The best soil

PÖTTINGER

For optimising your yield

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For optimising your yield

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The best soil

Climate change means farmers have to face ever-increasing challenges. Rising temperatures are having a major impact on our climate, and periods of extreme drought and heavy rainfall events are occurring more frequently. In addition to breeding plants that are more climate resilient, soil cultivation and agricultural technology also need to adapt. The most important goal is to provide fertile soil that can ensure consistent yields over the long term. That is where PÖTTINGER comes in to support you with an extensive range of products.

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Focus on soil

What is the best soil?

At PÖTTINGER, the best soil covers every aspect, from tillage and seedbed preparation to crop emergence and the best working results. It is a lot more than first meets the eye. Because the best soil literally does not exist, we need to make the best of what we have. To do this, we need to know, understand and appreciate our soil.

What do we need the best floor for?

This is defined by each farm's objectives and is as varied as agriculture in general. PÖTTINGER supports you with an extensive product range to achieve the best results with your soil.

In addition to the objectives of each farm, there are also global objectives that need to be taken into consideration.

In 2015, the United Nations ratified the Agenda for Sustainable Development. It contains 17 Sustainable Development Goals (SDGs), which, in addition to ending poverty and creating equal opportunities, also define the goal of ending hunger, as well as measures for climate protection, sustainable production and the preservation of biodiversity.

Agriculture can contribute in all of these areas by conserving resources in the production of high-quality food and animal feed while using sustainable raw materials. To achieve this and secure yields over the long term, it is important to maintain and improve soil fertility. Increasingly extreme and more frequent weather events are a particular challenge for agricultural crop production. That is why the stability of crop yields based on functional and fertile soil is becoming increasingly important. This means that good returns can be generated even in comparatively poor years, and total crop failure can be avoided.

In addition to stable yields that maintain farmers' revenues, the focus is also on the sustainable use of available resources. Careful usage of resources and process steps that are matched to the crop, the companion flora and the on-site soil conditions bring benefits in terms of cost effectiveness, and they have a positive impact on the environment.

Focus on soil

What is soil?

What is soil?

Soil is the uppermost loose layer of the Earth's surface where the atmosphere, water, and organisms in the soil intermingle and influence each other.

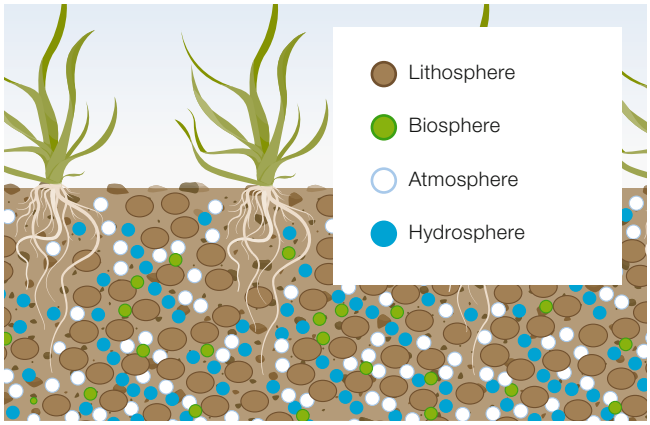
The soil is formed from the parent rock as a result of the influences of climate, elevation, water, vegetation, animals, and humans. Over millions of years, soil-forming processes have created different layers in varying states of development. It takes around 1000 years to create a 10 cm thick layer of topsoil.[1]

Soil textures

The soil texture indicates the composition of the individual particle sizes. A distinction is made between three particle sizes in soil: clay (< 0.002 mm), silt (0.002 mm - 0.063 mm) and sand (0.062 mm – 2 mm). With a little practice, it is possible to determine the texture of the soil by taking a finger sample in the field. In Austria, soil textures are graded according to the clay content in the soil (light soil < 15 %, medium soil 15 – 25 %, heavy soil > 25 %).[2]

Soil types

In comparison to the soil texture, the soil type describes the characteristic layers of the soil surface and the degree of weathering of the soil. Soils have different characteristics that need to be taken into account during planting and plant protection. Examples of soil types are brown earth, rendsina, loam, stagnosol and black soil.



Soil phases

The soil can be divided up into four phases: minerals, air, water, and organisms. Due to its composition, it can develop like an organism, can grow and thrive, but can also degrade due to erosion and acidification.[3]

Lithosphere (mineral phase)

The lithosphere makes up 45 % of the total volume of the soil and accounts for the mineral content. It is created from the weathering of the parent rock, which results in the presence of different minerals and elements.[4] The smaller the particle size, the better water and nutrients can bind to it. Sand promotes the exchange of gases, while clay is particularly good at binding nutrients and water.

Biosphere (organism phase)

The organic solid matter of the soil is made up of animate and inanimate components. It accounts for just 7 % of the soil. The animate part is the soil life, which consists of soil fauna (animals) and soil flora (plants, bacteria, fungi, algae, etc.).[4] Soil life is essential for the health and fertility of our soils. It helps to break down organic matter and recycle nutrients.

The inanimate part of the biosphere is known as humus, which is divided into nutrient humus and permanent humus. The main difference between the two lies in the conversion rate of the substances and the retention time in the soil.

Atmosphere (air phase)

Air accounts for around 25 % of the soil content and is described as atmosphere. The proportion depends, among other things, on the soil texture and the pore volume. Air is essential for many processes taking place in the soil and for soil organisms, which can only live to a limited extent in anaerobic conditions without oxygen. Subsequently, a high proportion of coarse pores and the resulting high proportion of air are responsible for rapid water absorption.

Hydrosphere (water phase)

The hydrosphere describes the water in the soil, which makes up around 23 % of the total volume and comes mainly from precipitation. Depending on the soil texture and pore volume, the water remains in the soil, seeps away or rises. Adhesion to the soil particles and capillary lift are the two most important control mechanisms for this.[4]

Understanding the soil

To get the best out of your soil, you need to know about its composition. A spade sample is a quick and easy way to assess soil moisture, odour, colour and structure. It provides information about the extent to which it can be driven over, the air and water balance, its structural stability, pore volume, and compaction. In addition to the spade sample, the finger sample can be used to determine the soil texture. Using a pH meter, take a reading from the spade sample at a depth of approx. 15 cm to determine the pH value. The hydrochloric acid test can also be used to check whether free lime is present in the soil.

Focus on soil

Soil fertility

Soil fertility

Soil fertility is a combination of the various properties of the soil. Soil fertility describes the suitability of the soil in a particular location for growing plants to produce the highest yield. It is made up of the various observations concerning the way the soil affects plants and is measured by the yield and quality of the harvest, and the extent to which they fluctuate.[7]

Physical properties

The physical properties are characterised by the soil structure and can be determined using a spade sample. The particle size distribution strongly influences the water retention capacity and the tendency for erosion. The aim of cultivation should be to maintain and stabilise the soil structure. Site-specific tillage and crop care can support the soil in this process. Plant roots also have an important role to play, as they directly influence other factors such as the nutrient balance and microbial activity. Species-rich cover crop mixtures in particular can offer great potential for improvement here.

Biological properties

The biological properties involve organic material activity and the presence of soil life. Microorganisms and earthworms are regarded as indicators of biological activity. Soil life helps to transform large quantities of organic material and contributes to forming the soil structure. Due to its transformation rate, it is also a key factor for soil rejuvenation and hygienisation of the soil with regard to pathogens.

Chemical properties

The chemical properties are primarily determined by the pH value and the type of rock on which the soil is based. Fertilisation and liming as well as a varied crop rotation can help to maintain soil fertility and the balance of chemical properties.

Focus on soil

Soil fertility

The five pillars of soil fertility

There are certain soil properties that provide an indication of the fertility of the soil. They provide information on whether the soil is allowed to develop undisturbed, or if measures need to be taken to improve its fertility. These properties are mainly influenced by the natural site-specific conditions, such as the climate and the source rock. However, agricultural activity can also cause changes. Everything that happens to the soil has a strong influence on everything else. If one parameter changes, this also affects the others.[8]

Pore volume

The pore volume of the soil describes the free space of the soil structure and is influenced by the soil composition and the soil texture. A distinction is made between coarse, medium and fine pores.

Coarse pores (10 µm – 50 µm) are particularly important for the rapid seeping of water and the oxygenation of the soil. They cannot hold water in the long term.

Medium pores (2 µm – 10 µm) are most important for plant growth and are decisive for the usable field capacity. Its diameter is small enough to hold water in the soil in the long term and large enough to release it back to the plants. The usable field capacity therefore describes the proportion water in the soil that is available for the plants and can be improved as the humus content increases.

Fine pores have a size of less than 2 µm. In fine pores the water is so strongly bound by adhesive forces that plants can no longer extract it. This is referred to as dead water.

Humus

Humus is the inanimate part of the biosphere, which is divided into nutrient humus and permanent humus. The main difference between the two lies in the conversion rate of the substances and the retention time in the soil.

Nutrient humus (a product of dead organic matter) is quickly converted and therefore only remains in the soil for a short time. Harvest residues, slurry, muck, and green fertilisers can be used to enhance the humus. These materials are easily degradable and provide nutrition for soil organisms and plants.

By contrast, permanent humus (formed from humic substances) consists of highly metabolised substances and is difficult to decompose.[5]

Humus content plays a particularly important role in soil fertility due to its various functions, such as the storage of nutrients, the creation of soil structure, and the way it retains water.

Plant roots in the soil

The extent to which plant roots can access the soil depends on how deep the soil is, and on the structure of the soil. If the soil has been physically compacted, the plant roots will not be able to access the soil below the compaction. This can severely restrict the availability of nutrients. What is more, incompatible pH values or poorly incorporated organic residues can also restrict root development and prevent plant roots from accessing the soil. Especially high levels of organic matter that have insufficient oxygen to decompose can also become a problem here.

CEC

Cation exchange capacity (CEC) describes the number of cations that can be exchanged, which is strongly dependent on the pH value of the soil. It indicates how many nutrients can bind with the soil. This helps to compare soils and provides information on fertility and the nutrients available for plants.

The more binding possibilities that are available on the negatively charged clay-humus complex for positively charged elements such as calcium, magnesium, potassium, sodium, and compounds such as ammonium, the greater the CEC. Because clay soils contain more clay-humus complexes, they are richer in nutrients compared to sandy soils.

The nutrients in the soil are always in flux. If they are washed out or consumed by plants without sufficient replenishment, they are replaced by hydrogen ions (H^+) to maintain the charge balance. This leads to acidification and a change in nutrient ratio in the soil.

Both the quantity and the ratio of ions present in the soil are decisive for soil fertility.

pH values and buffer solutions

The pH value reflects the acidic or alkaline character of the soil via the H^+ion concentration. Plants tend to grow better in slightly acidic pH ranges. As mentioned above, the pH value influences the CEC. This means that, depending on the pH value, different substances go into solution to make themselves available to the plant. These pH value ranges are known as buffer solutions.

In practice, it means that aluminium can be released if the pH value drops too low. In the optimum pH value range for arable soil (5.5 – 6.5), calcium goes into solution. Calcium plays an important role in soil fertility. It can buffer the pH value and ensure stable connections between clay minerals and organic soil matter. It gives the soil its elasticity and ensures consistent tilth formation.

Focus on soil

Maintaining soil fertility

Revitalising the soil

In Europe, we lose 2.46 tonnes of soil per hectare through erosion every year. Worldwide, it is estimated that 224 billion tons are lost. Fallow land is particularly at risk. The lack of vegetation makes the soil more susceptible to drying out and to erosion by wind and rain. Due to hydrophobicity, dry soils cannot absorb water during heavy rainfall events. Permanent vegetation or very short fallow phases enable the soil to retain more moisture in such circumstances. The leaves reduce evaporation and water is fed back into the soil as a result of dew formation. This makes the soil capable of absorbing water.

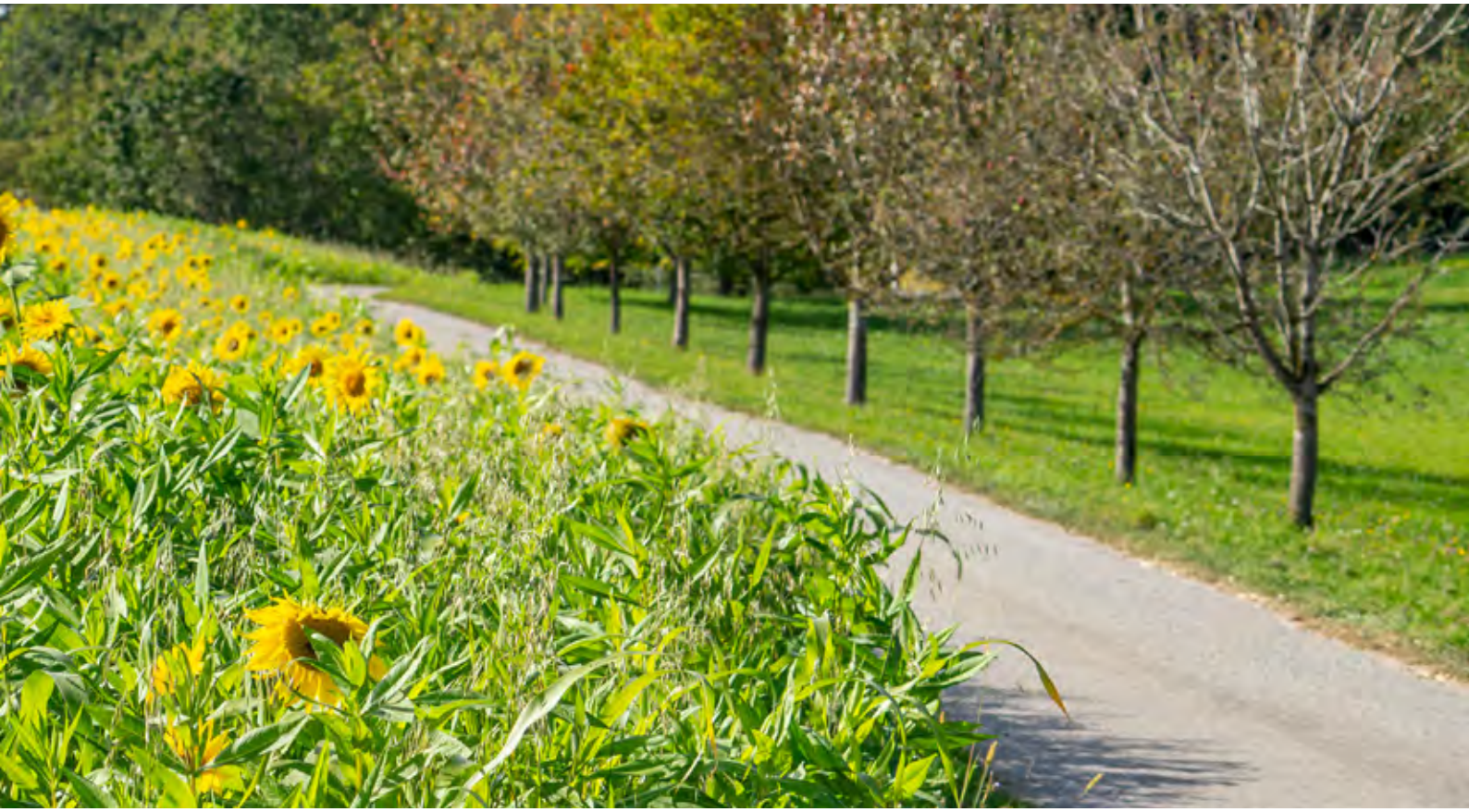
Another positive effect of evergreen systems is the promotion of soil life and, consequently, the formation of stable soil aggregates. Site-specific measures can also provide a solution to prevent or loosen up compaction. Some crops, such as field beans, sunflower seeds, and melioration radish, manage to break up compaction with their strong root growth and improve the fertility of the soil.[6]

If fallow periods are kept short, there are numerous advantages for crop production:

- Reducing unproductive water evaporation (evapotranspiration)
- Preventing the soil from overheating
- Promoting soil microorganisms
- Improving infiltration capacity
- Forming stable soil particles
- Providing food for earthworms

Earthworms as an indicator of fertile soils

The earthworms in the soil can convert up to 6 tonnes of organic matter per hectare every year. In order to provide them with sufficient food, it is an advantage to maintain plant cover all year round. Varied cover crop mixtures that also include deep-rooted plants are particularly favourable. This can break up compaction and expand the earthworm habitat.[6]



Because earthworms are very sensitive, they move to deeper layers, especially in winter and summer, to protect themselves from the heat or cold. This behaviour can be put to good use in order to make the soil more earthworm-friendly.

Ploughs and power harrows should only be used when necessary and should be avoided altogether during the active phases of the earthworm in spring and autumn. Shallow ploughing with the on-land plough is an advantage here.

It is essential to avoid compaction in deeper layers, because earthworms can only break these up very slowly. Even after 70 years, compacted layers are often still visible in soil profiles.

The best thing for earthworms is to minimise tillage and conserve the soil. Light and soil-friendly mechanisation that exerts less pressure on the ground and minimises compaction is also important. Moreover, processing steps should only be carried out on well-dried soil that is able to bear the weight of the machines.

Cover crops to improve the soil

Using cover crops or companion crops can help to keep the soil covered permanently and promote soil life.

Cover crops shorten or avoid fallow periods and have a number of positive influences depending on their composition. The roots of the plants promote the formation of soil particles, and plant root exudates are a source of food for soil life. Wilted organic material contributes to the nutrition of earthworms and the formation of humus. If legumes are included in the cover crop mixture, they store nitrogen in the soil. Sowing a cover crop quickly, especially after a crop that has been harvested early in the season, helps to reduce the soil temperature over the summer months and reduce dehydration.

Companion crops have a similar effect. In this situation, the faster growth of the companion crop can bridge the time until row integration and prevent erosion. In addition, when oil seed rape is used as a companion crop, for example, it acts as a decoy plant to reduce flea beetle damage to the primary crop.

Focus on soil

Maintaining soil fertility

What the plants need from the soil

If all the plants in a crop are to develop evenly, they all need the same starting conditions. That is where the placement depth of the seed comes in. Seeds should not lie too deep or too shallow.

There are three factors that are key deciders on the emergence of our plants: temperature, moisture and oxygen. These parameters are determined primarily by the type of soil, the location and the weather.

In terms of farming, these three parameters are difficult to influence. One of the biggest influencing factors is the pore volume of the soil. A loose, crumbly tilth structure with many medium-sized pores can absorb water better and ensure the exchange of gases. It can also warm up evenly and quickly, creating optimum germination conditions. A disease-free environment is also important, which is achieved through a varied crop rotation, sufficient fallow periods, and a rapid conversion rate of organic matter.

Preparing a bed for the seed

The seedbed needs to provide the seed material with the best conditions for rapid germination and even development. The most important properties are a stable structure that can absorb precipitation and prevent ponding. At the same time, it has to protect the water from evaporation and supply the seedling with sufficient capillary water.

The profile of an optimum seedbed could look like this: coarser clods on the surface that protect against drying out and crusting and can slow down the effects of wind and rain. This tapers into finer particles, which provide the capillary lift to supply the seed with water and nutrients. It is also important to ensure the seed is well covered following sufficient consolidation so that the supply of soil water is made available as soon as possible.

Plant nutrition

Most of the substances that the plant needs are provided by the reserves in the soil. However, the soil reserves can be limited, especially in terms of the nutrition provided by nitrogen, phosphorus and potassium. That is why these substances need to be replenished by fertilisation. Another factor is that these substances are not emitted endlessly by the source rock in the soil. Nutrients such as nitrogen can also be washed out or shifted to deeper layers where they are no longer available to the plants. Phosphorus, on the other hand, is a soil-immobile substance. It is released during a process called chemical weathering that makes it available to the plants and their roots.

Nutrients in the soil continue to decline as a result of decades of cultivation. That is why it is a good idea to analyse the composition of the soil at regular intervals and get an idea of the supply levels in the soil, and take the necessary measures.

Yields and soil fertility can be improved by implementing a varied crop rotation, planting mixed crops, and applying fertilisers and micro-granules at the time of drilling.

Crop rotation

Crop rotation plays an important role in soil health and fertility. Crops that improve the quality of the humus are alternated with crops that deplete the humus, and there is an alternation between summer and winter crops or leaf and stalk crops. On top of that, the effects of the previous crop and plant disease management also need to be taken into consideration when choosing crop rotation plants. Many harmful pathogens have a similar host plant cycle and can thrive in one-sided crop rotations.

Furthermore, there needs to be sufficient breaks in planting between each crop. Cover crops play a decisive role here, because they can have a healing effect when mixed correctly. On the other hand, they can also cause problems if, for example, mustard plants are grown as a crop in crop rotation and as a component of a cover crop mixture. A varied crop rotation offers a great deal of potential for keeping the soil healthy and optimising yields.

Focus on soil

Short-term measures to improve soil fertility

Improving root development

The development of plant roots can be improved both in the topsoil and in deeper layers. Mechanical tillage can be used to loosen the soil to tilth depth. In order to improve deep rooting, furrow bases and compacted layers of soil need to be broken up. In the long term, this is done by improving soil structure and nutrient performance with mechanical tillage and applying lime, and by promoting soil life with cover crops and crops featuring plants with deep roots.

- Mechanical loosening and breaking up compacted soil

Regulating the water balance

Depending on the moisture content of the soil and the expected amount of precipitation, water either needs to be retained in the soil, or sufficient drying ensured, in order to provide the right soil moisture for subsequent cultivation. The decisive factor here is the depth of the tillage process. That said, maintaining a layer of mulch and planting cover crops can also regulate the water balance without the use of tillage.

- Preventing evaporation by interrupting capillary action
- Preventing evaporation by using shallow tillage to interrupt capillaries
- Promoting evaporation by loosening the soil during tillage
- Regulating the water balance and temperature by planting cover crops

Regulating the air balance

Oxygen is essential for the balance of nutrients, and their mineralisation The targeted application of fertilisers in deeper layers can delay mineralisation by reducing the oxygen supply, while increasing the oxygen content through tillage promotes rapid conversion and mineralisation.

- Promoting mineralisation as a result of supplying oxygen by breaking up compacted soil structures
- Delaying mineralisation as a result of limiting oxygen by consolidating the surface and soil structure

The best soil

Incorporation of organic material

- Even distribution of harvest residues to stimulate conversion processes by soil organisms
- Reduction of outgassing through timely and shallow incorporation of farm fertiliser for improved efficiency

Weed control

Every plant competes for nutrients, water and light in the field in order to produce good yields. The higher the density of weeds, the more they cut of the supply and suppress the development of the crop.

- Stimulating weed germination by creating a stale seedbed with shallow cultivation and rolling
- Preventing weed germination by burying the weed seeds during tillage
- Inhibiting root growth by cutting through shallow to deep roots

Creating a seedbed for crop plants

The seedbed needs to be matched to the crop and the location. A rule of thumb is that the seedbed needs to be as fine as necessary and as coarse as possible. A seedbed that is too fine is prone to ponding or erosion. If some coarser clods remain in the seedbed, they have a positive effect on the microclimate and can protect against erosion and drying out.

- Promoting rapid germination by encouraging capillary action and supplying soil water
- Creating the same conditions across the whole field to enable even emergence

Crop care

In addition to keeping the soil free of weeds, the tillage tools on crop care machines also break up the upper soil crust.

- Preventing germination and growth by covering, uprooting, and ridging
- Improving gas exchange between the soil and the ambient atmosphere

Focus on soil

Long-term measures to improve soil fertility

Getting an overview

There are many parameters that influence soil fertility. To find out how the soil fertility on your own farm is doing, it is a good idea to get an overview of the most important values. The simplest way of doing this is to take a spade sample. Using a spade sample, it is possible to categorise soil water, soil air, microbial processes and the soil structure. At the same time, the pH value and the free lime content can be determined using a pH meter and hydrochloric acid. This provides an initial overview, while a more in-depth picture can be obtained with soil analysis. Soil analysis provides information about the nutrient supply in the soil.

Bringing nutrients into balance

The parent rock of the soil strongly influences the nutrient balance. More information about the nutrient supply in the soil can be provided by a soil analysis. If deficiencies or surpluses are detected, these need to be balanced out. The calcium-to-magnesium ratio at the soil particle ion exchange has a particularly strong influence on soil stability. While magnesium makes the soil firmer and leads to a layered structure, calcium forms soil into stable particles that make the soil elastic. In addition to site-specific fertiliser application, care should also be taken to retain the nutrients in the soil so they are available for the next crop. Planting cover crops or companion crops ensures that nutrients are not depleted, makes them available for the following crop and helps to build up humus in the long term.

Improving soil structure

Compaction or dense soil layers prevent plant roots from growing, restrict the activity of soil life and disrupt water infiltration. Tillage can provide a short-term answer by breaking up compaction. In the long term, it is important to improve the soil structure and maintain a stable soil consistency by promoting soil life using varied crop rotations, species-rich cover crop mixtures and regular liming.

An extensive root system consisting of a wide variety of species promotes soil life and the development of living organisms right down to the deeper layers of the soil. This means that nutrients can also be used more efficiently. A varied crop rotation, in which deep-rooted and shallow-rooted crops alternate, and uninterrupted soil cover by planting cover crops between the main crops, ensures long-term improvement of root growth at crumb depth.

Building up humus

Humus is one of the biggest parameters affecting soil fertility. Building up humus over the long term directly promotes soil fertility. The humus content of the soil is limited and depends on the geographical location and the soil conditions. For example, clayey soils can have higher humus contents than sandy soils. Humus is a nutrient for our plants, improves the structure of the soil and increases its water absorption capacity. Humus is built up using varied crop rotation that returns nutrients to the soil and constantly feeds the microorganisms in the soil. These use the humus as a source of energy and become part of the humus themselves when they die.

Microorganisms are promoted by species-rich plant combinations in the field, where the diversity of microorganisms is in direct proportion to the diversity of species above ground. Organic fertilisers and reduced tillage can also have a beneficial effect on the build-up of humus.

Primary tillage processes

From the plough furrow to min-till

The methods of primary tillage are as varied as our soils.

Primary tillage lays the foundation for successful sowing. It aims to loosen the soil, incorporate organic matter and make nutrients available. Furthermore, primary tillage helps to reduce harmful organisms and accompanying weeds.

Irregular precipitation and extended dry periods in particular make water a challenge. If the soil dries out, its ability to absorb water becomes limited to the extent that water cannot be absorbed even when it rains. This leads to increased erosion. To get the best out of the soil, it is a good idea to match the type of tillage to the specific field and the current weather conditions. Conservation tillage that only moves the upper layer of soil while preserving most of the soil structure below can provide a decisive advantage during periods with challenging weather conditions and on difficult land.

Primary tillage processes

Conventional tillage

Designed for success

Primary tillage lays the foundation in agronomic terms for the subsequent crop, which is why it has a decisive influence on the growth of the plants. To develop properly, these require an optimum supply of water and nutrients.

During this process, the plough loosens the soil over the full depth of the tilth and eliminates any compaction in the topsoil. As the soil passes the mouldboard, the furrow ridge breaks along its natural structure. Depending on the texture of the soil and its condition, the plough is set up to create a tilth that encourages downward root penetration and growth.

In loosened soils, the size distribution and volume of the pores also change. The higher proportion of large pores leads to faster warming of the soil due to the larger air content, and water can infiltrate faster.

A good start

Primary tillage using a plough does more than loosen the soil for the next crop. The plough furrow creates a “clean slate”, bringing additional agronomic advantages that directly affect subsequent passes and crop development.

The plough turns the soil over so that there are no harvest and plant residues at seed slot level, because these are reliably incorporated by the plough. Seed emergence is enabled, and the seed drill has an easier time doing its job.

In addition, the threat of weeds is reduced because weeds and their seeds are ploughed in and completely covered well below the surface. Especially in organic farming, the plough is still the tillage method of choice for a pre-emptive and active reduction of weeds, where weeds have become resistant and on problem sites.

For a healthy crop

Surface plant material and crop residues often result in increased phytosanitary risks for the next field crops. The organic material can harbour various diseases that go on to survive until the next round of infection.

The proven mouldboards from PÖTTINGER, together with an extensive range of skimmer tools, ensure that organic matter is incorporated without leaving any residues on the surface. Consequently, this reduces the risk of wheat becoming infected by fungal diseases such as fusarium ear blight (fusarium graminearum) or tan spot (drechslera tritici-repentis), and leads to a healthier and more resilient crop that requires less plant protection measures.

In addition, clean and tidy incorporation of organic residues also facilitates the control of animal pests. It can suppress the spread and reproduction of the European corn borer, for example.

The advantages of ploughing

- Breaking up compaction
- Loosening to tilth depth
- Drying faster
- Making the most of frost heave
- Promoting mineralisation
- Incorporating harvest residues reliably
- Incorporating fertilisers
- Positive phytosanitary effects
- Controlling resistant problem weeds
- Easier work for the next process
- Cost savings in plant protection

Primary tillage processes

Conservation tillage

Largely intact

Conservation arable farming completely dispenses with deep tillage that turns the soil over, i.e. the plough. Conservation tillage originated in the USA and Canada to prevent soil erosion. The aim is to keep straw and harvest residues on the soil surface as much as possible. The topsoil is then only loosened and not turned.

A distinction is made according to the tillage depth and the proportion of the surface that is moved. In the 1970s, the concept of strip till was developed, in which only the band along the seed slot is cultivated, combining the advantages of direct drilling and minimum soil disturbance.

Stubble cultivators and disc harrows are essential for conservation tillage. The relatively low power requirement compared to the plough enables higher working speeds and greater output.

Conservation tillage ensures that the harvest residues are incorporated and additional air is supplied. This improves the decomposition process because the microorganisms are stimulated. On top of that, the layer of mulch protects against erosion by dampening the force of raindrops. Because the lower layers are not moved, the natural structure is also preserved. Active soil life greatly increases the infiltration capacity of the soil.

Stubble cultivators or disc harrows make it possible to penetrate the topsoil and subsoil without leaving compaction at seed slot level, which means that soil life is less disturbed.

The best soil

Ensuring soil cover

Keeping the soil covered is essential for successful conservation tillage and subsequent mulch drilling. A layer of mulch formed by harvest residues or a cover crop has a positive effect on the water balance and soil organisms because it protects against evaporation and is a source of nutrients. In general, planting a cover crop offers the advantage of retaining sufficient organic matter in the field even during fallow periods.

The advantages of conservation tillage

- Encouraging soil life
- Preventing soil erosion
- Improving soil structure
- Increasing load-bearing capacity of the soil
- Reducing water losses
- Saving costs by reducing tillage work
- Increasing infiltration capacity

Primary tillage processes

Minimum tillage

Less is more

Ultra-shallow tillage is focused on a working depth of 2 cm to 3 cm, so only the seed slot level is cultivated. Healthy soil with a natural tilth structure and optimum pore distribution with no harmful compaction allows the crop to develop strong and deep roots. Shallow cultivation conserves the soil structure stabilised by plant roots and soil organisms in the deeper soil layers. It also causes less disturbance to soil life habitat, as there is much less deep movement of the soil.

Conserving soil water

With the help of shallow tillage and a crumbly soil surface, the capillary rise of water to the soil surface can be interrupted. This keeps the water in the soil and prevents unproductive water evaporation while the soil is ready to be planted. That is how moisture can be retained in the soil so that it is available to the plants.

In addition, ultra-shallow tillage minimises the volume of surface loosened soil that causes evaporation. This also saves valuable soil water.

Shallow tillage ensures that organic matter is distributed on the soil surface, because it is not incorporated into deeper layers. This ground cover protects the soil from direct sunlight, creates shade and conserves the soil water. At the same time, the organic material on the surface protects against soil erosion. Because the soil structure is preserved, it enables a good infiltration rate, even during heavy rainfall.

Arable hygiene is an increasing challenge

Arable farming is increasingly under pressure to find more and more alternative strategies to counteract resistance to pesticides and restrictions on plant protection products. Ultra-shallow tillage can offer advantages with regard to plant protection strategies for volunteer cereals and harmful grasses. By working at seed slot level, germination of the volunteers is encouraged and the seeds are not shifted to deeper layers, where they could fall into dormancy, as is the case with other processes.

Problem grasses and volunteer rape seed are not incorporated, even when working with strip-till, for example with the TERRASEM WAVE DISC. The film from the herbicide application remains on the unmoved strips, which means that the effect of soil herbicides lasts longer.

Delaying the sowing date also offers the opportunity to control black grass when it first emerges and to suppress a second wave to a large extent by minimising tillage.

The advantages of minimum tillage

- Increasing soil structure stability
- Erosion protection
- Reducing the use of plant protection agents
- Saving costs by reducing tillage work
- Saving costs by reducing fuel consumption
- High output with wider working widths

Tillage

Providing a solid foundation

Site-specific tillage is the key to sustainable soil fertility and high yields. It influences the soil structure, can have a positive effect on mineralisation and provides the foundation for seedbed preparation. The type of tillage is selected depending on the soil conditions, weed pressure, erosion potential and water supply.

PÖTTINGER offers a wide range of tillage machines. These innovative solutions can be optimally integrated into your operating concept.

Tillage

Ploughs – SERVO

Perfect results

To ensure the best ploughing pattern, PÖTTINGER offers the right mouldboards for all soil types and ploughing strategies. The different lengths and curvatures are available as solid or slatted mouldboards. Shallow as well as deep ploughing can be achieved with consistent quality to match your requirements. This creates a “clean slate”. This is the basis for a good start for the next crop.

Incorporating large quantities of straw and plant residues places special demands on a plough. The underbeam clearance and point-to-point spacing are selectable. Skimmers and trashboards provide additional assistance with this task. This creates the best conditions for subsequent work steps and has a positive phytosanitary effect. The risk of fungal disease from crop and stubble residues on the soil surface infecting subsequent crops is reduced.

“For me as an arable farmer and pig breeder, ploughing is still a priority, because I want to ensure there are no toxins in the forage. Especially after harvest maize, I believe that the straw should be ploughed in properly to avoid fusarium in the wheat.
That's why I decided to go for the SERVO 4000 P with hydraulic furrow width adjustment and the hydraulic depth wheel. I especially like the excellent surface finish to the soil, the strength of the plough, and how easy it is to adjust.”

Gerhard Neubauer
Thalheim bei Wels | Austria

Variable furrow width

Taking into consideration the conditions in the field in terms of the type of soil and its characteristics, it may be necessary to adjust the furrow width accordingly to achieve the ideal working results. Depending on the point-to-point spacing, different furrow widths can be achieved.

To achieve a consistent turnover of the furrow ridge, the furrow width needs be adapted when the furrow depth is changed, in order to ensure a constant ratio of ploughing depth to furrow width.

It is also possible to change the formation of the furrow ridge for agronomic reasons by changing the furrow width.

Up to the edge of the field

To achieve satisfactory and uniform working results, consistent depth control of the plough is needed using the depth control wheels. Depending on the requirements, a choice of proven pivot depth wheels, dual depth wheels and transport pivot wheels is available for hitch-mounted reversible ploughs.

Because they are mounted close to the plough beam, fenceline performance is improved. This means that plant residues and weeds can be reliably incorporated right up to the edge of the field. This is essential for grasses such as couch grass, which often spread from outside the field. Clean and tidy work from the first to the last furrow is ensured.

Drive outside the furrow

For more soil conservation by driving outside the furrow on unploughed land and for more convenience, the SERVO 4000 and the optional on-land equipment can be used with the tractor wheels in the furrow as normal, or on the unploughed land.

The on land system allows tractors with wide tyres and crawler tracks as well as steering systems to easily plough outside the furrow.

TRACTION CONTROL in the field

At the Austrian University of Natural Resources and Life Sciences (BOKU) in Vienna, the system has been tested in the field using a SERVO 45 S on medium-heavy soils. They investigated the influence on fuel consumption and on the wheel slip characteristics of the tractor at a working width of 2.60 m and a working depth of 25 cm.

The following positive influences with the active traction boost system were determined: The fuel consumption of 20.5 litres/ha was reduced by 2.1 litres/ha using the TRACTON CONTROL active traction boost system, which corresponds to a reduction of 10 %. The 1.5 % reduction in rear wheel slip led to an increase in output of 0.13 ha/h.

Tillage

Shallow cultivator – PLANO

Shallow to medium depth tillage

The design of the frame, tines, coulter tools and precise depth control across the entire working area combine perfectly to deliver full surface shallow tillage. The PLANO unites all these features while remaining compact.

The trailed shallow cultivator from PÖTTINGER ensures full surface movement, even at working depths as shallow as 3 cm. But shallow is not the only thing the PLANO can do. Working depths of up to 15 cm are possible too. The range of tasks it can perform is therefore wide, providing completely flexible operation all the year round.

The best soil

Compression spring tines

The outstanding advantage of these pre-tensioned tines is that they work in a straight line no matter what. They are configured in such a way that lateral movement is prevented, thanks also to the width of the clamped mounting brackets. As a result, the tines and shares always stay in position, and yet there are no blockages from plant residues. This characteristic enables precise, full surface movement during reliable shallow work.

By maintaining the set working depth, the full potential of ultra-shallow tillage can be utilised. In addition, the overlap is constant with duck foot shares to ensure complete movement of the soil surface across the full width of the machine.

Weeding tools

At the heart of every PLANO are the tines fitted with shares. The arrangement and properties of these tines greatly influence the tilling process and the working results.

The tine system can be equipped with DURASTAR PLUS duck foot shares or DURASTAR chisel points. The shape of the duck foot shares makes them ideal for shallow, full surface movement with a slicing action. The chisel points are particularly suitable for deeper tillage and intensive mixing, and they can also be used for shallow stubble cultivation.

Reliability

Regardless of whether distributing straw and harvest residues, levelling and crumbling the soil, or intensively chopping up organic material, it is the knife roller or the front board that takes the first step in the cultivation process to create ideal conditions for the following tines to slice and mix the soil. This expands the range of applications covered by the PLANO. Whether seedbed preparation, stubble cultivation or turning in a cover crop, you can react individually to the prevailing conditions. The integration of the front jockey wheels into the tine section makes for a compact design that allows additional tools to be mounted in front of the tine system.

Maximum versatility

The wide choice of equipment options makes the PLANO an extremely versatile tillage tool. The spectrum of applications ranges from seedbed preparation and stubble cultivation to deeper, soil loosening tillage down to a depth of 15 cm.

Tillage

Stubble cultivators – SYNKRO, TERRIA

Conservation tillage

The classic implement for conservation in soil preparation is the stubble cultivator. The incorporation of residue from the harvest increases the fertility of the soil by promoting decomposition and the formation of humus. SYNKRO stubble cultivators are available with two or three gangs, and are ideal for shallow stubble work as well as deeper tillage. With a wide choice of rear rollers, they create ideal germination conditions for weed seeds and volunteers for effective weed control, and the perfect seedbed for cover crops.

TERRIA trailed stubble cultivators cover a wide range of applications in tillage. You have the choice. From shallow stubble cultivation to deep loosening primary tillage. The perfectly configured tines leave an optimum working result for your soil, as the basis for a successful season.

“In spring, we have to take care of the water balance, and the SYNKRO allows us to work shallow enough to keep valuable water in the soil.

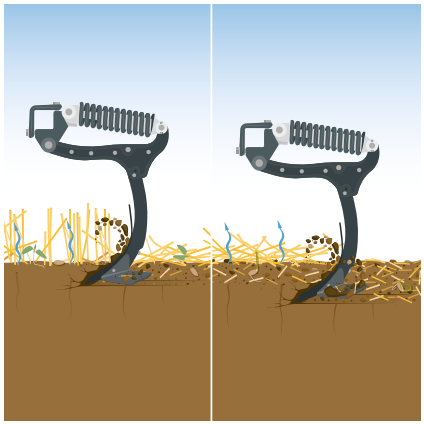
Erosion control is also an important issue, and the CONOROLL rear roller creates the best soil structure for preventing erosion when it rains.”

Katharina Huber
St. Margarethen | Austria

Proven tillage tools

PÖTTINGER stubble cultivators can be equipped with different shares depending on the task at hand. For intensive mixing work, the chisel points with a width of 80 mm are the tool of choice. Depending on the working depth, they can be combined with wing shares to deliver full surface movement. The points and shares can be provided with tungsten carbide protection as an option for reduced wear, depending on the soil type.

40 mm wide narrow points are recommended for deep loosening up to 35 cm deep to break up compaction without mixing the soil excessively.



Choice of settings

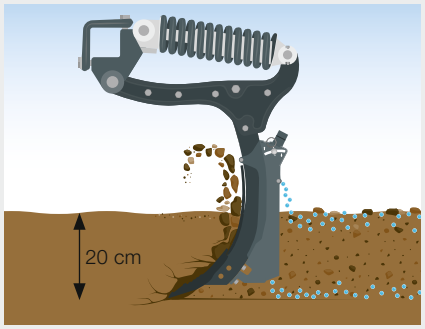
Regardless of whether they are used for shallow cultivation after harvesting, intensive incorporation or deep loosening, these proven adjustable tillage tools can be adapted to changing requirements in just a few steps.

Flat-mounted wings with a low cutting angle enable shallow cultivation. The less aggressive angle results in a level finish. To achieve a higher level of mixing effect, the wings are mounted in the steeper position.

The position of the leg can be adapted to match the specific task. You can adapt soil entry performance and cultivation intensity by altering the angle from shallow to deep.

Working without a rear roller

To promote gas exchange and to benefit from frost heave, leaving an open, unconsolidated soil in the autumn before winter dormancy can be a useful tillage strategy. Likewise, tillage without reconsolidation can promote drying when working arable meadows and cover crops. On the TERRIA, the rear roller can be removed for this purpose. The integrated chassis takes over depth guidance. In addition, loosening tines are mounted behind the chassis instead of the rear roller.



Conserves resources

In future, it will be necessary to deploy resources worldwide even more purpose-specifically and efficiently. That is why PÖTTINGER has teamed up the trailed TERRIA stubble cultivator with the AMICO F hopper for resource-saving work. The tillage and seed or fertiliser application steps can now be completed in a single pass. Different deposit depths for the fertiliser allow different levels of soil to be supplied as needed.

Tillage

Disc harrows – TERRADISC

The best soil movement

A uniform level finish with the best mixing performance meets farmer's and contractor's expectations in the field. To achieve this, PÖTTINGER has optimised the geometry, size, plus both mounting angle and soil entry angle of the discs. The result: low draft, perfect penetration, the best tilth and mixing effect, even in dry soil. The high tare weight of the TERRADISC also ensures the dependable performance of this disc harrow.

This makes TERRADISC disc harrows suitable for versatile use all year round. From seedbed preparation and shallow stubble cultivation in summer to sowing cover crops, spreading fertiliser and incorporating cover crops, the TERRADISC is up to any task.

Clever tillage tools

The TWIN ARM system features two solid forged carrier arms that are welded to a very wide clamping bracket. This ensures that the discs always retain their position and angle. Even in heavy, dry soil it is impossible for them to deviate to the side. Hard wheel marks are broken up reliably as a result.

Choose the scalloped or plain discs, both are rugged and made of special heat-treated steel with a diameter of 580 mm. The combined effect of an aggressive soil entry angle and optimised mounting angle ensures reliable performance in moving the whole surface, even at shallow working depths starting at 5 cm.

Indispensable equipment options

With the optional leading tillage tools such as the front board and the knife roller, your TERRADISC T gains additional flexibility. Regardless of whether preparing a seedbed, cultivating stubble or incorporating and chopping a cover crop and harvest residues, you can respond to the site-specific operating conditions.

In combination with the AMICO front hopper and the distribution system for the TERRADISC, fertiliser and seed material can be deposited during tillage. This saves on the number of passes and ensures efficient use.

Conserves the soil at the headland

At the headland, the trailed TERRADISC models are lifted and supported by the rear roller. In addition to saving precious time because there is no need to lower the transport chassis, the soil at the headland is conserved because the weight of the machine is distributed across the entire width of the rear roller.

Site-specific tillage

Used together with the Profiline comfort control system, the TERRADISC T enables site-specific control of the tillage depth. This brings direct cost benefits through fuel savings, and also reduces wear and increases productivity. In addition, unnecessary water losses can be avoided in order to create optimum growing conditions during seedbed preparation.

Tillage

Power harrows – LION

Optimum seedbed

The power harrow plays an important role in many arable farming scenarios. It actively tills the soil with its rotating tines to prepare the seedbed. What makes a perfect seedbed is an ideal proportion of fine soil at seed slot level to ensure capillary action. The soil is then consolidated by the rear roller.

Best quality tilth and excellent mixing of the soil to form a perfect seedbed are highlights of PÖTTINGER power harrows. Combined with a seed drill, this machine becomes a flexible and high output combination delivering perfect drilling results. PÖTTINGER offers a tailor-made solution featuring many equipment versions to cover all soil types and different sizes of farm.

The best soil

Intensive crumbling

The tines on the LION power harrow are especially shaped for intensive crumbling and mixing.

The tine carrier is completely integrated into the rotor beam to ensure a long service life.

- Active tillage, and no soil can flow above the rotors because of the small gap between the rotor and the rotor beam
- Harvest residues cannot wrap around the tine carriers
- Stones cannot become trapped

Neat work

Thanks to the configuration of the rotors, the machine actively cultivates the full working width from side board to side board. As a result, the soil is actively moved even along the outermost edge of the machine.

When used in combination with a coulter rail, all the seed coulters run on cultivated soil for consistent seed emergence.

The choice of 3.3 or 4 rotors per metre working width enables an optimum working pattern even with challenging soils.

Uniform seedbed

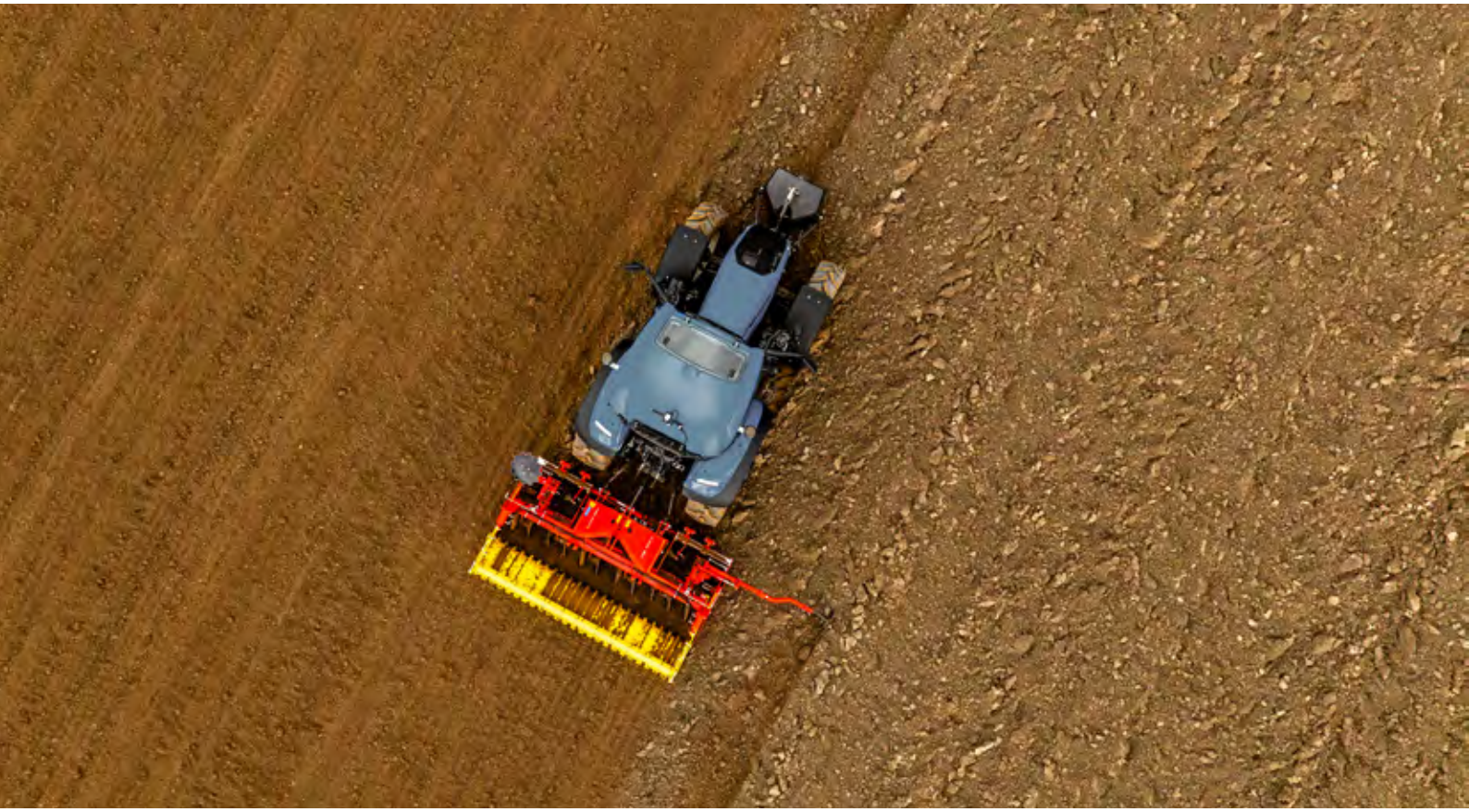
LION power harrows can be finely adjusted in several different ways. The levelling board and working depth can both be conveniently adjusted from the side. This makes it easier to fine-tune the settings in the field to get the best working results. As standard, the levelling board is adjusted in unison with the rear roller when the working depth is changed.

The best crumbling effect

- No stones can become trapped – the tine carrier is integrated into the casing
- Two tine positions: sweeping for intensive crumbling, aggressive for breaking up the soil from below
- A fine soil structure at seed slot level, a coarser structure on the surface to protect against erosion

Tillage

Compact combination – FOX



The FOX with many talents

The FOX compact combination is available with disc tools. With our compact combinations you benefit from low draft, fuel-saving seedbed preparation. Combined with a PÖTTINGER seed drill, this implement becomes a cost-effective seed drill combination. In combination with the flexible TEGOSEM hopper, the FOX becomes a high output cover crop combination.

This lightweight compact combination is ideal for use in light to medium soils with reasonable levels of harvest residues.

The best soil

Fuel-saving seedbed preparation

Our FOX D compact combinations enable smooth-running, fuel-saving seedbed preparation. Thanks to their compact and lightweight design, only a minimum power requirement is needed.

Perfect incorporation

The rubber-mounted discs ensure a consistent working depth and perfect mixing of the soil.

Blockage-free operation is ensured by the underframe clearance and the generous intergang spacing.

The passive tillage tools only mix the top layer to conserve the soil.

Breaking up incrustations on the soil surface mineralises nutrients, and improves oxygen and water absorption.

Compact design

The compact and lightweight design of the FOX D enables you to use it on its own with a working width of 3 metres with tractors starting at 75 hp.

Used in combination with an implement-mounted seed drill, efficient operation is possible starting at 90 hp. As a seedbed preparation specialist, the FOX D can also be used for incorporating cover crops or slurry.

FOX tillage tools

- 410 mm scalloped discs
- Mounted on maintenance-free rubber elements
- Designed for light to medium heavy soils

Drilling

Precision wins the yield

For a high-yield harvest, it is the quality of the drilling process that makes the difference. Coulter systems that work with precision to ensure optimum shaping of the seed slot lay the foundation for a successful harvest. The pressurised hopper system used by PÖTTINGER on pneumatic seed drills enables high application rates and, by partitioning the seed hopper, a second component can be applied at the same time. This is ideal for applying fertiliser or planting a companion crop, and provides the opportunity to maintain soil fertility during the drilling process.

With a choice of machine concepts, ranging from mechanical tractor-mounted and implement-mounted seed drills to pneumatic seed drill combinations and pneumatic universal seed drill technology, there is the right drilling technology for every application.

Drilling

Mechanical seed drill technology – VITASEM

Reliable drilling

Our VITASEM seed drills have been developed to provide an easy yet precise drilling process. The tried-and-tested technology is now combined with even easier operation. This is the signature feature of our mechanical seed drills.

Our VITASEM linkage-mounted and implement-mounted seed drills always work reliably, both in combination with our seedbed preparation machines and when used on their own. True to the tagline “Mechanical, practical, reliable”, our machines are ready to handle the site-specific conditions on any size of farm. This is reflected in the possible working widths of 2.5 to 4 m and also in the various seedbed preparation machines that can be teamed up with them. The proven, versatile coulter systems ensure a neat seed slot for perfect seed placement in almost all operating conditions.

The best soil

Always in combination

Our implement-mounted seed drills ride on top. Coupling up to FOX compact combinations or LION power harrows in their light, medium or heavy versions is done in minutes using a 4-point linkage on the rear roller. The optional hydraulic top link allows generous coulter lift via the centrally located pivot point on the rear roller.

Uniform seed germination

Uniform seed placement is of paramount importance for optimum crop management and ultimately a high-yield harvest.

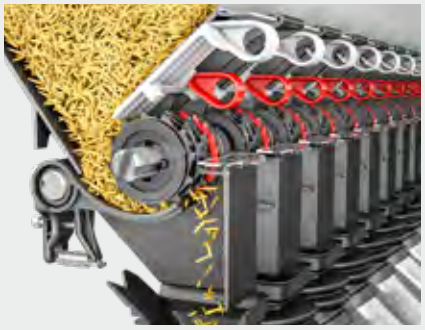
Thanks to the different coulter systems for a wide range of conditions, the PÖTTINGER coulter rails ensure a uniform placement depth and perfect seed emergence.

Homogeneous germination can result in uniform crop growth, enabling precise and effective application of pesticides. Crop that ripens evenly also contributes to improved harvesting performance.

Practical and reliable

The mechanical VITASEM seed drills enable a wide variety of crops to be sown thanks to the special multi-metering system. Special reducer inserts for seed mixtures and an agitator shaft ensure reliable drilling even if the seed mixtures have different sizes of seed.

This makes it possible to drill a variety of cover crop mixtures to promote soil life and, at the same time, minimise tillage.



Multi-metering system

- 2-shutter solution for fast changeover from fine to normal seed
- Choice of reducer inserts to increase the output of crops to be spread
- Achievable output rates of 0.7 kg to 400 kg

Drilling

Pneumatic seed drill – AEROSEM

More than just a machine

The unique AEROSEM seed drill concept from PÖTTINGER unites high output with versatility. Perfect placement of the seed is the most important factor. We enable this with our precision universal metering system, a distribution head, and robust coulters.

In addition to sowing cereals, this implement-mounted machine concept makes it possible to sow maize using precision seed drill technology with the PCS system.

The front hopper system also offers the capability of sowing a mixture of seed components together at the same time. This has also been adopted by our trailed seed drill combinations, which combine soil conservation and manoeuvrability.

“We chose a powerful yet simple seed drill with unique manoeuvrability. The low power requirement of the AEROSEM VT is impressive and is reflected in the much lower fuel consumption. The power harrow does a great job on our soil, which is often very heavy. The coulter rail ensures perfect seed placement and germination of the seed. The single shoot system offers us a huge advantage because the plants get a head start with fast growth.”

The Langhoff family
Stenderup | Syddanmark | Denmark

A seed hopper for multiple applications

The AEROSEM VT is equipped with pressurised hopper system. A two-section seed hopper enables two components to be carried and drilled in a single shoot The two components are first mixed together in the seed line to achieve a consistent ratio.

Implement-mounted seed drills with a PCS system also enable a second component to be added alongside the maize seed. This means that phosphorus fertiliser can be deposited next to the maize during drilling.

Proven seedbed preparation

Both the AEROSEM F seed drills for front hoppers and the trailed AEROSEM VT seed drill combinations rely on the proven LION power harrow. This actively cultivates the seedbed to create a finely crumbled tilth.

The implement-mounted seed drill can work together either with a power harrow or with a compact combination.

Optimum seed placement thanks to DUAL DISC

Our advanced coulter systems form the basis for perfect germination conditions.

A coulter offset of 30 cm ensures blockage-free sowing, even if there is a lot of organic matter.

The large DUAL DISC coulters cut right through surface trash with a coulter pressure of up to 60 kg. They form a neat and tidy seed slot even when mulch drilling in high volumes of harvest residues.

INTELLIGENT DISTRIBUTION SYSTEM

- Each outlet can be controlled individually
- Ingenious flap mechanism keeps the pressure constant even with multiple closed rows
- Distributor head inserts to reduce grain buffering with wider row spacing
- Reliable lateral distribution for perfect seed germination

Drilling

Pneumatic universal seed drill – TERRASEM

The all rounder for every situation

PÖTTINGER's TERRASEM universal seed drill technology combines tillage, consolidation and drilling in a single machine: the perfect combination of high output, excellent reliability and precision seed placement to meet your requirements. Thanks to the disc harrow equipped with plain discs, scalloped discs, or WAVE DISC discs as a front tool, the machine is ideal for mulch drilling. The CLASSIC version without tillage tools produces impressive results on prepared seedbeds.

These frame sections consisting of discs, packer, and coulter rail, are preloaded using hydraulic accumulators to ensure equal pressure distribution in any working position over the whole working width. The machine can adapt perfectly to undulations in the ground thanks to the pressure applied. The result: the best ground tracking, uniform tillage and seed placement across the entire working width.

“We have soils that vary a lot, from light to heavy. We sow most of the crops using min-till mulch drilling. That's why we decided to go for the TERRSEM V 4000 D. The strength of this machine lies in the X configuration of the disc harrow. As a result, there is absolutely no sideways pull and it cultivates the soil perfectly.”

Piotr Szymanski
Dobropole | Poland

Three zones for optimum mulch drilling

The TERRASEM has a 3-section design for perfect drilling.

This seed drill with passive seedbed preparation delivers an impressive performance with its precision universal metering and perfect coulter system to guarantee exact seed placement. The new configuration of the discs ensures that the machine works one hundred percent in a straight line. The disc harrow as well as the fertiliser coulters (FERTILIZER machine) and seed coulters are mounted in an X configuration. An additional central WAVE DISC in the rear section of the discs ensures full surface movement.

Minimum tillage

The WAVE DISC cultivates the soil in water-saving strips: only the region either side of the seed slot approx. 45 mm wide is worked. The rest of the surface remains untouched. The residual moisture in the bands in between helps the seed to germinate.

High volume tyre packer

The tyre packer is positioned between the disc harrow and the seed coulters. The packer supports the machine to conserve the soil during headland turns. Because the coulter rail is suspended by four linkages connecting it to the packer, optimum ground tracking of the coulter rail is achieved across the whole working width.

Optimum plant density

The proven coulter rail with DUAL DISC coulter system ensures an ideal plant density for your crop. The large double disc coulters with a diameter of 380 mm create a neat seed slot. With a row spacing of 12.5 cm, optimum plant development is ensured and weeds are largely suppressed. A spacing of 16.7 cm is available as an option, which is particularly suitable for regions with high precipitation for better surface drying.

Multiple sowing options

Single shoot, double shoot and double shoot-mix are the key to perfect emergence. To match your soil conditions and crop rotation, with the TERRASEM (Z) FERTILIZER models you can choose between drilling seed, seed with fertiliser or two different seed mixtures and additional components such as micro-granulate or a companion crop.

Mechanical crop care

Plant protection is evolving

For decades, increasing yields have been ensured by using chemical crop protection However, with increasing use, the resistance of harmful organisms also increases, meaning that the effectiveness of plant protection products is stagnating. And, fewer permits are being issued for plant protection products with new active ingredients.

PÖTTINGER accepts these challenges and now includes mechanical crop care machines in its product range for sustainable, crop-specific and site-specific plant protection.

Mechanical crop care

Crop care and soil health

Mechanical crop care in particular has seen some considerable development in recent years and offers more and more precision in controlling weeds and caring for crops. What the different methods have in common is moving the top layer of soil to break up the surface, cutting and uprooting weeds, or burying them.

As a result, crop care measures not only reduce weeds, but also break up the upper soil crust. They therefore have an effect on soil functions.

Breaking up encrusted soil

Breaking up and loosening incrustations improves the soil structure of the top soil layer. This leads to better aeration and improves the water absorption capacity of the soil.

The resulting loose soil promotes the growth of the crop and gives it a significant growth advantage over other plants.

The advantages of mechanical crop care

- Weed control
- Promoting tillering of the crop plant
- Breaking up encrusted soil
- Incorporating mineral fertilisers
- Also used for grassland aeration and pre-emergence

Mechanical crop care

Rotary hoe – ROTOCARE

A bonus for the soil

The ROTOCARE rotary hoe conserves the crop and is row-independent while delivering maximum output and low wear. In addition to its advantages in mechanical weed control, the machine is equipped for a wide range of other applications. For instance, breaking up the surface of the soil, incorporating fertiliser, planting a companion crop or applying micro-granules, and also for shallow stubble cultivation. Setting up is quick and straightforward.

In addition to effective weed control, mechanical crop care measures bring about other positive effects, such as breaking up heavily encrusted soils. This promotes quality tilth and thus improves the drainage capacity of the soil.

“During the first season, we already covered around 200 hectares. Among other things, manure from the barn and chicken sheds was incorporated. Before reseeding the pumpkin crop, we loosened the rain-hard soil. We really like the maintenance-free and simple operation of the machine. We definitely recommend the ROTOCARE, because its range of uses is much wider compared to a conventional tine harrow. Being able to drive at high speed means that it achieves a very high output.”

Thomas Hagenauer
Dobersberg im Waldviertel | Austria

The best working results

Optimum ground tracking is achieved because the rotary hoe stars have individual suspension. An 8.5 mm thick spring ensures that consistent pressure is applied to the ground. Each star has a maximum ground pressure of 20 kg.

The ROTOCARE rotary hoe operates consistently even in high volumes of organic matter and guarantees solid reliability thanks to the 105 mm offset position of the rotary hoe stars.

Multiple adaptation possibilities

The contact pressure of the spoon points is determined by the position of the tractor top link: the longer the top link is set, the higher the pressure applied. This enables excellent working results, even on heavily encrusted soil.

In addition, the depth control wheels are positioned close to the frame to ensure optimum tracking, even on bumpy ground.

The driving speed determines the aggressiveness of the process. The slower you drive, the more aggressive the effect and the greater the working depth.

Rotary hoe stars

The ROTOCARE rotary hoe stars consist of 16 low-wear spoon points that are 18 mm wide. The diameter of each hoe star is 540 mm. The individual stars are easily interchangeable thanks to a bolted connection.

The forged arms are mounted on precision-fit bushings to ensure that the star spacing of 89 mm is consistently maintained.

The option of locking individual rotary hoe stars in the parking position makes the ROTOCARE even more adapt at weeding in row crops and for conserving crops within the seed row.

Hoe star locking mechanism

- Preventive control of late weeds in maize and soya beans (precision planting) before crop closes the lanes
- Incorporation of fertilisers or sowing companion crops at later stages of development
- Adapting the working width to the planting scheme (tramlines, offset, etc.)

Mechanical crop care

FLEXCARE hoeing technology

The ultimate in precision

The PÖTTINGER FLEXCARE row crop cultivator makes crop care easy thanks to its precise depth control and a wide range of weeding tools. Ultimately, the FLEXCARE offers full flexibility and application-specific customisation for deployment in a variety of crops and is the perfect combination of precision, crop care, and efficient weed control.

The FLEXCARE row crop cultivator has been engineered to deliver maximum precision, weeding between plants and hoeing the soil. The hoe elements feature a modular construction and can be quickly and flexibly adjusted to the on-site conditions and type of crop. In addition to various share options, different following tools are also available.

To ensure the most effective process even in tough conditions, hydraulic adjustment of the ground pressure applied to all tools is available as an option.

“We have been using the FLEXCARE on our farm for two years to incorporate liquid fermentation residues and for controlling weeds early on. In 2023, we hoed 500 hectares of maize with the FLEXCARE. We particularly appreciate the flexibility of the hoe. The individual shares can be easily adjusted and removed. What's more, the camera system works very well, even in different crops, high levels of airborne dust, or if the sun is low on the horizon.”

Anica Hauptmann
PAE Marktfrucht GmbH | Putlitz | Germany

Equipment

The FLEXCARE row crop cultivator can handle row widths between 25 cm and 160 cm. The number of hoe elements can be freely selected depending on the machine type. Up to five tools can be mounted on each hoe element. All weeding tools are equipped with a spring hoe clamped to the adjustment rail.

The basic version of the FLEXCARE is already fully equipped for inter-row work. Fully equipped with plant protection discs, following tools and camera guidance, the FLEXCARE row crop cultivator delivers impressive precision and intra-row weeding ability.

Profiline comfort control system

With the Profiline comfort control system, the hoe elements can be lifted directly using certified ISOBUS control terminals. Each hoe element can be freely assigned to a button. For changing the row widths, multiple configurations can easily be saved in a user-friendly way and called up again at any time. The Profiline comfort control system divides the total working width into a maximum of 17 sections. With suitable GPS equipment, they can be controlled automatically using Section Control.

Camera steering

A 2D camera system is available as an option for the FLEXCARE row crop cultivator to keep the hoe elements precisely in line using an electro-hydraulically controlled shift frame. The rows of plants are reliably tracked using detection software. A second synchronised camera is also available as an option. This further increases the accuracy. The automatic camera-assisted shift system on the FLEXCARE features two bright LED floodlights as standard to ensure the work area is completely illuminated. Ultimately, they ensure precise control of the hoeing and weeding tools, even in low light conditions.

ROW CROP ASSIST

- The FLEXCARE row crop cultivator can be configured to match the existing tractor, row width and number of rows using ROW CROP ASSIST.
- In addition to the optimum machine width, the correct number and setting of the hoe elements (symmetrical, asymmetrical) are also displayed.

Mechanical crop care

TINECARE tine harrow

Precision tine harrow

The TINECARE V MASTER is a precision tine harrow with the highest clearance and optimum tine spacing. This makes it versatile for use in all arable crops, regardless of sowing method and process of conventional or soil conserving tillage adopted.

The decisive factor for the wide range of applications is the constant tine pressure over the entire arc of each tine unit, and across the full working width of the machine.

This is made possible on the TINECARE V MASTER from PÖTTINGER by a unique compression spring tine system. A linkage prevents pressure fluctuations so the tine pressure remains consistent at every angle of the tine arc, regardless of undulations in the ground.

How the tine harrow works

The objective of the tine harrow is to damage, uproot and overturn weeds in the early stages of growth. Soil incrustations can also be broken up to a certain extent to restore the essential exchange of water and gases. The TINECARE V MASTER precision tine harrow is designed to protect the crop from the planting stage through to the crop becoming well established.

For all arable crops

The tine harrow can be used for full-cover cultivation in cereals, row crops, and ridge crops. The basic configuration of six beams spaced at 360 mm with a tine spacing of 30 mm and high tine stability is fundamental to the success of the process. The maximum tine pressure of 6.5 kg and the wide angle at the end of the tines also make the TINECARE V MASTER ideal for caring for crops sown directly into mulch with higher soil consolidation as well as organic matter on the surface.

Optimised tines

The TINECARE V MASTER constant pressure tine harrow is equipped with durable spring steel tines with a diameter of 8 mm as standard. DURASTAR PLUS tines are available as an option to greatly increase the interval between tine changes and improve soil entry performance in particularly demanding conditions.

Both versions have an effective tine angle of 120° for optimum plant compatibility and suitability for processing mulch-drilled crops. Thanks to the diagonal tine length of 600 mm, it is possible to harrow right along the plants without damaging them.

Jockey wheels

The height and lateral position of the four front jockey wheels can be adjusted as standard. As a result they can make a significant contribution to ground tracking. When used in row crops, they are always positioned between the rows of plants. The double-sided wheel mounting features an impressively narrow design for working in ridge crops and between narrow rows of plants. In combination with the optional steerable rear wheels, they ensure the best ground tracking even in hilly terrain.

The large 18.5x8.5-8 tyres on the jockey wheels are available with grooved or lug tread pattern. They run smoothly and reduce the pressure applied to the soil.

Robust frame construction

The 120 mm x 180 mm frame, which is positioned with a favourable centre of gravity above the tines, ensures balanced weight distribution across the full working width. This ensures smooth operation even at higher operating speeds. A maximum ground clearance of 450 mm ensures trouble-free operation in well-developed crops.

Track harrow

An additional track harrow is available as an option to be mounted behind the rear jockey wheels. This uproots weeds that have been pressed into the soil to prevent them from growing back.

Optimum ground tracking

Thanks to the adjustable tine pressure, the tine harrow always works reliably even in varying conditions. If the operating conditions change, the tine pressure can be adjusted hydraulically while driving.

More arable products

In a single pass

Efficient and combined work is becoming more and more important due to increasingly shorter time frames for getting out into the field. While making it easier to stay on schedule for planting cover crops after harvest, it also has a number of agronomic advantages. By establishing ground cover rapidly and extensively, unproductive water evaporation is prevented. Likewise, excess nitrogen in the soil is absorbed by the plants and retained on site. Improving and stabilising the soil structure with organisms increases water infiltration while reducing the risk of erosion.

With additional arable products from PÖTTINGER, you can carry out several process steps in a single pass. This saves you valuable time, resources and consumables. The AMICO front hopper and the flexible TEGOSEM hopper offer you a wide range of options for applying additional components during tillage or sowing.

More arable products

AMICO F hopper

The AMICO F hopper enables a wide range of applications. Up to 2400 litre capacity and two metering units offer full flexibility and high output. Combined with various tillage machines, two work steps can be combined to save precious time.

TERRIA

Teamed up with the TERRIA cultivator, the AMICO F hopper enables resource-saving work. Seed or fertiliser can be optimally applied through various output points. A total of three deposit depths can be set: Top placement, mixed placement or down placement.

TERRADISC T

High output application during stubble cultivation and seedbed preparation is possible using the trailed TERRADISC T fitted with a distribution system. Two different configurations are available using a distribution rail with adjustable outlets.

AEROSEM F

Combining the AEROSEM F with a LION power harrow ensures optimum seedbed preparation at the same time as perfect sowing quality. The AMICO F is responsible for metering and transporting the seed material. The result is a high output and versatile combination.

FLEXCARE V

Crops such as maize, sugar beet and sunflower seeds require more nutrients to optimise yields during the later stages of vegetation. Equipped with a distribution system, the FLEXCARE makes it possible to apply nutrients to row crops as required during cultivation in order to optimise plant development and reduce the depletion of nutrients.

More arable products

Flexible hopper TEGOSEM

When the TEGOSEM is combined with crop care machines, seed drills and soil preparation implements, two processes can be carried out in a single pass. This is a fast and cost-effective way of sowing a cover crop or similar material. As a result, it opens up a number of different capabilities with different machine combinations.

TERRIA / PLANO VT / SYNKRO

During tillage, cover crop seed or granules can be mixed into the soil.

The distributor plates are located near the ground in front of the rear roller. As a result, the seed is immediately pressed into the soil. The necessary soil contact is established and capillary action for successful seed emergence starts straight away.

TERRADISC

Combined with TERRADISC disc harrows, cover crop seed material can be mixed into the soil during stubble cultivation, or micro-granules during seedbed preparation.

The rear rollers ensure that the seed is well covered so that cover crop plants emerge uniformly.

LION / FOX D

During levelling and seedbed preparation, a cover crop can be sown on the same pass.

The outlets are positioned in front of the rear roller so that the seed enters the loose soil before being pressed down. With the seed well covered, uniform and rapid emergence is ensured.

VITASEM / AEROSEM VT / TERRASEM

An additional component is applied using distributor plates at the height of the coulter rail. As a result, this can be used to plant a companion crop or cover crops. Extensive and continuous vegetation offers advantages for the soil, especially in locations that are prone to erosion.

TERRASEM

An additional component can be distributed by baffle plates located directly behind the packer. An alternative is the single shoot process, which involves material being metered by the TEGOSEM and fed by compressed air into the coulter pipes. The material is then applied using the same seed coulters.

This enables microgranules to be applied directly at the same time as the seed for the main crop or companion crop directly into the seed slot.

ROTOCARE

A cover crop or companion crop can be sown as part of a crop care measure.

The material is deposited right behind the raised flow of soil. This location means that the seed material or granules are subsequently covered with soil.

We focus on quality

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