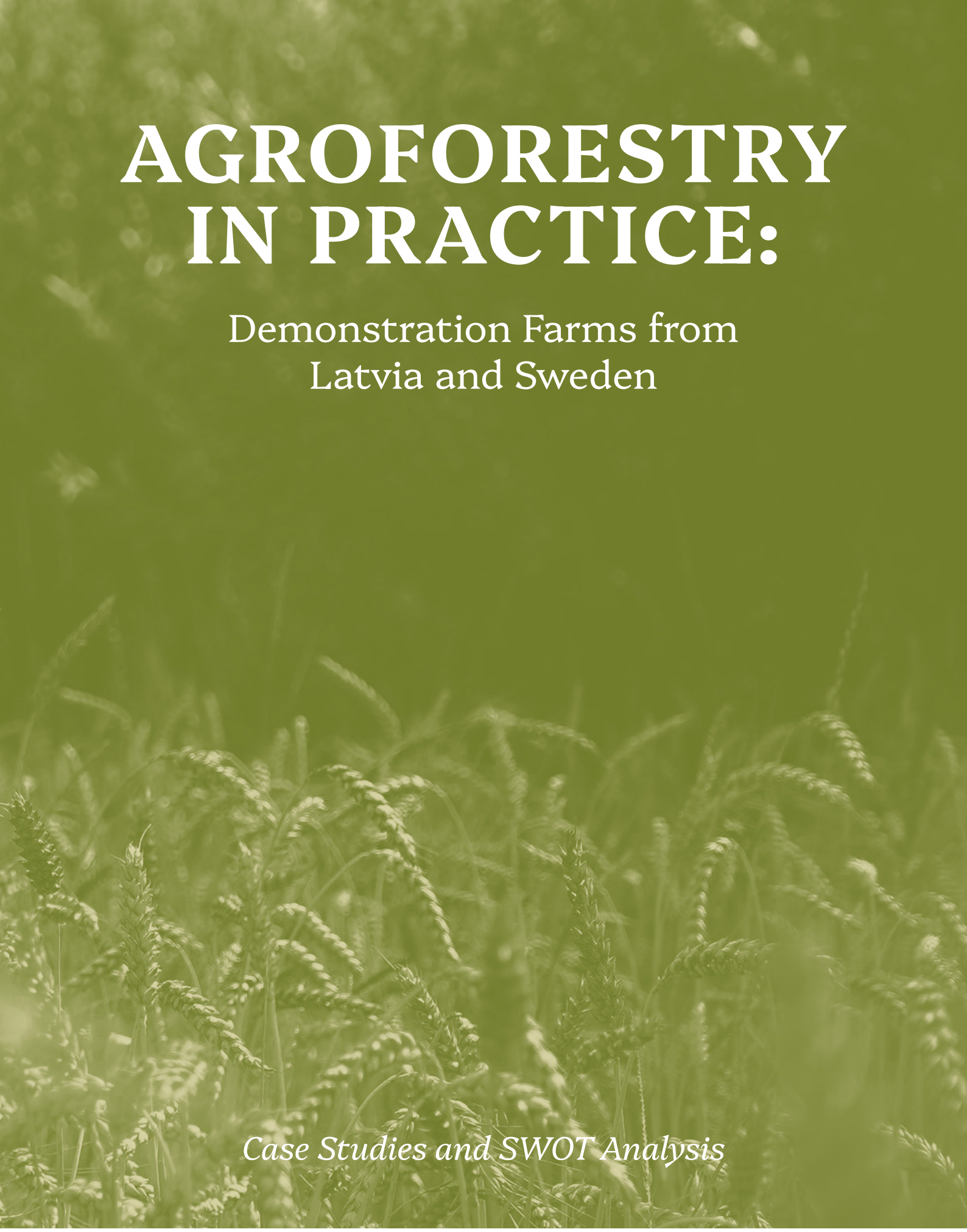

AGROFORESTRY IN PRACTICE:

Demonstration Farms from Latvia and Sweden

Case Studies and SWOT Analysis

Project: *UNHIDE AGROFORESTRY – Latvia–Sweden Agroforestry Knowledge Exchange*

2025

Agroforestry is the practice of integrating trees into agricultural land. Even a single tree —all the more so when several are planted in guilds or organized rows — can significantly enhance the microclimate, improve water and nutrient cycling, and expand habitats and food resources for a wide range of organisms. In doing so, they foster biodiversity — and with it, the natural resilience of ecosystems to pests, diseases, and climate stress.

By combining trees with crops and livestock, we may not hope to mirror the full complexity of a forest — with its intricate and only partly understood web of relationships among all living and non-living beings. Yet it offers far more than a sown grassland or a monocultural field. Agroforestry is a step toward making agriculture more nature-aligned — a system that cooperates with, rather than competes against, ecological processes.

In this booklet “Agroforestry in Practice: Demonstration Farms from Latvia and Sweden” we share diverse experiences of farmers who have begun this journey — transforming ploughed fields into living landscapes and moving, step by step, toward their own versions of the Garden of Eden.

AGROFORESTRY IN PRACTICE:

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Case Studies and SWOT Analysis

2025

Table of Contents

Gramzdas Ēdenes Dārzs

Farmer's name:
Māris Narvils

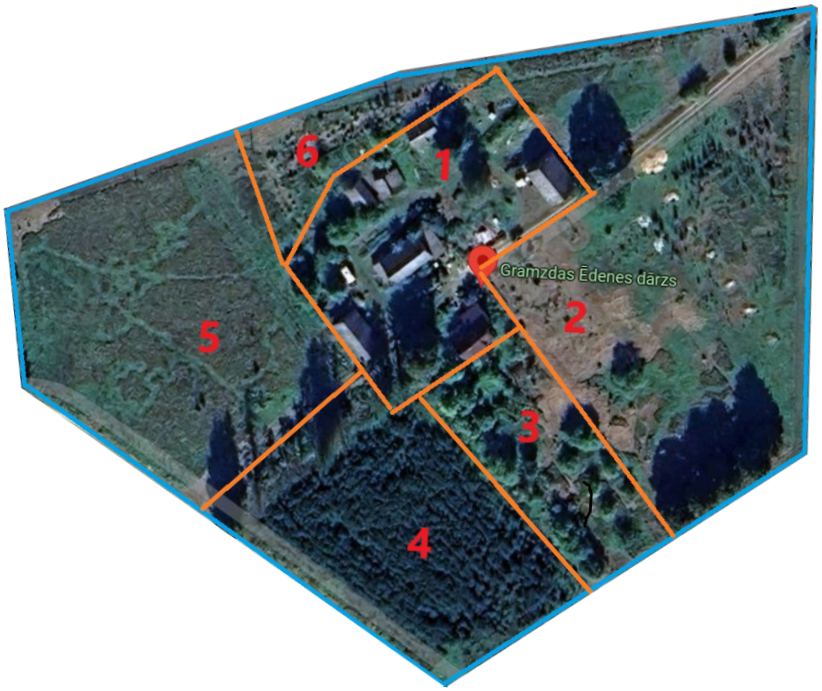
Farm type:
Family farm

Farm size: 3 ha

Crops and livestock:
- vegetables
- fruit & berries
- nuts
- herbs
- timber
- mushrooms

Gramzda Parish,
Dienvidkurzeme Municipality, Latvia

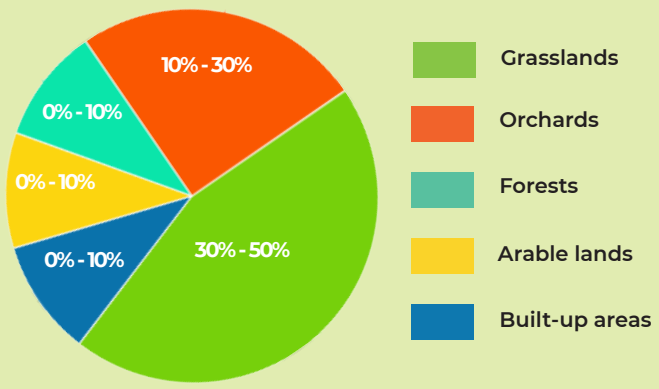
Māris Narvils' **"Gramzdas Ēdenes Dārzs"** or "Gramzda Garden of Eden" is a unique forest garden that has been cultivated since 2017 and now features a collection of **more than 120 edible plant species.** It includes fruit and nut trees, various berry bushes, and even exotic species. The garden serves both as a working farm and an educational site, combining food production, learning opportunities, and tourism, revealing the potential of forest gardening in Latvia's climate.



1	Farm and living area
2	New field of decorative and fruit trees and bushes
3	Old orchard
4	Former arable land, now a birch grove
5	Former pasture
6	Rare and exotic tree and bush garden

Which agroforestry aspects are most important?

Biodiversity and improved ecology	Very important
Sustainable lifestyle and social responsibility	Very important
Economics - increased income opportunities	Important



Agroforestry Practices

Implemented	Partially implemented
Tree landscape features Multi-layer tree-garden	Orchard intercropping Alternating cropping and grazing

Plants on the farm

- **Planted in guilds:** common walnut, black elderberry, mulberry, apple trees, pears, cherries, plums, peaches and apricots, blackcurrants, currants, gooseberries;
- **Bog-associated species:** cedar pine, cranberry, lingonberry;
- **Planted in linear rows:** black walnut, fruit trees, berry bushes.

Types of harvest	Harvesting time
Fruit and berries	June-October
Hazelnuts	August
Mushrooms for personal use	Seasonally, as available
Herbs for tea	Throughout the growing season

Yield from agroforestry?

○ **No**, not productive yet

◉ **Yes**, small income or self-consumption

○ **Yes**, noticeable income

Agroforestry impacts on the farm

Effects on financial stability	Neutral
Market opportunities	Positive
Soil quality	Neutral
Natural values	Very positive
Nutrient utilization	Positive
Carbon sequestration	Positive
Diversity of the living environment	Very positive

Farm History and Development

Dream phase

The initial idea of the owner was to form a collection to test, which plants could thrive in the micro-climate of the farm. A visit to a forest garden near Tingu in Norway served as an inspiration to plan his own forest garden.

2017

1 Year

Implementation phase

Developing the idea of creating a multi-layered system of trees and shrubs (forest gardening), based on walnut trees as the primary canopy layer and their accompanying plant guilds.

2 Years

2018

Evaluation phase

As a way of blending the farm's territory with the nature, the idea of building fences has been abandoned. The farm strives to remain open and welcoming to wildlife.

2020

5 Years

This approach encourages the arrival of new species and allows for careful observation of the roles they play in the ecosystem, for example, by feeding birds specifically. To prevent damage caused by ungulates, natural protection methods are used, inspired by observations in nature — such as placing branches or using animal urine as deterrents.

Harvest and Agroforestry Benefits

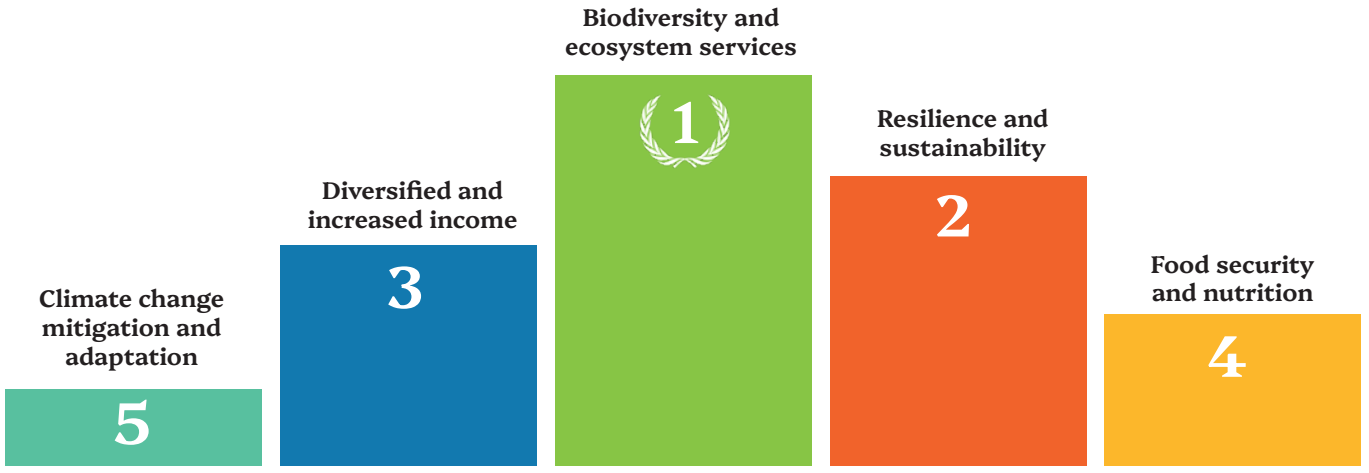
Highlights & Features

- The garden's **edible plant collection** is the owner's "secure future fund", dominated by plants with edible fruits, seeds or other parts. The plants are arranged in a mandala formation.
- The farm features **natural and multifunctional windbreaks**, made of local species, that provide protection against wind and soil erosion.
- The farm's **exotic plant collection** and diverse environment holds great research potential.
- The owner of the garden, Māris Narvils, **offers training and consultations** on plant selection, functions and the formation of plant communities and guilds.
- The forest garden provides a variety of produce, from berries and fruits to mushrooms, creating **biodiversity as a valuable by-product**. In the later stage of the forest garden's development, the owners plan to offer **self-picking opportunities** and sell products from the harvested crop.

Year-round yields	✗
Seasonal harvests	✓
Gradual harvesting over an extended period	✓
Single large harvest at a specific time of year	✓
Harvest every year	✓

Products

- Agroforestry training and consultations
- Plans for future yield processing and marketing
- Potential self-gathering and tourism services
- Research base for scientists to observe symbiosis and antagonism in a diverse plantation
- Opportunity to engage in income-generating research projects



Agroforestry benefits ranking

Photo Impressions

Ecological Benefits of Agroforestry Systems

The farm **"Ēdenes dārzs" (Garden of Eden)** is located in South Kurzeme, Latvia, within a flat, open lowland landscape previously used for intensive grain cultivation. There are no natural water bodies in or near the area, resulting in water scarcity, while the compacted soil limits infiltration and causes seasonal waterlogging. The landscape is characterized by naturally regenerated birch woodland and a heritage linden tree row, which serves as an effective windbreak, provides a nectar source for bees, and contributes to a balanced microclimate. The site also functions as an important feeding and shelter habitat for wildlife within an otherwise intensively farmed agricultural environment.

Soil

- Trees and shrubs accumulate nutrients in their leaves, which, once fallen, **enhance soil fertility**.
- Tree canopies **suppress weed growth** and **create open spaces** that support understory vegetation.
- Companion plants with varying root depths reduce competition and improve soil structure.
- **Targeted mowing** encourages natural self-seeding of legumes. Common comfrey is planned for introduction and will be processed into compost.
- Traditional compost and vermicompost are used.

Water

- Tree plantations help regulate local water microclimates. For example, birch trees **reduce the effects of wind and sun**, helping to maintain soil moisture.
- The presence of trees **slows down evaporation**, allowing the soil to retain moisture for longer periods compared to open areas.
- Windbreaks reduce wind speed and **delay water loss**.
- A **rainwater collection system** captures runoff from the roofs of the buildings and channels it back into the garden.

Microclimate

- Windbreaks help create **distinct microclimates** by reducing wind intensity and temperature fluctuations.
- **Woodchip piles** shape small-scale microreliefs, forming shaded areas and sun-exposed slopes that warm more quickly.
- A milder microclimate develops within **plant guilds**.
- In the collection garden, natural selection is simulated by exposing plants to the harshest conditions — those that thrive here are likely to perform well in other environments.

Pests

- **Aromatic plants** are cultivated to naturally repel pests.
- **Birdhouses** are installed to attract birds, with supplementary feeding provided during winter months.
- Trees and shrubs **offer habitat for beneficial species** such as bumblebees, dragonflies, and bats; cavity-nesting birds have also settled in mature trees.
- Flowering plants **attract predatory insects** that help regulate pest populations and maintain ecological balance.

Pollinators

- Wild bees and bumblebees are monitored.
- A range of pollinator habitats has developed naturally as a **by-product of extensive landscape design**, providing various insects with a wide range of living spaces.
- Several predatory insects deliberately attracted to the area also **serve as pollinators** in their adult stage.

Biodiversity

- **Species diversity is deliberately promoted** by both intentional planting and allowing naturally emerging vegetation to establish and thrive.
- The movement and diversity of insects, birds, and animals are facilitated by deliberately allowing **free movement across the farm**, enabling new plant species to establish naturally.

SWOT Analysis

Strengths

- **Enthusiasm & Knowledge**
  The owner's passion, commitment to the place and extensive knowledge are among his strongest assets. The design of the forest garden is developed and implemented with an understanding of how the plantings will grow over time, visually and spatially shaping the environment – how much space they will take up, where they will cast shade, and how they will mutually influence each other's growth
- **Existing Trees/Shelter**
  A row of inherited old linden trees serves as an effective windbreak, contributing to microclimate regulation and supporting a stable ecosystem with characteristic understory plants and pollinating insects. A naturally grown 6-year-old birch forest, when thinned, provides the farm with the necessary firewood.
- **Self-Sufficiency & Innovation**
  The farm stands out for its self-sufficient and energy-independent system, which, despite the meticulous work invested, retains a wild, natural character. Innovations are constantly being introduced into its development.
- **Product & Species Diversity**
  An extensive collection of non-native woody plants is cultivated primarily for their edible and medicinal properties. The garden acts as a place of practice and research where exotic and non-native woody plants are grown, cared for and observed to assess their adaptation to local conditions.

Weaknesses

- **Wind and Water Scarcity**
  Wind poses significant challenges, affecting plant growth and moisture retention. The farm has a high groundwater level that causes seasonal waterlogging, but there are no surface water sources, so prolonged water shortages and droughts further complicate the stability of the ecosystem and hinder the development of plantings.
- **Developmental Stage**
  The farm is still in its early stages of development, and the interaction between the plantings is still forming. The newly planted windbreak is not yet large enough to provide meaningful shelter or microclimatic benefits to other vegetation.
- **Plant Condition**
  Some trees are withering or even dying due to drought, wind, and competition with grasses. Grafted cultivars, which grow at the edge of their climatic tolerance in Latvia, are not suitable as pioneer plants, although they are occasionally used in this role on the farm.
- **Management**
  No alternative management or design plan has been developed for the naturally regenerated and densely growing birch forest. The owner lacks time to fully develop his ideas and maintain the plantations according to the original vision.

Threats

- **Wind**
  Wind poses a challenge to all agroforestry systems, but it is particularly severe on this farm.
- **Natural Conditions**
  Drought and lack of water bodies weaken the plantings. Wild animals such as deer, roe deer, water vole and mice cause damage to woody plants.
- **Competition**
  Without active management, planted trees compete with grasses and naturally regenerated birch for water and nutrients.
- **Long-Term Maintenance**
  Sensitive or poorly adapted tree species require near-ideal conditions to thrive, which can be labor-intensive to maintain. Without such care their establishment period is significantly prolonged.

Opportunities

- **Utilization of Birch Forest**
  The birch forest offers an opportunity to underplant with other tree species. These can benefit from the existing microclimate, gaining protection from wind and wildlife, with the birch growe acting as a nursery.
- **Improving Shelter Systems**
  Wind-exposed areas could benefit from the construction of ponds and the strategic development of windbreaks to improve microclimatic conditions. Twisted willows may also serve as a barrier to reduce wildlife damage.
- **Community Development**
  The farm has the potential to become a demonstration site, attracting volunteers, farmers, researchers, and apprentices for knowledge exchange and hands-on learning.
- **System Improvement**
  Planting in guilds can accelerate tree and shrub growth through symbiotic relationships. Using urine or manure in planting mounds can improve soil fertility. Establishing small ponds and rainwater harvesting systems will enhance water availability.
- **Product Diversification**
  There is potential for year-round production and processing of diverse products, including edible crops and propagation material. The birch forest is particularly well-suited for mushroom cultivation.

Impressions of the Farm

"Beautiful smallholding, with great potential for self-reliance. [...] So many exciting things going on in a relatively small space. I look forward to seeing it again in the future!"

-Katarina

"Absolutely beautiful place. The owner's enthusiasm and passion for the forest garden as a concept and practice and his love for the plants themselves will, without doubt draw a lot of people in."

-Leo

Rūķmuiža

Farmer's name:
Agnis Graudulis

Farm type:
Hobby farm/ garden

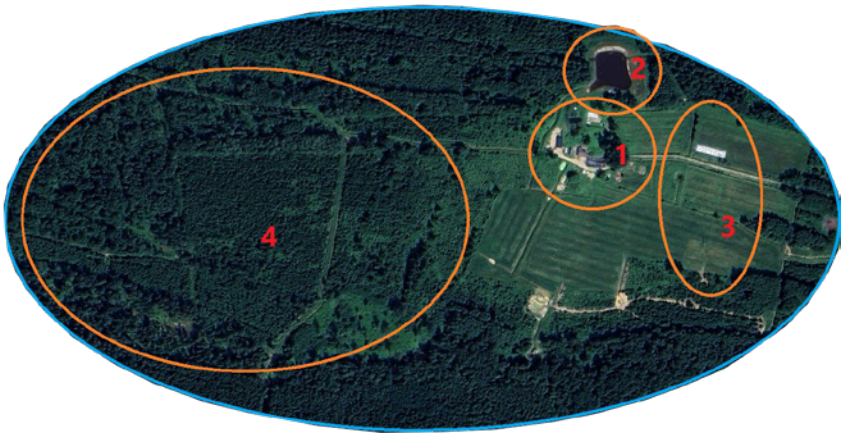
Farm size: 50 ha

Crops and livestock:

- nuts
- herbs
- propagation material
- timber
- other

Vadakste Parish,
Saldus Municipality, Latvia

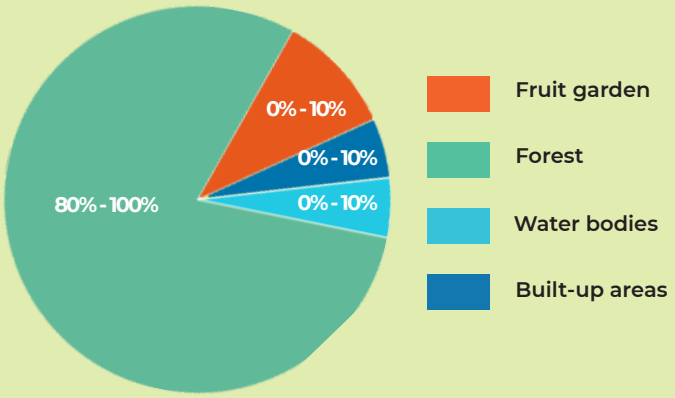
"Rūķmuiža" is a forester-managed, off-grid farm with a long-term vision: to gradually transform spruce stands into **broadleaf forests** while combining timber extraction with food production. Nut and fruit trees are integrated into the environment to create a so-called edible landscape. Today, the forest is a World Wildlife Fund Latvia demonstration site for continuous cover forestry.



1	Farm and living area
2	Artificially created body of water
3	Agricultural land
4	Mixed forest

Which agroforestry aspects are most important?

Biodiversity and improved ecology	Very important
Sustainable lifestyle and social responsibility	Very important
Economics - increased income opportunities	Important



Agroforestry Practices

Implemented	Partially implemented
Tree landscape features	Tree alley cropping Multilayer tree garden

Plants on the farm

- **Nut and Timber Production:** sweet chestnut, Greek walnut, black walnut, hazel varieties.
- **Berries and Fruit:** sweet cherry, apple and pear, black currant, viburnum, elderberry.
- Various **meadow plant** species for seed gathering.
- **Forest-forming trees:** Norway spruce, grey and black alder, aspen, silver and downy birch, mighty oak, Norway maple, small-leaved linden, Baltic pine, grey willow, alder buckthorn, common ash, maple and birch for sap

Types of harvest	Harvesting time
Varieties and natural cultivars of berry trees	3-5 yrs after planting
Nuts	10 yrs after planting
Poplar timber	15 yrs after planting
Meadow plant seeds	2-3 yrs after sowing

Yield from agroforestry?

- ○ **No**, not productive yet
- ◉ **Yes**, small income or self-consumption
- ○ **Yes**, noticeable income

Agroforestry impacts on the farm

Effects on financial stability	Positive
Market opportunities	Positive
Soil quality	Positive
Natural values	Positive
Nutrient utilization	Positive
Carbon sequestration	Positive
Diversity of the living environment	Positive

Farm History and Development

Dream phase

The foundational idea was to develop a method for creating a self-sufficient edible plant farm or forest which would enable the natural cultivation of edible species within the farm area. The owner also aimed to design a landscape where edible plants grow in ecological niches that best suit their needs. The farm was intended to serve as a starting point for the spread of biodiversity into the surrounding landscape while offering consistent productivity from edible plants throughout the growing season.

2015

4 Years

Implementation phase

A forest garden consisting of edible plants — such as walnut, sweet chestnut, and sweet cherry — was established in both forested areas and open fields to create an alley cropping system and a polyculture with poplar and nut trees. Hazel trees were planted in the fields and various herbs were introduced within the forest and in tree patches beneath the canopies. As part of utilizing existing resources, an old ditch system was renovated. Its functionality is being monitored and gradual reconstruction is being carried out.

1 Year

2019

Evaluation phase

Already after the first season, a continuous evaluation process began, aimed at implementing improvements each subsequent year — for example, by adding plants to existing systems.

2020

5 Years

In 2024, polycyclic planting of poplars and nut trees was introduced, and a local tree nursery was established to grow seedlings on-site. The farm's focus remains on continuous learning and understanding how the ecosystem responds to the addition of new plants and how plants adapt to different environments.

Harvest and Agroforestry Benefits

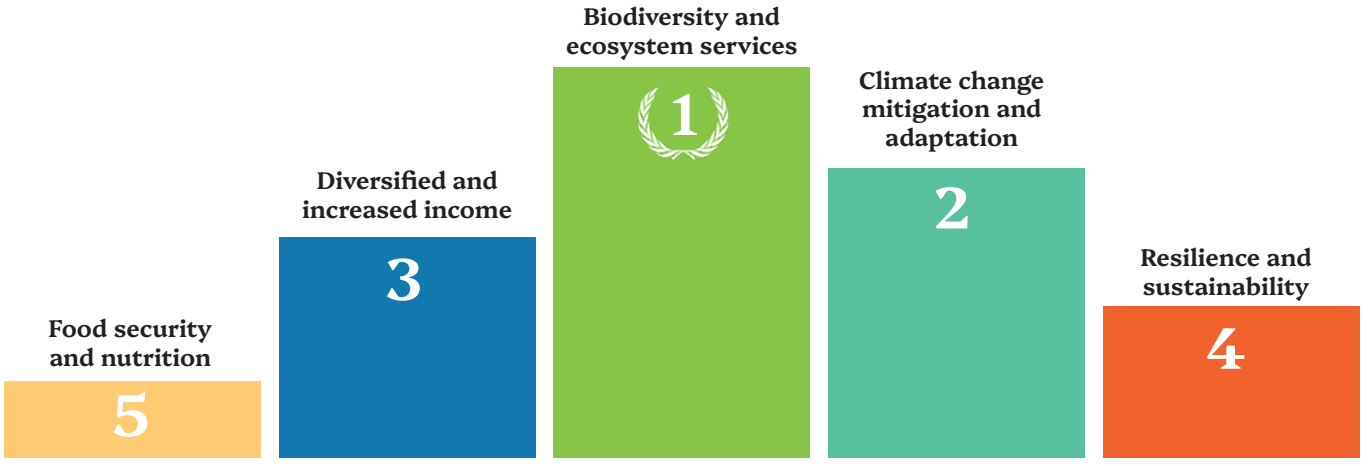
Highlights & Features

- Visitors to "Rūķmuiža" can experience the creation of a forest garden in two ways — through a **forest enriched with edible plants and through a forest garden grown from a meadow.**
- The farmer's **goal is to restore the original broad-leaved and alder forests** by integrating species characteristic of the forest's Potential Natural Vegetation (PNV), enhancing resilience to climate change and reducing risks from extreme weather and pests.
- Species and plants from warmer regions are **introduced, preparing for climate change** so that, when it occurs, these species will already be adapted to higher temperatures, remain productive, and can spread naturally.
- Agnis Graudulis, the farm owner, states: **"The main product here is biodiversity."** In addition to creating it, he also offers forest management consultations and services, using his Vadakste Biodiversity Forest as a demonstration site.
- The owner cultivates walnut and sweet chestnut seedlings in a local nursery, aiming to **encourage the wider adoption of sweet chestnut** as an edible plant across Latvia.

Year-round yields	✓
Seasonal harvests	✓
Gradual harvesting over an extended period	✓
Single large harvest at a specific time of year	✓
Harvest every year	✓

Products

- Forest management and agroforestry consulting
- Agroforestry demonstration site
- Biodiversity
- In the future: propagation material (seeds, seedlings and cuttings)



Agroforestry benefits ranking

Photo Impressions

Ecological Benefits of Agroforestry Systems

"Rūķmuiža" (including Vadakste Biodiversity Forest) is a 50-hectare forest farm in southern Kurzeme, situated on calcareous clay soil and surrounded by state-owned spruce monoculture forests. Part of the area consists of former agricultural land and pastures that have naturally overgrown with trees, including grey alder. The landscape still features old oaks, apple trees, maples, lindens, ash, and pines as valuable landscape elements. The owner's goal is to transform the old, overgrown spruce forest into a natural deciduous forest by integrating edible woody plants and developing polycyclic wood-harvesting systems.

Soil

- Reduced compaction and improved porosity through **subsoiling** was done before planting.
- **Nitrogen enrichment** is achieved with the help of species such as black alder, Siberian pea shrub, broom, and legumes.
- Organic matter input from **leaf litter** improves soil fertility.
- **Continuous soil cover** prevents erosion and loss of nutrients.
- **Service plants** contribute to soil quality until the main tree species are established.

Water

- Slowing down the water flow in ditches **reduces erosion** and improves water infiltration.
- Nutrients are recycled into the system by managing sediment from **established sedimentation points.**
- Bushes are planted and grasses are seeded on ditch and pond slopes. The **vegetation stabilizes slopes**, prevents erosion.
- Before the establishment of the agroforestry system, subsoiling was carried out to **improve infiltration of rainfall.** The system is kept productive to ensure efficient use of nutrients within it and to reduce downstream eutrophication.

Microclimate

- Trees are **planted sparsely** and forest stands are **thinned** where necessary to respect the needs of trees and plants for light and water resources.
- Plant clusters and forest stands are used as **shelter** for newly integrated trees, shrubs, and other plants in the system.
- The property is located in the middle of a forest, which serves as a **natural windbreak** for the agroforestry system.

Pests

- A high level of **plant diversity** supports system stability and reduces vulnerability, therefore the natural biodiversity of fungi and insects is enhanced.
- Cultivars are **fenced off** to reduce browsing by deer and other animals.
- Small rodents and insects are controlled by **establishing habitats** for predatory birds.

Pollinators

- The area is **rented for beekeeping**, with 10 hives established for organic honey production.
- Piles of debris and stones are provided as **habitats for solitary bees**, and deadwood is left in the forest to support biodiversity and provide habitats for pollinators.
- Pesticide contamination is highly unlikely, as the farm is **isolated from any industrial farming areas**.

Biodiversity

- Trees and plants in agroforestry systems are planted as **mixtures of productive and non-productive species** (e.g., alder, buckthorn, and nut trees).
- The system is located in the middle of a forest and is surrounded by a **buffer strip** of various trees and shrubs. These plantings are expected to expand into the surrounding forest, increasing its functional diversity and serving as a future source of seeds.

SWOT Analysis

Strengths

- **Owner's Knowledge and Dedication**
  The owner possesses deep knowledge of ecology and forestry. His passion, enthusiasm, and persistence are remarkable, as he continuously introduces new practices and corrects previous attempts.
- **System Diversity and Demonstration Potential**
  The farm is a good example of silvo-arable and forest farming practices. It is considered a top-class demonstration farm in the European context. The 50-hectare fenced area includes various distinct systems, serving as an inspiring example for converting spruce monocultures into broadleaf forests that yield both timber and food.
- **Naturally Formed Microclimates**
- Planting trees in thinned alder stands provides optimal growing circumstances. This environment improves winter hardiness for young, frost-sensitive nut trees.
- **Plant Material Quality and Resilience**
- Plants are grown from self-collected seeds (not clones or cultivars), ensuring high genetic diversity and relying on natural selection due to low agricultural input. The local nursery established in raised sand beds improves seedling robustness.
- **Biodiversity Focus**
- Excellent work promoting biodiversity, managing habitat, and implementing water systems. The creation of specific microhabitats (vernal lizard ponds, Woodhenge, Mulmholks) positions the farm as a biodiversity stronghold.

Weaknesses

- **Management Reliance and Resources**
  The operation is largely a "one man show", which presents low resilience if the owner runs out of energy or funding. If the system is not maintained, it risks becoming overgrown in 1–2 seasons. There is a lack of time for making careful notes on what practices work best.
- **Planting Structure**
  It was noted by the visiting expert as unfortunate that the alley cropping system was planted in straight rows, as denser plantings are often preferred to accelerate the development of a beneficial forest environment with mycorrhiza.
- **Risk Factors**
  Young trees planted in open fields are susceptible to damage from harsh winters or frosts. Since the design includes timber harvesting, there is a threat of bark beetle infestation.

Threats

- **Regulations**
  Existing agricultural regulations and subsidy systems pose a threat, particularly rules related to canopy coverage on arable land.
- **Wildlife Damage**
  Wildlife, including deer, water voles, and beavers (due to dam removal efforts), pose a threat to the plantings, despite the fencing.
- **Natural Conditions**
  Harsh conditions, including drought and vulnerability to late spring frosts in open areas.
- **Maintenance**
  Risk of the system becoming overgrown or poorly maintained if resources (labor or funding) are insufficient.

Opportunities

- **Hub and Education Center**
  Excellent opportunity to become a research center and educational hub, demonstrating a more biologically resilient system. Potential to develop the nursery for commercial sale of robust seedlings.
- **System Improvement**
  Suggested improvements include thickening the plantings with more walnuts and native trees to establish a forest environment and introduce mycorrhiza by bringing in soil from the native forest.
- **Regulatory Advocacy**
  Opportunity to lobby the Latvian Ministry of Agriculture to modify rules that restrict tree canopy cover on arable land (currently limited to 5%) and encourage guilds (plant communities) instead of monocultures.
- **Product Diversification**
  Potential to develop the farm as a key seed source. The thinned forest provides an excellent location for growing mushrooms.

Impressions of the Farm

"Fantastic example of both silvo-arable and forest farming practices where the practitioner can draw from extensive experience of the forestry sector to build a top class demonstration farm of agroforestry for the European context. Deep knowledge of ecology and dedication of labor to the plantings has generated nature-based solutions to water management and care for plants unsurpassed by his Swedish counterparts."

-Leo

"Favorite things about this remarkable farm is the details like vernal lizard ponds, how well the fence is put up around the ditches going under them, the nursery and the excellent Woodhenge area. [...] Nice job on so much, in such a big place!"

-Katarina

Pardenči

Operator:
LSFRI Silava and the Institute of Agriculture

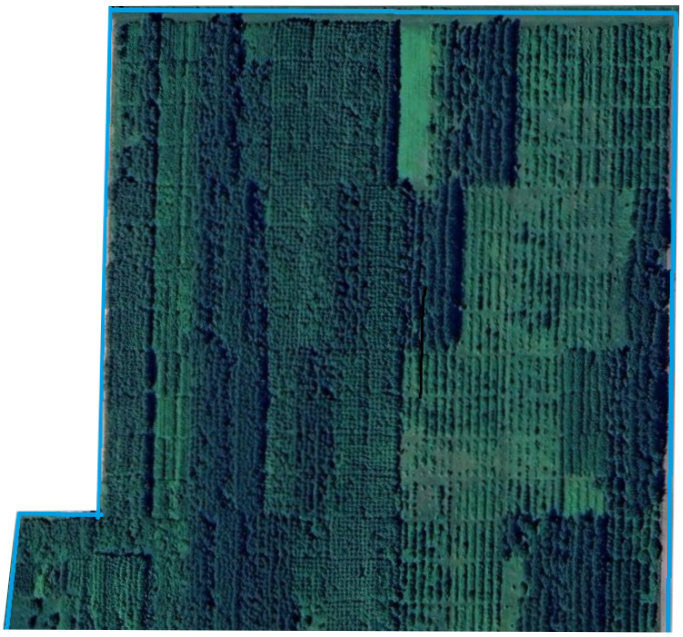
Farm type:
Research

Farm size:
400x500 m

Crops and livestock:
- timber
- mushrooms
- forage
- other

Skrīveri Parish,
Aizkraukle Municipality, Latvia

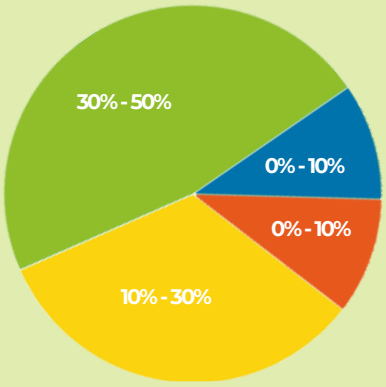
The agroforestry research field "Pardenči" has been managed by the Latvian State Forest Research Institute "Silava" (LSFRI "Silava") in cooperation with the Institute of Agriculture (ZI) since 2012. It features a range of experimental, **science-based approaches to agroforestry**, one notable example being the integration of less conventional crops in the spaces between tree alleys.



Entire marked area - Experimental plantation

Which agroforestry aspects are most important?

Biodiversity and improved ecology	Very important
Sustainable lifestyle and social responsibility	Important
Economics - increased income opportunities	Very important



Agroforestry Practices

Implemented	Partially implemented
Tree alley cropping Coppice alley cropping Tree landscape features	N/A

Plants on the farm

- **Introduced trees:** all available varieties of willow, hybrid aspen, poplar, birch, black and grey alder (including hybrids), maple, linden, and sweet cherry.
- **Perennials:** low-alkaloid lupin, reed canary grass, festulolium, and galega.
- **Spontaneously occurring plants:** native meadow species

Types of harvest	Harvesting time
Willow twigs and coppice	Annually
Other tree species	Every 15 years
Perennials (for seeds and hay)	Annually
Mushrooms	From year 3 onward
Birch bark (for handcrafts)	From year 11 onward
Wild strawberries	Annually (summer)
Dandelions	Annually (spring)

Yield from agroforestry?

- ○ **No**, not productive yet
- ◉ **Yes**, small income or self-consumption
- ○ **Yes**, noticeable income

Agroforestry impacts on the farm

Effects on financial stability	Neutral
Market opportunities	Neutral
Soil quality	Neutral
Natural values	Positive
Nutrient utilization	Slightly positive
Carbon sequestration	Positive
Diversity of the living environment	Positive

Farm History and Development

Dream phase

In 2006, the term “agroforestry” was not yet known in Latvia, and “Pardenči” site was not initially intended specifically for agroforestry research. However, when the LSFRI Silava was introduced to the Institute of Agriculture through joint research activities in 2009, discussions began on establishing a small-scale demonstration agroforestry field as an alley cropping system.

2005

4 Years

Implementation phase

The initial implementation period lasted one and a half years. Due to technical limitations, a 2.5 × 5 m alley cropping system — a new concept at that time — was established with maple, linden, wild cherry, hybrid aspen, and poplar, and the spaces between rows were sown with galega, lupin, reed canary grass, and festulolium as an alternative to conventional plantations. All crops were fertilized with wood ash and wastewater sludge, hybrid aspen fields also received residues from biogas production.

1.5 Years

2011

Evaluation phase

During the first years, the plantation suffered from frost damage and browsing by wild animals. Despite fencing, young tree mortality remained high, leading to the decision to abandon maple cultivation and replant affected sites with poplar rods in 2017.

2012

13 Years

With trees now established, the focus is shifting toward more intensive integrated farming, including annual crops in the interrows.

Harvest and Agroforestry Benefits

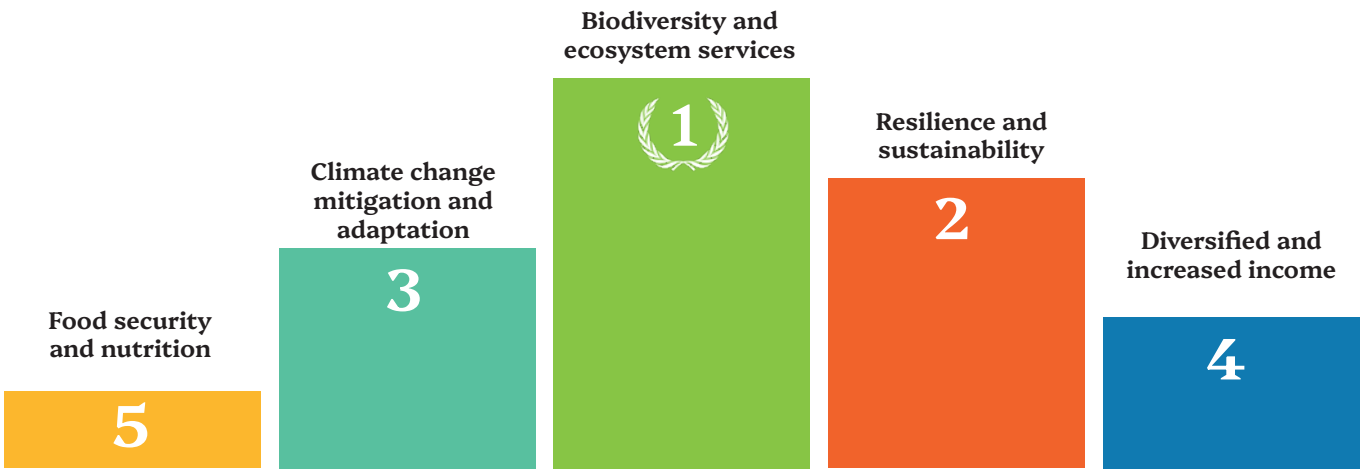
Highlights & Features

- The original plan was to **establish a demonstration experimental field** of various fast-growing forest species to compare their growth at dense and sparse spacings for a research project.
- The site **demonstrates several practical benefits of agroforestry:** edible mushrooms appear after just three years, willow and hazel bark can be harvested for tea and crafts, and nitrogen-fixing undergrowth provides food for insects and wildlife. Bee apiaries are also tested as a potential source of additional income.
- One field contains **twisted willow trunks** that serve both as protection against wild animals and as early-flowering forage for bees.
- This research field aspires to **become an "ambassador" for nature-oriented, agroforestry-based solutions**, showcasing how multiple crops, products and practices can be experimentally combined with scientific knowledge to diversify income and promote sustainable land use.

Year-round yields	✗
Seasonal harvests	✓
Gradual harvesting over an extended period	✓
Single large harvest at a specific time of year	✗
Harvest every year	✗

Products

- Research opportunities
- Galega, lupin and reed canary grass seeds
- Willow twigs and birch bark for handcrafts
- Timber
- Mushrooms and wild strawberries
- Hay



Agroforestry benefits ranking

Photo Impressions

Ecological Benefits of Agroforestry Systems

The "Pardenči" property, located in Skrīveri municipality in central Latvia, serves as a demonstration site established on former agricultural land with a collapsed drainage system and gently sloping terrain facing northeast. The experimental planting focuses on alley-cropping agroforestry, using species such as aspen, maple, linden, and alder to test fast-growing trees for industrial timber and biomass production under varying climatic conditions. The tree rows are sparsely planted and lack a multi-layered structure, while the spaces between them are occupied by perennial meadows and nectar crops that support seed production, provide some ecosystem services, and facilitate experimental research.

Soil

- The organic matter of the **soil has been enriched**, accompanied by **increased diversity of soil macro- and mesofauna**. Legumes have further improved soil fertility by fixing nitrogen.
- After two years of growing alongside legumes, the **trees began to benefit from the additional nitrogen** and showed faster growth.
- No soil erosion has been observed in the fields, as the trees and grasses with deep and well-developed root systems **effectively protect and stabilize the soil**.

Water

- The field has a **high water table** and was established on a **collapsed drainage system**.
- Evapotranspiration during the growing season **helps regulate the groundwater level**, while tree shade **preserves soil moisture** for perennial plants. This protection is especially important during prolonged dry periods, keeping the understory vegetation healthy.

Microclimate

- **Planted trees reduce wind speed**, moderate temperature extremes, and influence water movement through transpiration.
- The roots of trees and perennials interact at different soil depths, forming a mutualistic or symbiotic relationship.
- Sunlight exposure is regulated by planting tree **rows in a northwest–southeast orientation**.

Pests

- Risks were managed through **species diversification**, avoiding planting species susceptible to the same pests together, e.g. larch and poplar were not planted in the same area.
- Where possible, **different clones** were used within a species to reduce vulnerability to pests; the plantation includes at least four willow clones and sixteen poplar clones, each with varying resistance.

Pollinators

- Flowering trees provide **food for pollinators** throughout the year, and piles of dead wood offer **habitat for insects**.
- **Honey bee hives** are also present, but during the season, honey **bees do not compete with wild pollinators**, as they primarily forage in rapeseed fields and other crops, collecting nectar from meadows only in August.
- **No pesticides** are used within the agroforestry system itself, although surrounding agricultural fields may apply them.

Biodiversity

- The artificially introduced tree and shrub species did not affect naturally occurring vegetation during the first five years. Later, **differences emerged** due to variations in sunlight, tree species, root system depth, and soil conditions.
- Trees in the field **provide nesting and feeding sites for various bird species**, filling the air with birdsong all year round.
- **The diversity of insects has increased** thanks to the variety of trees and plants. Insects overwinter undisturbed in the soil and under bark, tree stems provide shelter for overwintering butterfly species.

SWOT Analysis

Strengths

- **Academic and Policy Platform**
  This demonstration farm serves as a platform for disseminating knowledge about agroforestry systems at both academic and policy levels. The researchers are preparing a report that will serve as a stepping stone for the introduction of agroforestry in Latvia.
- **Industrial Perspective**
  The plantations offer an insightful view of agroforestry from an academic standpoint within the forestry sector, while also providing a large-scale industrial perspective in terms of both cultivation principles and end products.
- **Diverse Yields and Cascading Income**
  There are different sources of income (e.g. honey, tree sap, and basket weaving). The concept of "cascading income" is highlighted — initially generated from agricultural crops, then from storytelling and educational activities, followed by jam production, and finally from timber. By-products include bark from willow and hazel trunks (used for tea, crafts, and animal feed), as well as mushrooms (scaber stalks), which appeared naturally in the third to fourth year after planting.
- **Sustainability Aspects of the Production System**
  Legumes (such as Galega and lupine) naturally enrich the soil with nitrogen, while the biomass from tree roots and leaves improves soil health and carbon sequestration. System includes some multilayered features, although it retains characteristics of monoculture, meaning that biodiversity is partially maintained and supported.

Weaknesses

- **Management Complexity**
  Specialized knowledge in both forestry and agriculture is required to manage this system. Maintaining the project is time-consuming and requires constant personal involvement during both the installation and development phases.
- **Monoculture Thinking**
  The system has low biodiversity – it can be defined as a semi-mixed monoculture without plant guilds. Therefore, the project's scientific and unified approach is quite distant from the basic principles of agroforestry – multifunctionality, diversity, ecosystem synergy, and sustainability. Trees are of the same height and age, planted in narrow rows with a repetitive structure, which provides fewer habitats and supports lower biodiversity compared to a natural forest or woodland garden. As the plantation matures, it also creates greater competition between trees and crops than in traditional alley-cropping systems.
- **Industrial Input-Oriented Approach**
  Experiments with fertilizers such as animal slurry and municipal sewage sludge are conducted to promote faster tree growth, even though these inputs are unnecessary in diverse agroforestry systems and may damage the natural nutrient uptake capacity of trees.
- **Financial and Yield Limitations**
  High initial costs for planting, maintenance, and plant protection are required. Economic returns are only possible in the long term, as wood products take several years to start yielding income. Additionally, mechanization is limited by the system's design, making tasks such as mowing and silage harvesting challenging due to the narrow alleys.

Threats

- **Dominance of the Industrial Approach**
  Risk that the current industrial and academic approach becomes the dominant standard in agroforestry, diverting attention from more diverse, regenerative systems.
- **Loss of Funding**
  Risk of a loss of funding for the research project, which may result in the project being discontinued.
- **Regulatory Constraints**
  Common Agricultural Policy (CAP) rules on eligible land area still limit the cultivation of trees beyond certain thresholds on arable land (not exceeding 20% of the field block area) and on grassland (no more than 100 individual trees per hectare), which may limit structural diversity on agricultural land.
- **Risks of Monoculture and Management Errors**
  There is a risk that insufficient diversity and repetitive structure could make the system less resilient to climate and disease threats, mimicking the weaknesses of other monocultures – susceptibility to fungal diseases, bird damage, and pest infestation. As tree crowns expand, shade can reduce yields, especially for grasses. Drought can increase competition between trees and forage crops for water and may also elevate fire risk.

Opportunities

- **Economic Diversification**
  In this research site income could be generated from both wood products (wood chips, biomass, and willow rods for basketry) and from high-value niche products such as sweet cherry and linden honey production, or even possibly shiitake mushroom cultivation on low-value wood from forest thinning.
- **Subsidy Access**
  Alley cultivation is eligible for EU and national support schemes.
- **Knowledge Transfer**
  The system can serve as an ambassador for nature-based solutions in the industrial sector, promoting awareness of the benefits of agroforestry among commercial farmers and forest owners, such as the importance of roots and mycorrhiza for enhancing water circulation and soil health.
- **System Improvement**
  It is possible to enrich the species diversity and structural variation of the system, using native tree species as "nurse trees", and introduce forage crops suitable for grazing, mowing, or silage production.
- **Carbon Sequestration**
  Trees and perennial legumes significantly contribute to achieving climate mitigation targets.

Impressions of the Farm

"Very impressive and important to have a large-scale test site to get real data on different inputs into alley cropping. It was fun to see and opens up so many possibilities for multiple income streams, interweaving different crops and practices in an experimental way with real-time understanding of what can work in the future!"

-Katarina

"Interesting take on agroforestry from the academic perspective of the forestry sector. Very large-scale industrial perspective on both cultivation principles and products."

-Anders

Gundegas

Farmer's name:
Andris Ansis Špats

Farm type:
Private farm

Farm size: 20 ha

Crops and livestock:

- fruit
- berries
- propagation material

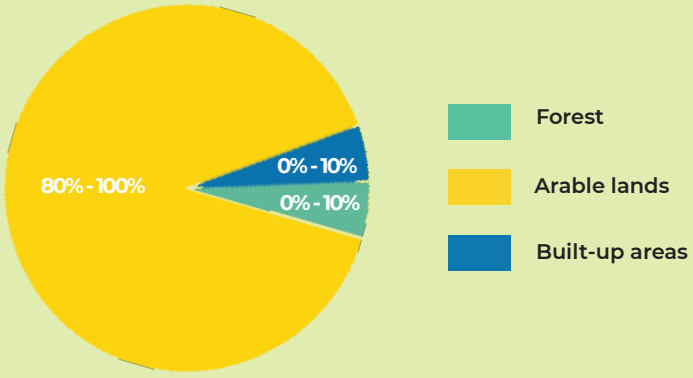
Lauga Bog,
Limbaži Municipality, Latvia

"Gundegas" is a **lingonberry and large cranberry farm**, that produces a variety of healthy products. The farm takes an experimental approach, cultivating cranberries in a prepared peat bed while preserving naturally grown pine trees for cover and shade.

1	Farm and living area
2	Cranberry field

Which agroforestry aspects are most important?

Biodiversity and improved ecology	Important
Sustainable lifestyle and social responsibility	Not important
Economics - increased income opportunities	Very important



Agroforestry Practices

Implemented	Partially implemented
Tree landscape features	Tree alley cropping

Plants on the farm

- **Berry fields:** large cranberries, pine
- **Windbreaks:** honeysuckle, white willow
- **Birch:** considered a weed, removed as necessary
- **Additional crops for product development:** rhubarb, quince, chokeberries, blueberries, sea buckthorn, blackcurrant, viburnum berries, mountain ash

Types of harvest	Harvesting time
Honeysuckle	June
Lingonberries	September
Cranberries	September
Cranberry planting material	October

Yield from agroforestry?

- ○ **No**, not productive yet
- ○ **Yes**, small income or self-consumption
- ◉ **Yes**, noticeable income

Agroforestry impacts on the farm

Effects on financial stability	Slightly positive
Market opportunities	Very positive
Soil quality	Positive
Natural values	Very positive
Nutrient utilization	Positive
Carbon sequestration	Neutral
Diversity of the living environment	Positive

Farm History and Development

Dream phase

The cranberry farm was established on an undeveloped peat field. There were no initial plans to introduce agroforestry; the natural afforestation in the cranberry fields was simply allowed to continue, especially along the edges of former ditches left after peat extraction.

2010

5 Years

Implementation phase

After observing the positive effects of trees and the natural landscape on berry yields — creating shade, protecting against frost — and on human wellbeing — instilling confidence in self-harvesters that the farm is organic — the farm began deliberately supporting tree growth and shaping tree crowns to allow free movement of people and machinery.

4 Years

2015

Evaluation phase

The idea of leaving birch trees near the cranberry fields was abandoned because their leaves and seeds spread into productive areas.

2019

6 Years

Honeysuckle and white willow plantations have been established, and pine trees continue to be pruned and shaped. Although agroforestry has not significantly increased yields, leaving the pine trees to grow minimizes labour. Plans include extending the windbreak and restoring white willow plantations damaged by wildlife.

Harvest and Agroforestry Benefits

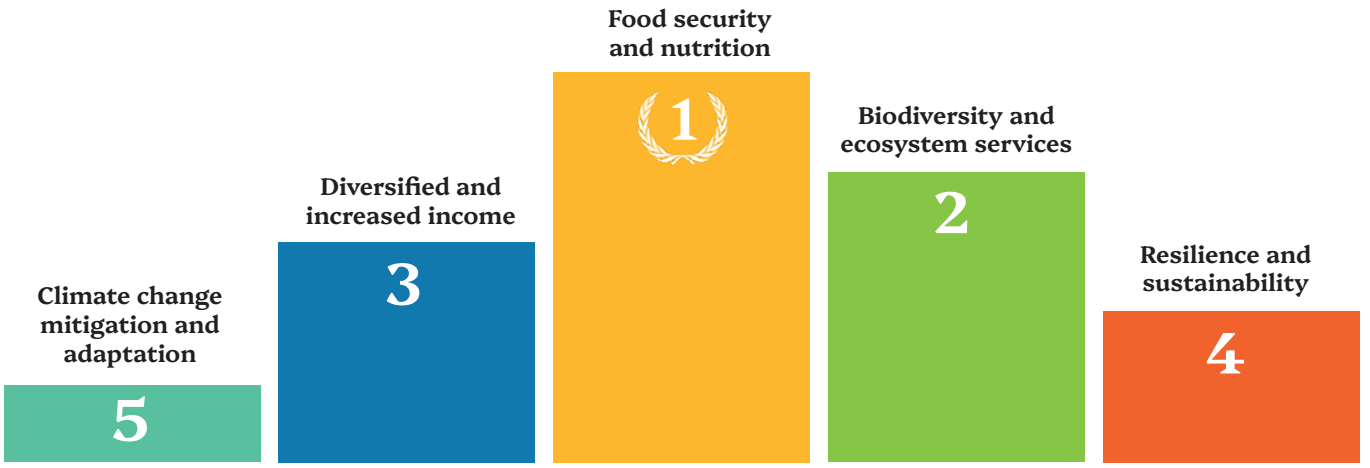
Highlights & Features

- The main product of Andris Ansis Špats' farm **is self-harvesting of eight cranberry varieties**, attracting around 1,500 visitors annually. The **agroforestry system provides aesthetic appeal as well as a pleasant environment** with shade and breeze.
- The farm **processes its harvest** into juices, syrups, berry powders, sweet sauces, and candies, using cranberries and various other plants such as rhubarb, quince, chokeberries, blueberries, sea buckthorn, blackcurrant, viburnum berries, and mountain ash.
- Alongside producing a range of goods, the farm also **invests in research and technology development** for farmers. This includes equipment and methods for producing biologically active salt solutions for large farms, hospitals, and home use, as well as innovative berry processing technologies and farmer-friendly devices for precise berry cutting, osmotic drying, and low-temperature drying.
- Cranberry fields are **mulched with sawdust to absorb excess nitrogen.** To maintain natural balance and reduce costs, the farm avoids over-fertilizing and plants male white willow clones along ditches as windbreaks.

Year-round yields	✗
Seasonal harvests	✓
Gradual harvesting over an extended period	✓
Single large harvest at a specific time of year	✗
Harvest every year	✓

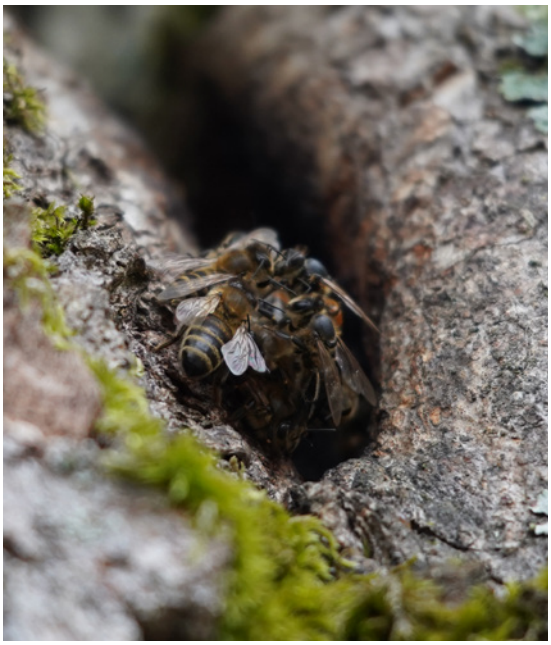
Products

- Self-harvesting of cranberries
- Large cranberry varieties
- Berry-based products: syrups, juices, powders, sweet sauces, and confections
- Honey and honey-based snacks
- Birch sauna whisks



Agroforestry benefits ranking

Photo Impressions



Ecological Benefits of Agroforestry Systems

The **"Gundegas" farm** (Nature Gift Cranberry Farm) is located approximately 50 km north of Riga, on a partially extracted peat bog. The farm has established plantations of large cranberries (Vaccinium macrocarpon). Within an alley-cropping agroforestry system, tree rows — initially established spontaneously along former peat extraction ditches — include species such as pine, honeysuckle, and white willow, that help to reduce the risks of frost and drought.

Soil

- The plantations are established on **peat soils, where sawdust mulch is applied** to improve soil structure, suppress weeds, and retain moisture.
- During gradual decomposition, the sawdust **enriches the soil** with microelements while **absorbing excess nitrogen** — beneficial for cranberries that thrive in nutrient-poor, acidic conditions.

Water

- Trees help **reduce moisture loss** and **improve water movement** within the soil.
- Although the block ditch network is only partly functional, **natural drainage channels** have been created, directing water into a pond that can be used for irrigation when needed.

Microclimate

- **Windbreaks** are used to reduce air movement, which l**owers evaporation**, prevents soil surface cooling, and **decreases frost risk**.
- Tree rows have a beneficial impact on cranberry cultivation: the shade they provide and the reduced air movement help **stabilize temperature fluctuations**, which is crucial for achieving consistent and high-quality yields during sensitive growth stages.
- For visitors participating in the self-picking service, the tree-provided shade and shelter from the wind create a more comfortable and enjoyable experience in the field.

Pests

- Manual harvesting **without flooding prevents the spread of fungal diseases and rot**, resulting in minimal pest and disease pressure compared to conventional flooded cranberry systems.
- Maintaining dry harvesting conditions and balanced soil management **reduces habitat suitability for many pest species**, lowering the need for chemical interventions.

Pollinators

- Seasonal flowering of cranberries, honeysuckle, and surrounding willow and pine trees **provides continuous foraging resources for pollinators** throughout the growing season.
- The alley-cropping system with **tree rows offers shelter and wind protection**, creating a favorable microclimate for bees and other pollinating insects.

Biodiversity

- Although vascular plant diversity is low due to the intensive productive system, cranberry fields and surrounding tree lines **provide habitat for insects, birds, and amphibians**.
- Located on a former peat bog, the **farm contributes to preserving wetland-related biodiversity** and **supports natural vegetation regeneration** along field margins and ditches.

SWOT Analysis

Strengths

- **Environmental Restoration and Carbon Sequestration**
  Located on a partially developed peat bog, the farm's perennial cranberries and trees help restore a formerly carbon-releasing wetland and support long-term carbon storage.
- **Microclimate Improvement and Crop Protection**
  Tree rows reduce wind, evaporation, and frost risk, protecting cranberry buds and stabilizing soil moisture. Shade from trees moderates temperatures, improving berry flavor and color.
- **Sustainable, Nature-Based Management**
  Natural afforestation along former peat ditches is encouraged as part of the landscape design. Sawdust mulch from wood waste suppresses weeds, conserves moisture, and gradually balances soil nutrients.
- **Socioeconomic and Educational Benefits**
  The agroforestry layout supports self-picking tourism, offering visitors comfort, shade, and insight into organic practices. The farmer develops resilient cranberry varieties and affordable on-farm processing methods for juices, candies, and powders.

Weaknesses

- **Biodiversity**
  The area presents limited vascular plant diversity due to its intensive agricultural use.
- **Natural Pioneer Species as Weeds**
  Some naturally occurring species, like birch, are considered weeds because their leaves and seeds spread into the fields and require extra work to manage
- **System Development**
  Agroforestry was initially introduced spontaneously, not as a planned, conscious process, therefore the planning has developed spontaneously, in places it may not be optimal.

Threats

- **Wildlife Damage**
  Forest animals, such as moose or deer, feed on white willow plantations, threatening the effectiveness of windbreaks.
- **Industry Competition**
  Other industrial companies are preparing to establish new, large-scale berry plantations, which may increase competitive pressure.
- **Generational Change**
  Generational change and the transfer of knowledge to the next generation is a general threat in this type of specialized farms.

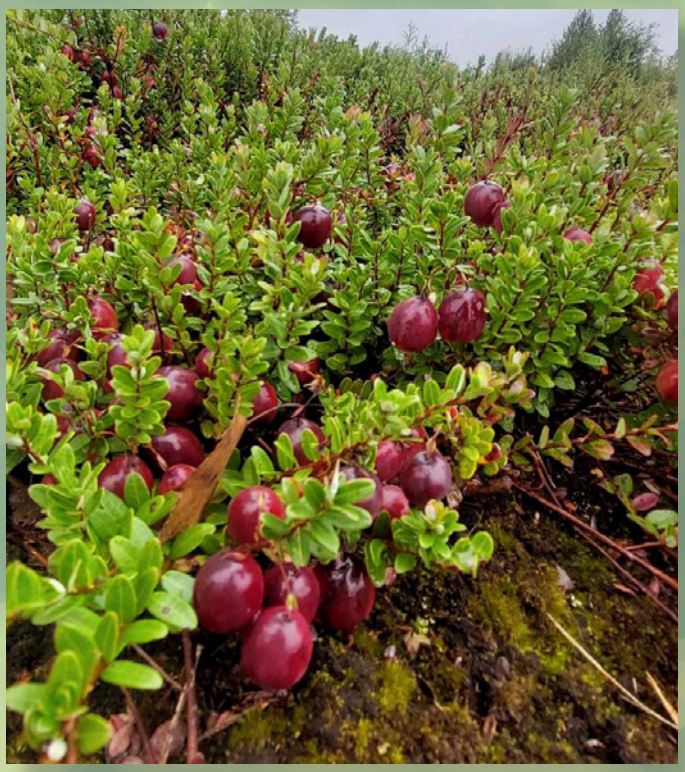
Opportunities

- **Breeding and Clones**
  There is strong potential to expand the farm's innovation in cranberry breeding. Developing and propagating new, more resilient clones adapted to agroforestry conditions can enhance productivity, reduce input needs, and support the establishment of new, climate-resilient cultivation areas.
- **Windbreak Improvement**
  A higher and more sturdy windbreak could be created by restoring white willow plantations gnawed by forest animals, possibly using species less attractive to wildlife.
- **Water Resource Use**
  Runoff water could be collected in a pond that can later be used to irrigate plantations if necessary.
- **Food and Horticultural Potential**
  Expanding the cultivation of small plantations in windbreaks (honeysuckle, willow) in addition to berry production could contribute to diversified products.

Impressions of the Farm

"A visionary who has fulfilled his dreams, this place works really well and has an impressive setup of alley cropping, a good understanding of his land and how to make it work for both the people and remediating it for better natural value. Excellent example."

-Katarina



"Very unique take on alley-cropping that I personally had not seen in practice before. Organic and nature based production with world class products made this visit very valuable. The fact that growing cranberries is a more profitable and environmentally friendly land-use alternative to peat extraction lends another interesting dimension to this farm."

-Leo

Līči

Farmer's name:
Anna Bole-Viljamsone

Farm type:
Family farm

Farm size: 17 ha

Crops and livestock:

vegetables, fruit and berries, nuts, herbs, propagation material, livestock for meat, poultry for meat and eggs, timber, mushrooms, forage, other.

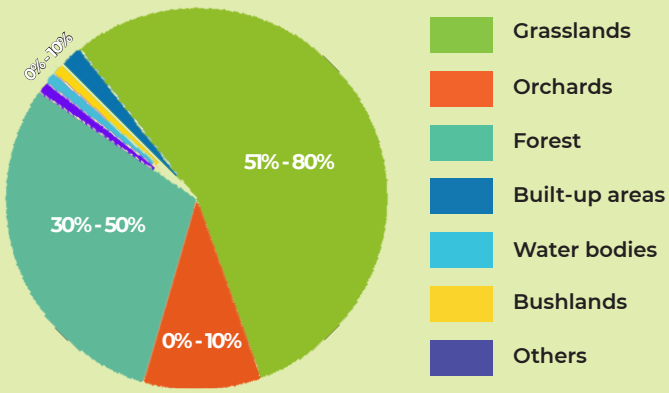
Zvārde Parish,
Saldus Municipality, Latvia

"Līči" features an **impressive kitchen garden**, and several areas of the farm have begun incorporating food forest elements. Initially designed as a "family food bank" to meet household needs, it gradually expanded to produce farm products for sale. The owner, Anna, dreams, experiments and examines the result of her work constantly, creating a fluid, dynamic system.

1	Farm and living area
2	Permaculture garden
3	Old apple orchard
4	New forest
5	Self-established apple orchard
6	Forest
7	Grassland

Which agroforestry aspects are most important?

Biodiversity and improved ecology	Very important
Sustainable lifestyle and social responsibility	Very important
Economics - increased income opportunities	Not important



Agroforestry Practices

Implemented	Partially implemented
Tree landscape features Orchard intercropping	Multi-layer tree-garden Orchard grazing

Plants on the farm

- **Windbreaks and nut bearing species:** hazel, walnut
- **Fruit trees:** apple, pear
- **Berries and shrubs:** blueberries, raspberries, blackberries, honeysuckle, blackcurrant, redcurrant
- **Perennials and vegetables:** various seasonal vegetables
- **Newly introduced crops:** asparagus, Jerusalem artichoke, rhubarb, grapes, actinidia

Types of harvest	Harvesting time
Hazelnuts, walnuts, new apples, pears	In a few years time
Fruit, berries and vegetables	Autumn
Beans and other legumes	Summer
Herbs, teas, medicinal plants	Summer to Autumn

Yield from agroforestry?

- ◉ **No**, not productive yet
- ○ **Yes**, small income or self-consumption
- ○ **Yes**, noticeable income

Agroforestry impacts on the farm

Effects on financial stability	Slightly positive
Market opportunities	Neutral
Soil quality	Positive
Natural values	Positive
Nutrient utilization	Slightly positive
Carbon sequestration	Positive
Diversity of the living environment	Positive

Farm History and Development

Dream phase

Agroforestry on the farm began as a self-sufficient approach, inspired by the owners' background in conventional farming, which proved that things had to be done differently. The dream merged with the implementation, with the first ideas experiencing immediate implementation.

2020

5 Years

Implementation phase

First, the garden and vegetable plots were prepared and shaded with straw, leaves, and plastic sheeting to suppress unwanted vegetation. Numerous fruit trees and bushes were planted, and experiments were conducted with mulching materials such as haylage, hay, and oak leaves.

Evaluation phase

Different practices have been evaluated through observation and hands-on experience. Without proper management, some previously cultivated species can become weeds in the following year, therefore reproduction of mature plants is now controlled.

In winter, areas are left uncovered to manage mice and aerate the soil. During the five years, the focus has been on restoring and maintaining the existing garden, including managing the greenhouse. The farm is currently pausing new practices, observing results, reassessing economic aspects, and taking a moment to enjoy the results of its efforts.

Harvest and Agroforestry Benefits

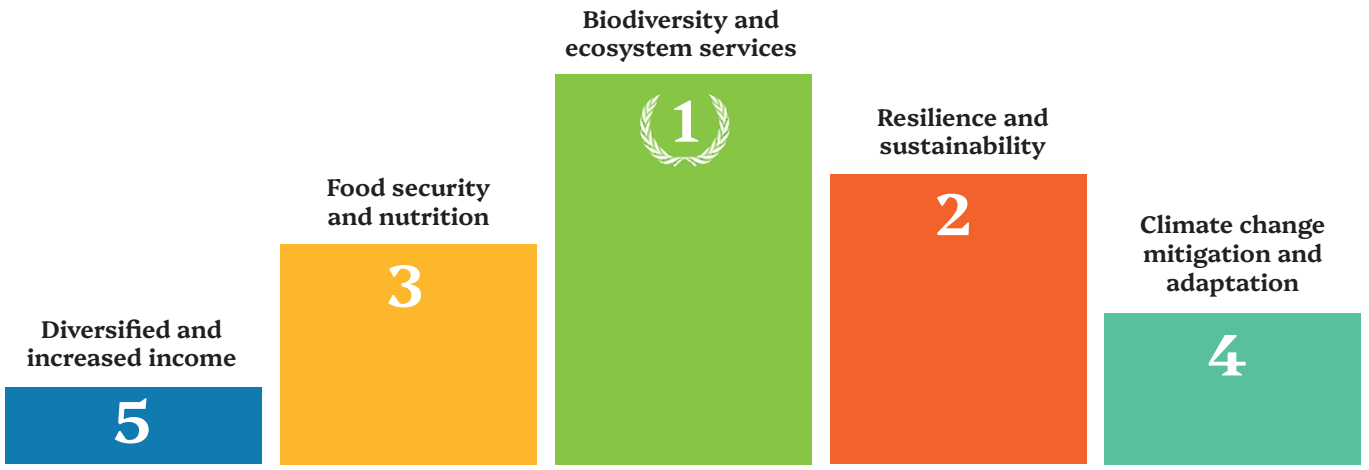
Highlights & Features

- The farm embraces **biodynamic agriculture** and combines a forest garden with **permaculture** principles and practices, including mulched beds, raised beds, and diverse composting methods. Farming here is not just a livelihood nor the main source of income, but a philosophy and a natural way of life.
- Bee houses are maintained not for honey production, as nearby conventional crops are treated with pesticides, but to **support pollinator populations** and promote biodiversity.
- Currently, the **main focus is on perennial plantings**, while the share of annual crops reduced. Perennials require little maintenance and grow slowly, but their yields and the income they bring are more difficult to predict.
- **A dust-protection plantation, that also functions as a windbreak** has been established, primarily consisting of hazelnuts and walnuts, which are used for firewood, nut harvests, and other purposes.
- The farm uses its own wood chipper for mulching, fertilization, and compost production. Anna, the farmer, applies her extensive knowledge of **composting directly in the garden.**

Year-round yields	✗
Seasonal harvests	✓
Gradual harvesting over an extended period	✓
Single large harvest at a specific time of year	✓
Harvest every year	✓

Products

- Meat
- Berries and fruit
- Vegetables (sold fresh in autumn markets)
- Different products from dried, cured, and preserved autumn harvest
- Nuts
- Herbs and herbal teas
- Unconvential products: meadowsweet oil macerate, pot marigold (*Calendula officinalis*) oil etc.



Agroforestry benefits ranking

Photo Impressions

Ecological Benefits of Agroforestry Systems

The "Līči" farm, located in southern Kurzeme, covers 17 hectares. It is a historic homestead with centuries-old oaks, an old orchard, and soils enriched with organic matter after decades of cultivation. The mature trees provide shelter, support mycorrhizal networks, and help sustain water circulation. Today, the farm is surrounded by intensive agricultural fields.

Soil

- A variety of natural mulch materials, including oak leaves, hay, and silage, are used to improve soil structure, **enhance water retention**, and **prevent erosion**.
- Compost made from on-site organic waste is applied regularly to **boost soil fertility** and **stimulate microbial activity**.
- Crop diversity, including nitrogen-fixing species, is integrated into the system to maintain n**utrient balance** and support **overall ecosystem health**.
- The guiding principle is to **keep the soil "alive"** — fostering thriving soil organisms while avoiding prolonged surface coverage that could disrupt natural biological processes.

Water

- Water conservation is achieved primarily by **improving soil structure and organic content**, which enhances natural moisture retention.
- **Mulching** reduces evaporation and stabilizes soil humidity, while the **no-dig approach** improves the soil's capacity to absorb and store rainfall.
- During winter, greenhouse roofs are partially opened or removed to let in snow and rain, maintaining **natural soil moisture** and **frost cycles**.

Microclimate

- A living windbreak composed of hazel, rowan, and sweet cherry trees has been planted along the northern boundary — it not only **protects crops from cold winds** and desiccation but also **filters potential chemical drift** from neighboring intensive farms and enhances local biodiversity.
- The southern edge of the nearby forest is strategically used to **form "sun pockets"** — sheltered, sun-exposed areas ideal for establishing a forest garden.
- Observations show that northern slopes have lower yields even for fruit trees. Therefore, these areas are **managed less intensively**, often serving as habitats for resilient perennial plants or as buffer zones supporting ecological diversity.

Pests

- **Pest-repellent plants** such as partridge pea, hellebores, garlic, daffodils, marigolds, and rue are strategically planted to deter rodents and insect pests.
- Crops vulnerable to the same pests are not grown together, and **crop rotation** is consistently practiced to prevent pest buildup.
- Natural pest control methods are applied, including the release of **Trichogramma** wasps, the use of **biological preparations** (e.g., Bio-Effect), and the installation of **birdhouses** to attract insect-eating birds.

Pollinators

- **Phacelia is sown** to attract pollinators, while sections of **meadow flowers are left** uncut to provide continuous nectar sources.
- **Insect habitats are created** using piles of branches and the hollow stems of perennials, offering shelter for beneficial insects and solitary bees.
- No synthetic pesticides are used, ensuring a safe environment for pollinators and promoting ecological balance.

Biodiversity

- The farm does not intentionally create designated ecological zones — **habitats emerge naturally and spontaneously** within the managed landscape.
- Surrounded by intensive agricultural fields, the farm's **tree belts act as protective buffers**, reducing chemical drift and shielding crops from external impacts.
- Although primarily focused on production, the **farm functions as a living ecosystem** where agricultural activity and natural processes coexist.

SWOT Analysis

Strengths

- **Focus on Sustainability and Ecology**
  The main strengths of the farm lie in sustainable management, biodiversity, and healthy soils. These resources are partly the result of previous generations' work, which has created a solid foundation for today's management practices.
- **High Personal Investment and Labor Commitment**
  The establishment of the agroforestry system began with an intensive approach — investing in seedlings, labor, education, and soil research. The owners themselves have personally contributed substantial effort to the development of the system.
- **Authentic Approach and Lifestyle Philosophy**
  Operations are guided less by purely economic considerations and more by values and a lifestyle philosophy. This is characteristic of a small-scale, family-based system with significance to the local community, where financial returns are only one aspect rather than the primary goal.
- **Cultural and Ecological Core (Oaks)**
  Centuries-old oaks at the center of the property serve as both cultural and ecological keystones. They provide shelter, acorns, and a mycorrhizal network, help maintain water and nutrient cycles, and symbolically connect landscape, people, and nature.

Weaknesses

- **Social Pressure and Internal Differences**
  Multiple generations live on the property, creating differing understandings of management practices, daily routines, and quality standards. These differences sometimes affect decision-making and the implementation of a unified strategy.
- **Planting Failures and Insufficient System Development**
  Not all plantings have been successfully established or managed — young trees compete with grasses, and some are located in poorly drained soils, creating waterlogged conditions harmful to trees. Some elements, particularly forest-garden plantings, do not yield crops, except for mushrooms cultivated on logs.
- **Imbalance Between Economy and Ecology**
  Agroforestry practices increase the farm's self-sufficiency but currently do not generate significant economic returns. System alignment with economic objectives should be reviewed to achieve a sustainable balance.
- **Non-Functional Practices**
  Some earlier practices have been discontinued — for example, mulching was stopped to prevent rodent proliferation and allow the soil to "breathe," and leaving seeds for birds (e.g., yarrow, nettles, hemp) led to unwanted weed spread over large areas.

Threats

- **Impact of Neighboring Land Use**
  There is a risk that neighboring intensive agricultural practices, based on a very different philosophy, could negatively affect the property. Windbreaks provide some protection, reducing impacts from surrounding farming activities and chemical drift.
- **Uncertainty of Property Rights**
  Threats related to unclear property rights may limit development opportunities and investment security.

Opportunities

- **Developing an International Retreat and Education Center**
  The property has potential to become an international permaculture retreat, possibly focusing on health-related aspects — self-produced food from perennial systems, sauna rituals, and wellness experiences. It can serve as a source of inspiration for others.
- **Expansion of Plantings and Food Offerings**
  The farm can provide healthy food for itself and others, offering a seasonal and diverse selection for visitors and local markets. The planned cherry alley could become a central and attractive feature. Observation of edible walnut tree plantings and pollinator-supporting hedgerows offers further opportunities.
- **Diversification of Unused Land**
  The property still has unused land, which could be diversified into forest and meadow areas, enhance biodiversity, and develop permaculture-based activities such as grazing, nature trails, or additional agroecological systems.

Impressions of the Farm

"A perfect place to end the trip. Tired and weary, arriving here and being greeted by the big oak trees, the owner and the dogs felt like arriving "home"."

-Leo

"A true and authentic example of how small farms can play an important role in the lives of modern Europeans, providing values to individuals and society that go far beyond financial aspects."

-Anders

Östergård

Farmer's name:
Anders Rydén

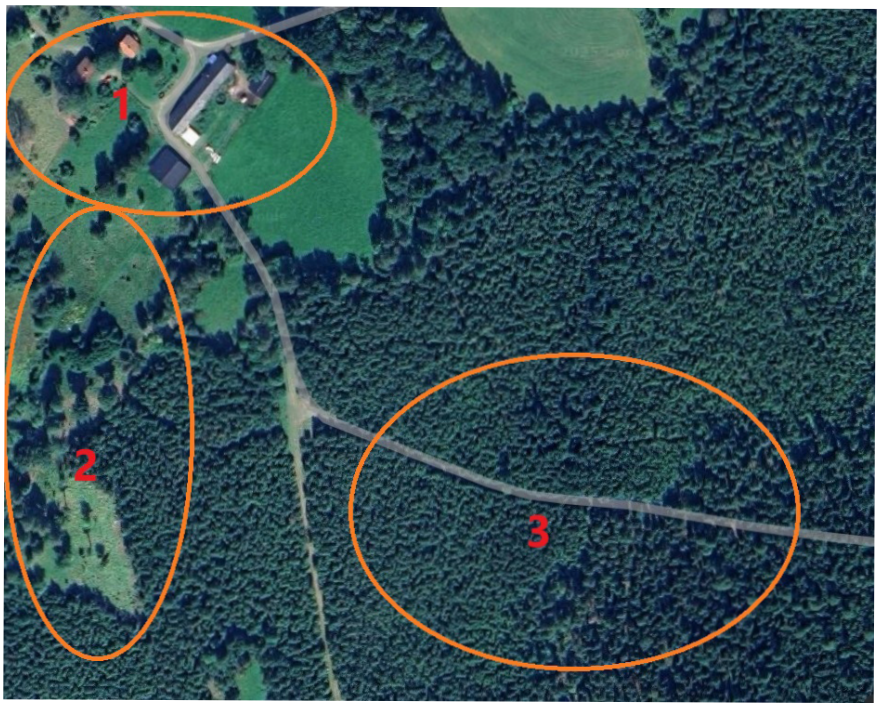
Farm type:
Small scale commercial farm

Farm size: 137 ha

Crops and livestock:
- livestock for meat

Vrankunge,
Kronoberg County, Sweden

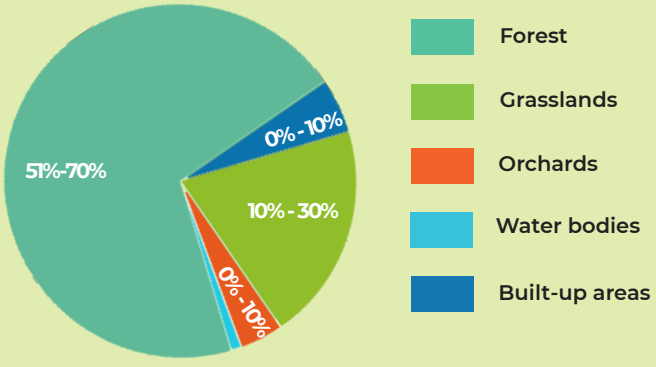
At **"Östergård" farm**, a herd of Belted Galloway cows helps manage the forest through foraging, clearly demonstrating the environmental and economic **benefits of forest grazing**. This example serves as an inspiration for reintroducing traditional Swedish animal husbandry practices into modern forestry.



1	Farm and living area
2	Wood pasture
3	Forest grazing area

Which agroforestry aspects are most important?

Biodiversity and improved ecology	Very important
Sustainable lifestyle and social responsibility	Very important
Economics - increased income opportunities	Very important



Agroforestry Practices

Implemented	Partially implemented
Forest grazing Wood pasture	Coppice alley cropping Multi-layer tree-garden Orchard grazing

Plants on the farm

- **Tree species:** fir, oak (including white oak), birch, pine, linden, beech, elm, cherry, spruce, rowan, aspen, alder, and maple.
- **Forest products:** mushrooms and wild berries.

Types of harvest	Harvesting time
Mushrooms, wild berries	Seasonally, as available
Honey	Seasonally

Latvian agroforestry expert Māris Narvils notes: "Harvest in forest pastures should be understood in a broader sense as the growth of forest biomass, the establishment of grasses within forest areas, the harvesting of pasture grass in open pastures, and the increase in the live weight of cattle."

Yield from agroforestry?

- ○ **No**, not productive yet
- ○ **Yes**, small income or self-consumption
- ◉ **Yes**, noticeable income

Agroforestry impacts on the farm

Effects on financial stability	Positive
Market opportunities	Neutral
Soil quality	Positive
Natural values	Positive
Nutrient utilization	Positive
Carbon sequestration	Positive
Diversity of the living environment	Positive

Farm History and Development

Dream phase

When Anders Rydén inherited the family farm in 2016, the cyclone "Gudrun" (in 2005) had destroyed most of the old spruce monoculture trees. In this disaster, he saw the opportunity to establish a more robust deciduous forest and realized grazing animals made it easier to encourage the growth of broadleaved trees.

2016

1 Year

Implementation phase

It started with four Belted Galloway cows in a fenced-off forest area twelve years after the cyclone — a sufficient amount of time for the new trees to grow and not be damaged by browsing. Soon enough, the positive aspects of the herd on the environment were revealed, and the grazing area was expanded. After three years, the economic benefits became obvious as well.

3 Years

2017

Evaluation phase

Anders has plans to grow black walnuts for timber and to use other animals for various services, such as the Swedish semi-wild pig breed Linderödsgris, and sheep for grazing in the broadleaf forest.

2020

5 Years

He envisions a highly diverse forest landscape where edible species, such as wild roses, honeyberries, walnuts, fruit trees, and chestnuts, grow alongside the native ones and are spread further with the help of the animals.

Harvest and Agroforestry Benefits

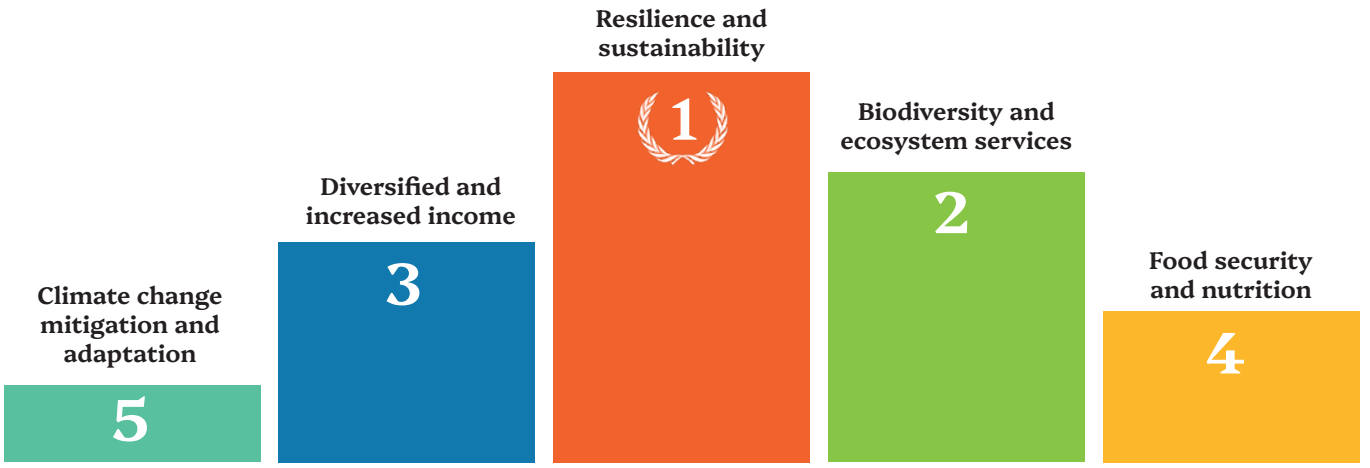
Highlights & Features

- **Belted Galloway cows** are kept on the farm — a Scottish breed well adapted to **grazing on poorer pastures,** which helps reduce the need for silage. Belted Galloway is commonly **used for targeted vegetation management** which makes them suitable for forest grazing and management.
- To learn and adapt to the habits of the livestock, Anders Rydén **observed the behaviour of cattle in the nature.** The grazing system was then adjusted to adapt to their needs. The pasture is enclosed with an electrical fence that the animals respect, and the **grazing rotation is controlled by access to water and salt.**
- The **forest landscape benefits from grazing** in many ways — it clears undergrowth, improves accessibility, reduces fire risk, enhances soil quality, lowers maintenance costs, and promotes biodiversity and ecological balance.
- In recent years, Swedish forestry has seen growing interest in forest grazing as a **tool for transforming spruce** plantations into more resilient broadleaf forests. Anders believes that many forest owners would adopt this practice if there were sufficient support and funding. When properly managed to prevent overgrazing, it is a valuable method for enhancing the resilience of forest ecosystems — even within commercial forestry operations.

Year-round yields	✓
Seasonal harvests	✓
Gradual harvesting over an extended period	✗
Single large harvest at a specific time of year	✗
Harvest every year	✓

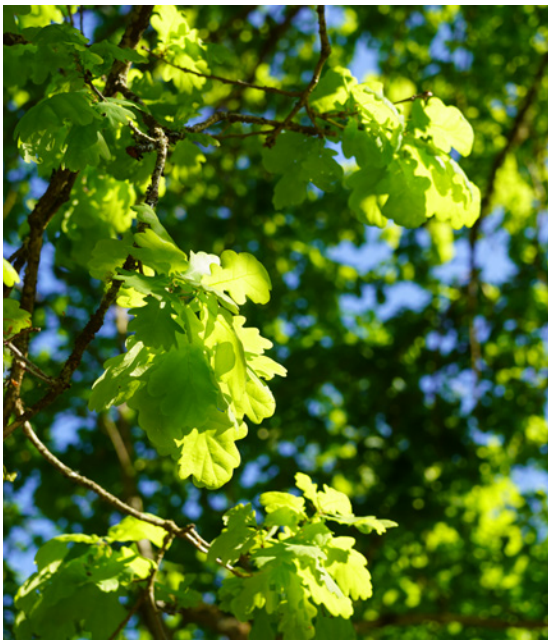
Products

- Linden honey
- Forest berries
- High-quality meat
- Forage establishment in forest
- Forest understory management



Agroforestry benefits ranking

Photo Impressions



Ecological Benefits of Agroforestry Systems

"Östergård" farm in Vrankunge is located in Småland, southern Sweden, near Växjö, covering an area of 137 hectares. The landscape features semi-natural meadows with trees and wet forest types. After the 2005 Gudrun storm destroyed much of the spruce monoculture, the owner, Anders, began transitioning toward a mixed broadleaf forest, planting species such as lime, oak, beech, willow, and cherry. This transition is supported through rotational cattle grazing, where cows selectively thin the understory and naturally maintain forest structure.

Soil

- Forest grazing helps **regenerate soil**, gradually transforming acidic spruce soils to support pasture grass growth.
- **Grass seeds** pass through cattle digestive tracts and, together with dung, are deposited into the soil, where they successfully germinate.
- The soil is **mixed with manure**, improving soil structure and fertility.
- Cattle **break and bury dry spruce branches**, which increases soil aeration and adds organic matter.
- Grass ground cover develops gradually from **seeds dispersed through dung**, enhancing soil stability and coverage.
- Careful management, such as **selective cuttings**, can accelerate these processes and further improve soil quality.

Water

- Cattle contribute to the accumulation of organic matter in forest pastures, and **increased organic matter improves the water absorption** capacity of the soil.
- Enhanced water absorption supports **better growth of plants** within the ecosystem.

Microclimate

- In forest pastures, increased sunlight **promotes plant photosynthesis**, which helps capture more carbon in the soil.
- Greater sunlight also **warms the topsoil layer**, supporting the growth and development of grasses.
- Trees in the pasture offer natural shelter, providing **shade during summer** and **cover during winter**. The improved microclimate benefits livestock welfare by providing favourable conditions for grazing and resting.

Pests

- As the number of species per unit area increases, the likelihood of pest outbreaks (such as European spruce bark beetle) and diseases decreases.
- Livestock activity **disrupts the development cycles of pests** and pathogens, particularly those affecting the soil and the lower parts of trees up to 2 meters.
- Grazing introduces more nutritious grasses, which **satisfy the dietary needs of forest animals**, such as deer and elk, reducing damage caused by browsing.
- Cow dung attracts flies which in turn **draws in birds**, aiding in the control of spruce bark beetle populations.

Pollinators

- Along with the establishment of grasses in forest pastures, there are more opportunities for pollinating insects to thrive. Forest pastures provide both **suitable habitats** and **abundant feeding grounds** for them.

Biodiversity

- The introduction of grasses through grazing **encourages the appearance of numerous other species**.
- Weeds and herbs introduced through grazing help **repair the soil**, supporting the **return of earthworms** and establishing a **richer ground flora**, including plants like dandelions.
- The increased diversity and improved soil flora also benefit wildlife. Grazing **enhances the nutritional quality of grass**, which develops within just a few years.

SWOT Analysis

Strengths

- **Economic Efficiency and Cost Savings**
  Cattle act as "natural trimmers," reducing forest maintenance and understory clearing costs by about €90 per hectare compared to contractors (€500/ha). Without livestock, forest management would not be economically viable. Belted Galloway cattle thrive on low-quality forage, lowering feed costs and reducing the risk of herd losses during fodder shortages. Having forest grazing systems prevents emergency slaughter in dry years.
- **Ecological Restoration and Resilience**
  Grazing improves soil fertility by reintroducing weeds and herbs that attract worms and restore soil health. Birds attracted by dung insects help control spruce bark beetles. Grazing facilitates the transition from spruce monocultures—previously damaged by storm Gudrun—to more resilient broadleaf forests. Cattle trampling helps incorporate carbon from fallen branches into the soil, reducing fire risk, while the forest provides natural shade in summer and shelter in winter, enhancing animal welfare.
- **Management Efficiency**
  Cattle selectively browse non-target species, shaping natural regeneration toward desired trees (oak, beech, linden). Livestock are easily controlled with electric fencing; the calm, white-banded Belted Galloway breed is easy to monitor.

Weaknesses

- **Need for Constant Presence**
  Livestock, fences, and water points must be moved regularly, requiring continuous attention and labor.
- **Resource Management Risks**
  Overgrazing can harm natural values; sheep may eat bark and cows may browse buds when pasture is scarce. Manure concentration in resting areas can cause nutrient overload and root rot. Intensive grazing and nutrient enrichment may reduce wild berry yields. Proper road access is needed to avoid cattle trampling and damaging trees.
- **Development Limitations**
  The farm functions mainly as a hobby and secondary income source, limiting further expansion or intensification.

Threats

- **Predators**
  Potential wolf presence poses a risk to livestock.
- **Climate Change**
  While agroforestry increases resilience, prolonged droughts could limit grazing resources without sufficient water reserves.
- **Storms and Pests**
  Southern Sweden faces recurring storms, tree diseases, and spruce bark beetle outbreaks — further justification for transitioning to broadleaf systems.
- **Habitat Shifts and Overgrazing**
  Bracken fern expansion can reduce pasture quality, as it is avoided by all livestock and outcompetes grasses. Historically, forest grazing declined in the 1600s as timber became valuable, reflecting persistent tensions between forestry and grazing.

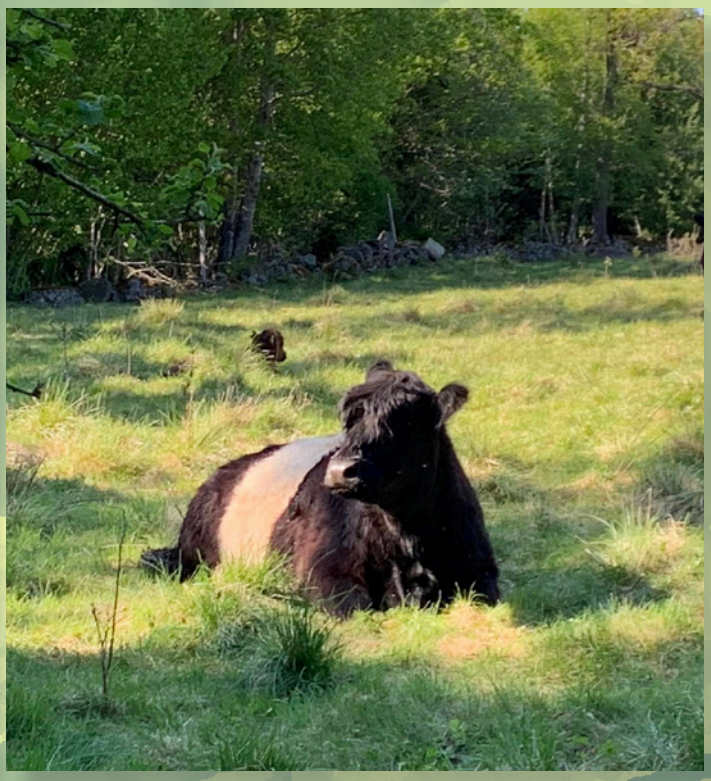
Opportunities

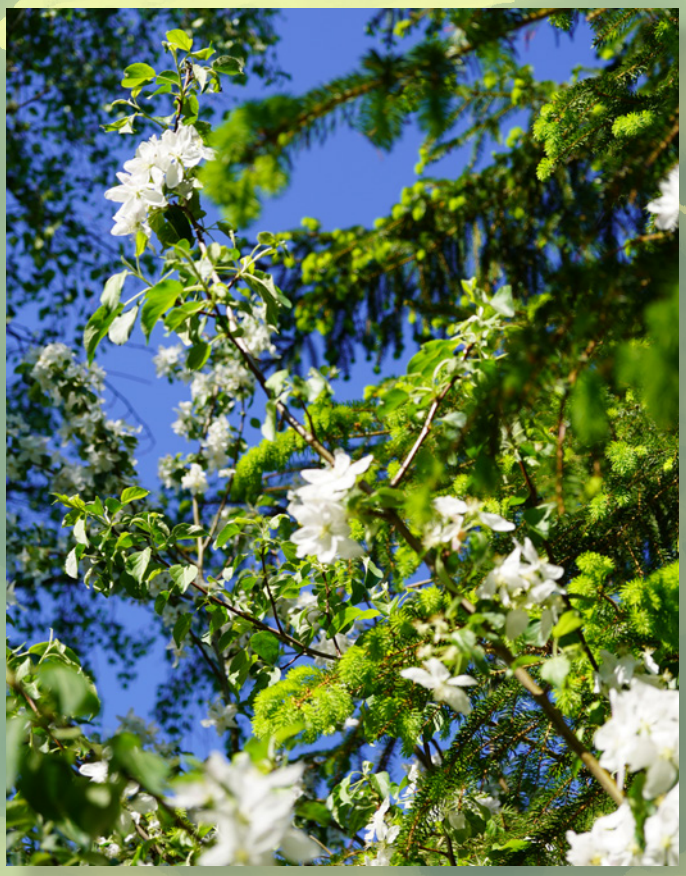
- **Economic and Policy Potential**
  Introducing compensation schemes for forest grazing could reward ecosystem resilience services.
  "What is missing in today's subsidies for forest- and mosaic grazing is the support for grazing as a tool to create more robust ecosystems," says Anders Rydén.
- **System Diversification**
  Plans to add Linderödsgris pigs to forage on nuts and sheep to manage undergrowth as well as other tree species for timber production. The grazing rotation system could be refined by replacing water tanks with a rainwater pond and ditch system, improving rotation logistics.
- **Knowledge Sharing**
  A valuable example that can help increase national interest in forest grazing by sharing experiences and knowledge as a tool for converting spruce plantations into broadleaf forests.

Impressions of the Farm

"The long awaited example of forest grazing! My confidence grows that livestock should become a part of the creators of the ecosystem. What 9 nursing cows and 6 calves can do in at least 70 hectares of forest is amazing."

-Māris





"It is amazing that a person whose only connection to the countryside is his ancestral roots has decided to devote all his free time to reviving livestock farming on his parents' former farm. I really liked the owner's perspective on how to farm economically while being as gentle as possible toward nature and his livestock. It was very interesting to watch how he tries to preserve the ancient ancestral pastures with impressive old stone pile fences and forest pastures [...]. And of course, the beautiful cows — small in size, black with a wide white stripe in the middle, as if wrapped in paper. This is a farm I would love to visit again!"

-Roberts

Stora Juleboda Gård

Farmer's name:
Marcus & Anna Callenbring

Farm type:
Organic (certified) commercial farm

Farm size: 120 ha

Crops and livestock:

- grain
- vegetables
- fruit and berries
- nuts
- herbs
- livestock for meat
- poultry for meat and/or eggs

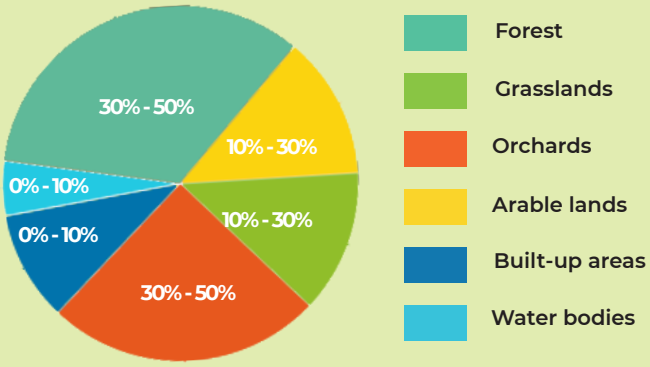
Degeberga, Skåne County, Sweden

"Stora Juleboda" became an agroforestry site after reconstructing a dying orchard and making it biodiverse and multifunctional by planting sea buckthorn, wild rose, plum, blackcurrant and redcurrant among the apple trees. **Chicken, pigs** and **sheep** live on the farm, complementing farming practices. The farm has 8 different sources of income, including wild rose petals.

1	Blackcurrant field
2	Farm utility buildings
3	Apple and pear orchard
4	Future vegetable garden
5	Grassland and sheep pasture
6	Farm and living area

Which agroforestry aspects are most important?

Biodiversity and improved ecology	Important
Sustainable lifestyle and social responsibility	Very important
Economics - increased income opportunities	Very important



Agroforestry Practices

Implemented	Partially implemented
Multi-layer tree-garden, orchard intercropping, orchard grazing, alternating cropping and grazing, tree landscape features, forest grazing	Wood pasture, tree alley cropping, coppice alley cropping

Plants on the farm

- **Fruits and berries:** apples, pears, plums, sea buckthorn, raspberries, blackberries, blackcurrant and blueberries.
- **Ground cover and meadow plants:** nettles, fireweed, phacelia, white clover, meadowsweet and dandelions.
- **Other plants:** hops (Humulus lupulus), wild garlic (ramson), wild rose.

Types of harvest	Harvesting time
Ramson	Early spring (as early as February)
Large nettles	Early spring
Birch sap	Spring
Fruit and berries	Summer
Niche crops	Year-round
Apples	Autumn (until November)

Yield from agroforestry?

- ○ **No**, not productive yet
- ○ **Yes**, small income or self-consumption
- ◉ **Yes**, noticeable income

Agroforestry impacts on the farm

Effects on financial stability	Positive
Market opportunities	Positive
Soil quality	Positive
Natural values	Positive
Nutrient utilization	Positive
Carbon sequestration	Positive
Diversity of the living environment	Positive

Farm History and Development

Dream phase

Marcus and Anna Callenbring's journey into farming and agroforestry began almost by chance. Marcus was trained in conventional agriculture, while Anna's background in animal husbandry led them to acquire Stora Juleboda — a property rich in apple trees — as a promising place to integrate animals into their farming system.

2014

3 Years

Implementation phase

The first step towards a productive farm was restoring the neglected apple orchard, where most trees had to be replanted. A "permacultivation" system was then introduced — an alley-cropping approach combining apples, pears, plums, berries, and other perennials. The farm also actively collaborated with the Swedish University of Agricultural Sciences (SLU), hosting several research projects to explore ecological balance and the benefits of biodiversity through diversification and animal grazing.

1 Year

2017

Evaluation phase

The need for evaluation is constant due to ongoing innovation and the demanding task of preventing frost damage. Through continuous observation, the roles of animals on the farm have been refined — sheep now only graze the permaculture orchard once the main season has passed.

2018

7 Years

Marcus and Anna dream of turning their farm into a learning site, where biodiversity, balance, and knowledge grow side by side. They encourage others to think creatively and find innovative, respectful, and sustainable ways to work with nature's resources.

Harvest and Agroforestry Benefits

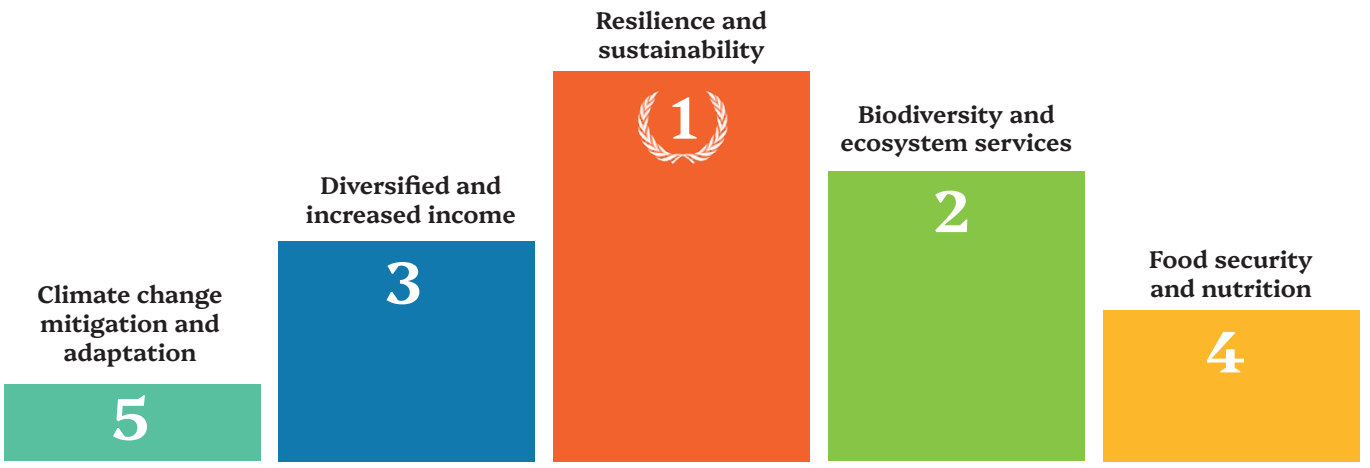
Highlights & Features

- The farm produces an astounding number — **around 100 different products** throughout the year and sells them to wholesalers, local restaurants, ICA stores, and retail customers.
- The farmers develop their own apple varieties together with the Swedish University of Agricultural Sciences. There are **more than 20 different food and cider apple varieties** on the farm.
- Using permaculture and agroforestry methods **extends the growing season**, and a creative approach to harvesting **increases the variety of crops available for sale** compared to traditional systems: the harvest season can start as early as February and continue until the end of November.
- The utilization of **pigs for tillage and weeding** is less expensive than using human labour and allows for the conversion of low-value forested areas into agricultural land. They also control apple tree roots that can become invasive and help keep voles away.
- Each animal plays a distinct role in supporting farm ecology and influences the environment in a positive way, contributing to soil microbiology and fertilization. **Regenerative grazing is practiced by rotating animals** — chickens, sheep, and pigs — to mimic naturally grazing herds and improve soil, plant, and animal health.
- The farm has **participated in a number of research projects** that have provided new lessons and fueled the desire to experiment, with hopes of establishing the farm as an organic farming knowledge exchange center.

Year-round yields	✓
Seasonal harvests	✓
Gradual harvesting over an extended period	✓
Single large harvest at a specific time of year	✓
Harvest every year	✓

Products

- Apples for food and cider
- Versatile products from herbs and different plant parts
- Nettles (picked fresh or dried and powdered)
- Birch sap



Agroforestry benefits ranking

Photo Impressions

Ecological Benefits of Agroforestry Systems

"Stora Juleboda" is located on the coast between Åhus and Kivik, covering 120 hectares divided among orchards, pastures, forest, and cropland. Its proximity to both the sea and surrounding forest results in mild autumns, though there is a risk of late spring frosts. The site features sandy soils and is bordered by beech and pine forests, heather, and a beach that forms part of a nature reserve.

Soil

- Soil fertility is improved through the **use of domestic animals** — sheep, pigs, and chickens — which **contribute organic matter** and **aid in nutrient cycling**. Fertilization is supplemented with chicken manure pellets and molasses-based foliar sprays.
- Chickens forage near trees and shrubs where **machinery can't reach**, consuming pests and weeds, loosening the soil, and distributing natural fertilizer.
- **Lactic acid bacteria are added** to irrigation and drinking water to support soil microbiota, plant health, and animal digestion.
- Apple cultivation is **diversified with blueberries, and nitrogen-fixing trees** and shrubs are planted to enhance soil fertility naturally.

Water

- Nettles and other weeds **shade the ground** and **help retain moisture** in the soil.
- Outside the garden areas, a **deep irrigator is used, which improves the water regime** in the soil. There is a river nearby that can be used for watering.

Microclimate

- **Late-blooming apple varieties** are planted to **minimize frost damage** and make better use of the farm's microclimate.
- Methods that help **fight the frost damage** include burning straw, ploughing tree alleys and using strong fans to **mix the air between the rows of trees**. This results in temperature rise from -3°C to +2°C.

Pests

- The use of domestic animals helps **disrupt pest and disease cycles**. Chickens **reduce insect populations**, while pigs consume fallen, damaged apples that **could host pathogens**. Their rooting activity also deters water voles, which avoid disturbed soil.
- **Foliar calcium fertilization** improves apple resistance to disease. Pheromone traps are used for pest control.
- The integration of windbreaks, ground cover and birdhouses creates a **biodiverse ecosystem that supports beneficial species** like ants, ladybugs and birds.
- Continuous plant sap analysis helps maintain balanced plant nutrition, **enhancing resistance** to fungal diseases and pest attacks.

Pollinators

- No special measures are used to attract pollinators. Since the garden is located near a forest, there are **enough natural pollinators**.

Biodiversity

- Livestock **supports the development of biodiversity** in ecologically favorable ways, with manure promoting beneficial soil microbial communities.
- **Increasing species diversity** in the orchard not only enhances production but also attracts a greater variety of beneficial insects and birds.

SWOT Analysis

Strengths

- **Economic Resilience and Diversified Income**
  The business is described as "standing on 7 legs" (multiple income streams, none being the main one, each supporting others). Foraging from edge zones provides a substantial and stable income, which financially saved the farm one year when frost destroyed the apple harvest. Nettles alone generate as much income as apples.
- **Integration of Animals (Silvopasture)**
  Pigs and chickens are used for ground preparation, controlling pests, and eating fallen fruit (reducing disease spread) in the orchard. Pigs are used for tilling the soil and clearing weeds like couch grass before sowing. Animals kept outdoors all year (mainly pigs) are hardy and help keep voles away.
- **Ecological and Natural Pest Control**
  The high diversity of perennials in the orchards attracts natural enemies of insect pests (ladybugs, birds, and a specific ant species that preys on codling moth larvae). This functional biodiversity creates a resilient environment.
- **Certifications and Innovation**
  The farm is KRAV-certified. The owner consistently thinks outside the box and utilizes everything nature provides.

Weaknesses

- **Labor Intensity and Workload**
  The high diversity and constant innovation are demanding for the owners. Manual work is required, especially for harvesting diverse products and managing frost (using fans and burning hay bales). Animal rearing ties the farmer to the site, involves safety risks for both people and animals, and reduces operational flexibility.
- **Economic and Knowledge Barriers**
  Maintaining pigs causes financial losses, as they are not kept for meat or food production but solely for providing ecological services. Managing livestock effectively requires significant expertise, creating a steep knowledge barrier.
- **Grazing Risks**
  Introducing pigs into the orchards carries a potential risk of contaminating fruit crops.

Threats

- **Wind**
  Wind poses a challenge to all agroforestry systems, but it is particularly severe on this farm.
- **Natural Conditions**
  Drought and lack of water bodies weaken the plantings. Wild animals such as deer, roe deer, water voles and mice cause damage to woody plants.
- **Competition**
  Without active management, planted trees compete with grasses and naturally regenerated birch for water and nutrients.
- **Long-Term Maintenance**
  Sensitive or poorly adapted tree species require near-ideal conditions to thrive, which can be labor-intensive to maintain. Without such care their establishment period is significantly prolonged.

Opportunities

- **Commercialization of Non-Traditional Yields**
  The successful commercialization of edge zone products (leaves, sap, buds) can be further expanded.
- **Product Diversification**
  Opportunity to sell specialty meat and eggs (Berkshire pigs and chickens) to increase interest in the farm and market sales.
- **Cultivar Development**
  Collaborating with plant breeders (SLU) to develop new resilient blackcurrant and apple cultivars.

Impressions of the Farm

"The farm clearly shows that any group of animals can create additional value on the farm if the system is properly established. The implementation of such systems makes the farm operation more ecological, more nature-friendly [...].

I really liked the owners' way of thinking that the use of natural resources in food and farm processes is much broader than people are used to thinking. But in order to see these opportunities, a person must want to become and has to become a part of nature."

-Roberts

"Very diverse farm with a creative approach to making money in extra-ordinary and creative ways. [...] The most inspiring, practical, and multi-diversified farm and production line. Think outside of the box and use all that nature gives you!"

-Anna

Boat in the Forest

Farmer's name:
Etta Säfve &
Jona Elfdahl

Farm type:
Family farm

Farm size: 4 ha

Crops and livestock:

- vegetables
- fruit and berries
- nuts
- herbs
- propagation material
- poultry for meat and eggs
- livestock for wool and other products
- other

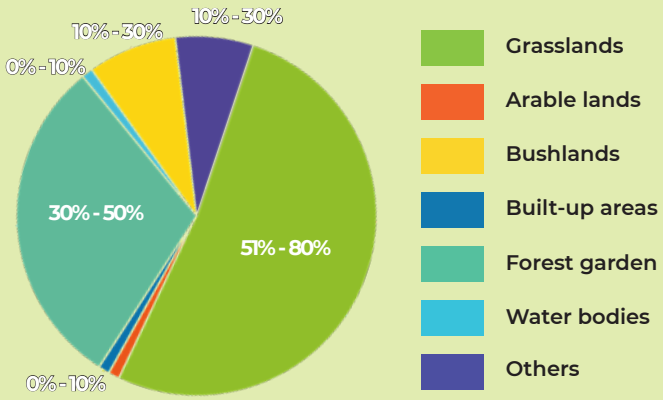
Gärsnäs, Skåne County, Sweden

"Boat in the Forest" is more than just a farm or residence — it's a **dream come true** for permaculture design teachers, eco-artists, and forest garden creators Etta and Jona. It serves as a place for learning permaculture design, where a forest garden is gradually being established, beginning with plant communities or guilds. The main crops include edible chestnuts and walnuts.

1	Utility and storage buildings
2	Edible and medicinal plantings
3	Root crop garden
4	Mixed-species row plantings
5	Farm and living area
6	Partially established edible and medicinal plantings
7	Experimental plantings in rocky soil

Which agroforestry aspects are most important?

Biodiversity and improved ecology	Very important
Sustainable lifestyle and social responsibility	Very important
Economics - increased income opportunities	Very important



Agroforestry Practices

Implemented	Partially implemented
Multi-layer tree-garden	Orchard intercropping
Tree landscape features	Alternating cropping and grazing

Plants on the farm

- **Main Nut Crops:** European chestnut, Greek walnut, common walnut, hazelnut, pine
- **Fruit Trees and Shrubs:** apple trees, sweet cherries, wild peaches, sea buckthorn, black elder, currants, gooseberries, strawberries, honeysuckle
- **Nitrogen-Fixing and Soil-Improving Plants:** common alder, white alder, common broom, common gorse, comfrey
- **Other Plants:** various groundcover species, medicinal plants, various bulb species, wine-grapes, shiitake mushrooms

Types of harvest	Harvesting time
Various greens, lettuce, root vegetables, herbs	From early April to late autumn
Strawberries, honeyberries, honeysuckle	Late spring to early summer
Sweet cherries, peaches, apples	Summer to early autumn
European chestnuts, Greek walnuts	September to end of October
Shiitake mushrooms	Throughout the growing season
Medicinal plants, bulbs, and groundcover species	During the vegetation period

Yield from agroforestry?

○	◉	○
No, not productive yet	**Yes**, small income or self-consumption	**Yes**, noticeable income

Agroforestry impacts on the farm

Effects on financial stability	Slightly positive
Market opportunities	Neutral
Soil quality	Positive
Natural values	Positive
Nutrient utilization	Positive
Carbon sequestration	Positive
Diversity of the living environment	Positive

Farm History and Development

Dream phase

Jona Elfdahl has been working on this land since 2010 when he realized that the urban life in Gothenburg was not suitable for him and left the city behind. In 2014, Jona started taking courses in agroforestry and permaculture design. The original idea was focused on self-sufficient management, which led to dreams of a forest garden and a permaculture garden.

2010

2 Years

Implementation phase

Forest gardens and food forests were introduced to the farm, as well as permaculture-style vegetable gardens. The design and development steps are: Plan, Do, Observe, Reflect, and then repeat. Initially, trees were planted in rows at set intervals in a forest garden. Later, as the relationship with the land deepened, planting was done through intuition or instinct.

3 Years

2012

Evaluation phase

The farmers have gained valuable experience and a deeper understanding of the costs and added value associated with integrating trees and shrubs. Insights into the role of mycorrhizal fungi in carbon and nitrogen cycling have also improved.

2015

10 Years

The current project involves transforming a hilly, degraded area of former pasture and hayfield into a nut orchard featuring walnuts and sweet chestnuts. There are also plans to introduce grapevines into this forest orchard, with the goal of producing forest-grown wine.

Harvest and Agroforestry Benefits

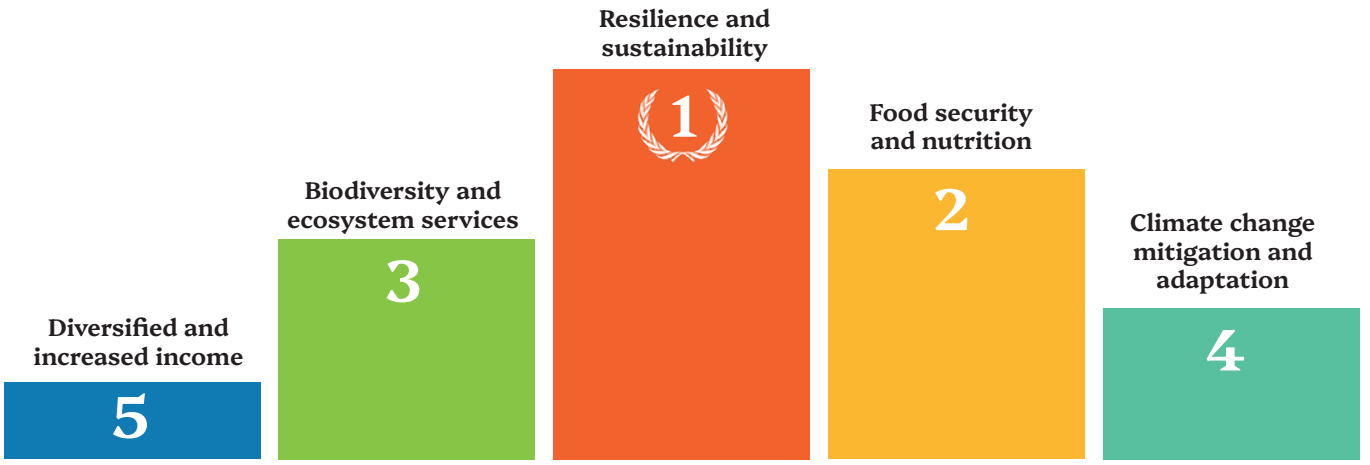
Highlights & Features

- The core of the **farm's agroforestry system is the cultivation of edible chestnuts and walnuts**, chosen for their high nutritional value, resilience, and potential for local food autonomy. By cultivating disease-resistant hybrids and embracing low-input harvesting, Etta and Jona **pioneer a regenerative model of agriculture** — one that points toward a future of self-sufficiency, ecological balance, and resilient local food systems.
- Etta and Jona actively promote biodiversity by inviting **as many species as possible** into their nut fields and gardens, including nitrogen-fixing plants such as alder and comfrey. This ecological diversity strengthens the soil, **supports mycorrhizal networks, increases plant resistance** to diseases, and enhances the overall resilience of the ecosystem.
- Since 2011, the farm has **developed a comprehensive water management system**, constructing ponds and swales to capture and store rainwater. These water bodies support irrigation, serve as **habitats for aquatic plants and animals**, and **create balanced ecosystems** while also offering natural swimming areas.
- The farm's landscape is carefully designed to **take advantage of natural terrain features**, creating distinct microclimate zones. Nut trees, fruit trees, and groundcover plants are strategically **combined to support soil health, control moisture**, and ensure **year-round productivity** within a compact, ecologically diverse system.

Year-round yields	✗
Seasonal harvests	✓
Gradual harvesting over an extended period	✓
Single large harvest at a specific time of year	✗
Harvest every year	✓

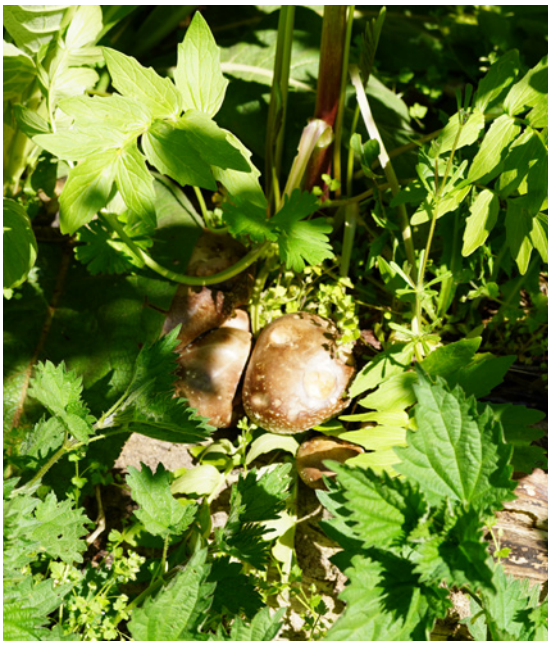
Products

- Fruit and berries
- Herbs
- Vegetables
- Nuts
- Shiitake mushrooms



Agroforestry benefits ranking

Photo Impressions



Ecological Benefits of Agroforestry Systems

Located in southern Sweden near the Baltic Sea, **"Boat in the Forest"** lies in a mild coastal lowland with gentle slopes. Thanks to the proximity of the sea and the southern location, autumns are long and mild, providing ideal conditions for walnut cultivation, which has a long tradition in the region. The area's compacted, nutrient-poor soils are gradually regenerated through agroforestry practices, supporting a resilient and diverse ecosystem.

Soil

- **Nitrogen-fixing species** such as white alder, broom, and common gorse, grown within the plant guilds, **enrich the soil** by naturally adding nitrogen and improving its structure.
- The use of organic mulch materials — wood chips, leaves, and other biomass — **increases humus content, supports microbial activity**, and **enhances moisture retention**.
- Deep-rooted trees like European chestnut and Greek walnut **draw minerals from deeper layers**, making them available to shallower-rooted plants within the guild, while comfrey acts as a dynamic **nutrient accumulator**.

Water

- Plant guilds help **maintain soil moisture** by creating shade, reducing evaporation, and improving soil structure.
- The farm features **water accumulation ponds at different elevations** that collect both surface runoff and rainwater from building roofs.
- Border plantings and windbreaks **minimize water loss caused by runoff and wind**, enhancing overall landscape resilience.

Microclimate

- Windbreaks, border plantings, and the strategic placement of buildings and vegetable gardens help create diverse microclimates within the farm, **providing shelter, reducing wind stress**, and **moderating temperature fluctuations** for plants and soil.
- Plant guilds and large trees on the borders enhance the microclimate by improving **shade, humidity,** and **airflow**, supporting both crop growth and ecological stability.
- The terrain's height differences and proximity to water create **natural variations in moisture and temperature**, allowing **for tailored planting zones** and more resilient, productive agroforestry systems.

Pests

- **High species diversity** within the farm reduces the risk of pest and disease outbreaks **by interrupting pest cycles and limiting host availability**, creating a more resilient ecosystem.
- The integration of **aromatic plants, herbs, and plant guilds** acts as a natural pest deterrent, minimizing the need for chemical interventions and **supporting balanced biological control**.

Pollinators

- Planting a **diverse mix of species** ensures continuous availability of flowers, **providing food and habitat** for pollinating insects throughout the growing season.
- Nitrogen-fixing plants and comfrey serve as effective **pollinator attractors**, **enhancing pollination rates** and supporting the overall productivity and resilience of the agroforestry system.

Biodiversity

- The farm **actively integrates species diversity** across all areas, including forest gardens, nut orchards, and plant guilds to support soil health and ecological interactions. **Species composition is purpose-driven**, with each site featuring plants suited to its specific function. The owners also **allow weeds and invasive species to grow**, viewing them as messengers and indicators that help maintain natural balance.
- Large areas are dedicated to **wildlife habitat**, complemented by **biochar production** and **prescribed burnings**, which enhance mycorrhizal networks, support generalist and forest-specialist species, and **increase overall connectivity and ecological stability** within the landscape.

SWOT Analysis

Strengths

- **Design and Biodiversity**
  The design is centered on plant groups, or guilds (guild-centered design), where plant combinations help each other survive and thrive. A tremendous diversity of species is cultivated.
- **Nature-Guided Approach**
  The system uses pre-existing wild plants (for example, common broom and common gorse) to support guilds, accelerating and facilitating the introduction of new plants.
- **Resilience and Resource Management**
  Water-retention ponds at various levels and windbreaks protect against drying out, improving the microclimate. Trees and shrubs provide wind protection and reduce desiccation.
- **Innovation and Philosophy**
  Creative solutions are implemented, such as "married wine" cultivation alongside walnut trees, shiitake mushroom cultivation for barter trade, and the use of human urine as fertilizer.
- **Income/Value**
  Value is derived from using the farm's harvest for personal needs and as a platform for lectures, art, and workshops.

Weaknesses

- **Soil and Moisture Challenges**
  Sandy soils and low natural water retention on the plateau limit water availability, requiring careful management to maintain plant health.
- **Limited Early Harvest**
  Large nut trees, such as Greek walnuts and European chestnuts, have not yet begun producing yields, delaying full productivity.
- **Knowledge-Intensive Management**
  The system relies on extensive experimentation and observation, demanding continuous attention, expertise, and hands-on involvement from the owners.

Threats

- **External Influence**
  Intensive conventional farming in nearby fields can impact the farm's ecological balance.
- **Risks from Wildlife**
  Initially forest animals may browse young plantings, potentially damaging newly established crops.
- **Economic and Social Instability**
  One of the motivations for seeking independent food systems on this farm is global risks of partial or complete collapse of food chains.

Opportunities

- **Soil Improvement**
  Planting humus dams (sunken compost wells) can store water and enrich nearby guilds, improving overall soil health and water availability.
- **Expansion and Development**
  Degraded fields offer opportunities to expand the nut orchard, increasing production and ecological diversity.
- **Genetic Selection**
  Developing diverse nut tree hybrids can produce productive, healthy, and cold-hardy varieties adapted to northern conditions.
- **Educational Platform**
  The farm can serve as a seed source and learning site, offering courses, workshops, and hands-on demonstrations.

Impressions of the Farm

"A great new landscape has been created, guided by nature and the terrain. It is still very young, but I see hints at future shapes, like a butterfly in a cocoon. I love how old stumps and timber are integrated into the newly planted garden. As they say, it is a place where art and science merge in life."

-Katarina

"A lovely example by Etta and Jonas, this southern Swedish homestead spreads across 4 hectares. Buildings made from natural and locally available materials blend seamlessly into the landscape. Simple, inviting recreational areas are scattered throughout. It is a wonderful example of a well-managed permaculture farm."

-Māris

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The project aims to **promote nature-based farming practices, integrate agroforestry principles into land use planning, and share knowledge on sustainable land management.** The project is implemented by the Latvian Permaculture Association (Latvijas Permakultūras biedrība, Latvia) in cooperation with Agroforestry Sverige and (Sweden) and Forest projects (Meža projekti, Latvia)

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This booklet presents the outcomes of the project UNHIDE AGROFORESTRY – Latvia–Sweden Agroforestry Knowledge Exchange, highlighting practical examples of agroforestry implementation in both countries. It features eight demonstration farms that represent diverse landscape types, management approaches, and levels of integration between trees, crops, and livestock.

Through detailed case studies and SWOT analyses, the publication illustrates how agroforestry can enhance ecological resilience, improve soil health, increase biodiversity, and provide sustainable economic returns. The experiences shared by farmers and researchers demonstrate the potential of tree-based systems to address the challenges of modern agriculture while maintaining productive and multifunctional landscapes.

This material serves as a resource for land managers, policymakers, and anyone interested in applying agroforestry principles in Northern Europe's temperate climate.

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biedriba Meža projekti

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