Pajottenland is predominantly farmland and lies mostly between the rivers Dender and Senne in close proximity to Brussels. Pajottenland has historically provided food and drink for the citizens of Brussels. This SLM practice was established in September 2019 on parcels on 7 different farms in Pajottenland. Such flower strips are 3-12 metres wide and are established at the edges of fields to provide nectar and pollen to attract beneficial species that control pest species. It is estimated the beneficial effect of the flower strips on field margins extends about 50 metres into the field.

The strips provide a habitat for natural enemies of various crop and livestock pests to control and decrease their population and to reduce the necessity of spraying pesticides. Care it taken in choosing and sowing flower species that attract arthropods with a role in biocontrol, such as hoverflies, lacewings, parasitoids and ladybirds. The flower strips conserve ecosystems and improve biodiversity, also facilitating ecosystem-based disaster risk and integrated soil fertility management.

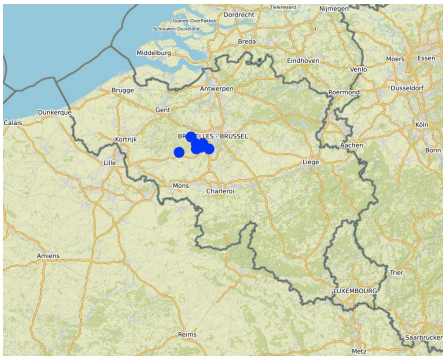
Farmers dedicate strips of land on field margins to flowers (perennial herbaceous plants). Work includes management of the soil, sowing seeds, mowing flowers and removal of residues. Costs are related to farmers working hours, sowing and mowing equipment, pesticides (if necessary) and seed costs. Savings are related to providing a habitat for natural pest controls, thereby reducing pest in crops and increasing yields.

What do land users like about the technology?
- increased recreational impact for humans due to the beauty of the flower strips
- increased biodiversity (beyond natural pest enemies)

What do land users dislike about the technology?
- reduced overall income from crops (due to reduced area)
- the costs - unless subsidies become more widely available

The compilation of this SLM is a part of the European Interreg project FABulous Farmers which aims to reduce the reliance on external inputs by encouraging the use of methods and interventions that increase the farm's Functional AgroBiodiversity (FAB). Visit www.fabulousfarmers.eu and www.nweurope.eu/Fabulous-Farmers for more information.

LOCATION



Location: Pajottenland, Flemisch Brabant, Belgium

No. of Technology sites analysed: 2-10 sites

Geo-reference of selected sites
- 4.07265, 50.84066
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- 4.20218, 50.76314
- 4.20218, 50.76314
- 4.13875, 50.75017
- 4.30031, 50.74885
- 4.2192, 50.7917
- 3.92424, 50.71966
- 4.13733, 50.78815

Spread of the Technology: applied at specific points/ concentrated on a small area

In a permanently protected area?: No

Date of implementation: 2019

Type of introduction
- ☐ through land users' innovation
- ☐ as part of a traditional system (> 50 years)
- ☑ during experiments/ research
- ☑ through projects/ external interventions

Flower strip in the orchard (Mathias D'Hooghe)

A hover fly, Episyrphus balteatus, attracted by field margins. The larva consumes aphids and the adult fly is a pollinator. (Anna Kosubek)

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- [ ] improve production
- [ ] reduce, prevent, restore land degradation
- [ ] conserve ecosystem
- [ ] protect a watershed/ downstream areas – in combination with other Technologies
- [x] preserve/ improve biodiversity
- [ ] reduce risk of disasters
- [ ] adapt to climate change/ extremes and its impacts
- [ ] mitigate climate change and its impacts
- [ ] create beneficial economic impact
- [ ] create beneficial social impact
- [x] Reduced pesticide use

Land use

Land use mixed within the same land unit: No

Cropland

- Annual cropping

Number of growing seasons per year: 1
Is intercropping practiced? No
Is crop rotation practiced? No

Water supply

- [x] rainfed
- [ ] mixed rainfed-irrigated
- [ ] full irrigation

Purpose related to land degradation

- [ ] prevent land degradation
- [ ] reduce land degradation
- [ ] restore/ rehabilitate severely degraded land
- [ ] adapt to land degradation
- [x] not applicable

Degradation addressed

biological degradation - Bp: increase of pests/ diseases, loss of predators

SLM group

- integrated pest and disease management (incl. organic agriculture)

SLM measures

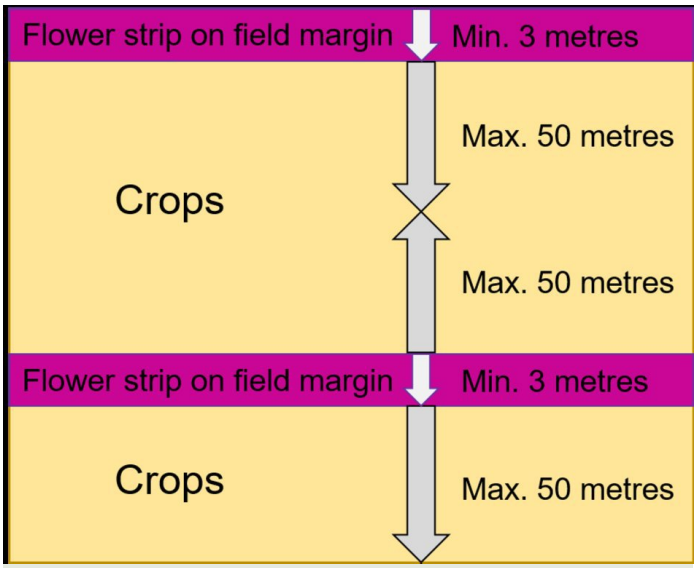
agronomic measures - A1: Vegetation/ soil cover

vegetative measures - V2: Grasses and perennial herbaceous plants

TECHNICAL DRAWING

Technical specifications

Dimension flower strip: minimum 3 metres wide
Effect of the flower strips goes up to 50 metres
Sowing= 2 g seeds/m²= 20 kg seeds/hectare



Author: Mathias D'Hooghe

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs
- Costs are calculated: per Technology area (size and area unit: **1 ha**; conversion factor to one hectare: **1 ha = 1ha - 2.47 acres**)
- Currency used for cost calculation: **€**
- Exchange rate (to USD): 1 USD = 0.91 €
- Average wage cost of hired labour per day: 240

Most important factors affecting the costs
Cost of seed mix Cost of machines to embed and maintain the flower strips if not already available to farmer

Establishment activities
1. Soil strip preparation (Timing/ frequency: Spring)
2. Planting wildflower seed (Timing/ frequency: Spring)
3. Mowing wildflowers (Timing/ frequency: Late-Summer)
4. Residue removal (Timing/ frequency: Late-Summer (before crop harvest))

Establishment inputs and costs (per 1 ha)

Specify input	Unit	Quantity	Costs per Unit (€)	Total costs per input (€)	% of costs borne by land users
Labour					
Farmer time for establishment	Days per establishment	3.0	240.0	720.0	100.0
Equipment					
Machine to cultivate the land (already owned by farmer)	1	1.0			100.0
Machine for sowing after cultivating (already owned by farmer)	1	1.0			100.0
Mower to cut and clear flowers (already owned by farmer)	1	1.0			100.0
Plant material					
Flower seeds	per ha	1.0	900.0	900.0	30.0
Other					
Loss of income with reduction of cultivated area for crops due to flower strips	ha	1.0	500.0	500.0	100.0
Total costs for establishment of the Technology				**2'120.0**	
Total costs for establishment of the Technology in USD				*2'329.67*	

Maintenance activities
n.a.

NATURAL ENVIRONMENT

Average annual rainfall
- ☐ < 250 mm
- ☐ 251-500 mm
- ☐ 501-750 mm
- ☑ 751-1,000 mm
- ☐ 1,001-1,500 mm
- ☐ 1,501-2,000 mm
- ☐ 2,001-3,000 mm
- ☐ 3,001-4,000 mm
- ☐ > 4,000 mm

Agro-climatic zone
- ☐ humid
- ☑ sub-humid
- ☐ semi-arid
- ☐ arid

Specifications on climate
Average annual rainfall in mm: 751.0
Rain spread throughout the year
Name of the meteorological station: KMI, VMM

Slope
- [ ] flat (0-2%)
- [x] gentle (3-5%)
- [x] moderate (6-10%)
- [ ] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms
- [ ] plateau/plains
- [ ] ridges
- [ ] mountain slopes
- [ ] hill slopes
- [ ] footslopes
- [x] valley floors

Altitude
- [x] 0-100 m a.s.l.
- [x] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [ ] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

Technology is applied in
- [ ] convex situations
- [ ] concave situations
- [x] not relevant

Soil depth
- [ ] very shallow (0-20 cm)
- [ ] shallow (21-50 cm)
- [ ] moderately deep (51-80 cm)
- [x] deep (81-120 cm)
- [x] very deep (> 120 cm)

Soil texture (topsoil)
- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Soil texture (> 20 cm below surface)
- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Topsoil organic matter content
- [ ] high (>3%)
- [x] medium (1-3%)
- [x] low (<1%)

Groundwater table
- [ ] on surface
- [x] < 5 m
- [ ] 5-50 m
- [ ] > 50 m

Availability of surface water
- [ ] excess
- [x] good
- [ ] medium
- [ ] poor/ none

Water quality (untreated)
- [ ] good drinking water
- [x] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Water quality refers to: ground water

Is salinity a problem?
- [ ] Yes
- [x] No

Occurrence of flooding
- [ ] Yes
- [x] No

Species diversity
- [ ] high
- [x] medium
- [ ] low

Habitat diversity
- [ ] high
- [x] medium
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [x] mixed (subsistence/ commercial)
- [x] commercial/ market

Off-farm income
- [x] less than 10% of all income
- [ ] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [ ] poor
- [x] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [ ] manual work
- [ ] animal traction
- [x] mechanized/ motorized

Sedentary or nomadic
- [x] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [x] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [ ] women
- [x] men

Age
- [ ] children
- [ ] youth
- [x] middle-aged
- [x] elderly

Area used per household
- [ ] < 0.5 ha
- [ ] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [x] 5-15 ha
- [x] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [ ] small-scale
- [x] medium-scale
- [ ] large-scale

Land ownership
- [ ] state
- [ ] company
- [ ] communal/ village group
- [ ] individual, not titled
- [x] individual, titled

Land use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [x] leased
- [ ] individual

Water use rights
- [x] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [ ] individual

Access to services and infrastructure

health	poor	✓ good
education	poor	✓ good
technical assistance	poor	✓ good
employment (e.g. off-farm)	poor	✓ good
markets	poor	✓ good
energy	poor	✓ good
roads and transport	poor	✓ good
drinking water and sanitation	poor	✓ good
financial services	poor	✓ good

IMPACTS

Socio-economic impacts

crop quality — decreased ✓ increased

Beneficial species control pests that leads to improved crop quality

expenses on agricultural inputs	increased ✓ decreased	More beneficial species and fewer pests reduces reliance on pesticide use

Socio-cultural impacts

Ecological impacts

beneficial species (predators, earthworms, pollinators)	decreased ✓ increased	Flowers attract more beneficial species
pest/ disease control	decreased ✓ increased	Flowers attract more beneficial species that can control pests and diseases

Off-site impacts

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns	very negative ✓ very positive	
Long-term returns	very negative ✓ very positive	

Benefits compared with maintenance costs

'Positive' with the support of subsidies.

CLIMATE CHANGE

-

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- single cases/ experimental
- ✓ 1-10%
- 11-50%
- > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- ✓ 0-10%
- 11-50%
- 51-90%
- 91-100%

Has the Technology been modified recently to adapt to changing conditions?

- Yes
- ✓ No

To which changing conditions?

- climatic change/ extremes
- changing markets
- labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- Reduced reliance on pesticide use
- Landscape diversity and colourful appearance

Strengths: compiler's or other key resource person's view

- Improved crop quality and health with natural pest control and more beneficial species for pollination, reduces inputs and labour
- Social benefit with attractive flower strips in landscape

Weaknesses/ disadvantages/ risks: land user's view → how to overcome

- Loss of production land for crops → Costs offset by reduced pesticide use and potential for improved crop quality
- Expensive seed mix → Subsidy for implementation

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's view → how to overcome

- Specialist knowledge required for right seed mix → SLM expert support and more training opportunities provided through projects like FAB Farmers

REFERENCES

Compiler
Alan Radbourne

Reviewer
Rima Mekdaschi Studer
William Critchley

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Resource persons
Mathias D'Hooghe - co-compiler

Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_5620/

Linked SLM data
n.a.

Documentation was faciliated by
Institution

- Biobest Group (Biobest Group) - Belgium
- UK Centre for Ecology & Hydrology (CEH) - United Kingdom

Project

- European Interreg project FABulous Farmers