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FEATURES OF THE PNEUMATIC SEEDER AND ITS ROLE AT THE PRESENT TIME

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Abstract
The precision seeding machine is a high-tech solution for high-precision seeding, which implements a seed-by-seed distribution system.

Keywords: Soil moisture, hardness, density, machine quality, productivity and energy intensity, crucial agricultural tools.

Introduction

The yield of agricultural crops largely depends on the quality of sowing or planting. Each plant requires a certain area of nutrition in the field. Therefore, the optimal amount of germinating seeds of the cultivated crop is sown per hectare for this zone. This amount in units or kilograms per hectare is called the seeding rate.

The basic requirements for sowing agricultural seeds can be summarized as follows: sowing the optimal number of seeds per unit area of the field in agrotechnical terms, evenly distributing them over the area, sealing to the required depth, laying on a dense bed and covering with moist, loose soil.

A shallow sowing depth is essential for successful establishment, even though seeds can sprout at any soil depth. The seedling must reach the soil surface and begin producing leaf material as quickly as possible before running out of energy because the plant's seed stores limited amounts of energy. For best results:

• to sow seed within 1–2 cm of the soil surface.

• For small seeds, such as clover, a sowing depth of less than 1 cm is necessary to ensure emergence.

Three weeks after sowing, only 20% of seedlings at a depth of 5 cm emerge (Pic.1.). Furthermore, compared to seedlings planted near the soil surface, those that reach the soil surface from this depth tiller considerably more slowly.

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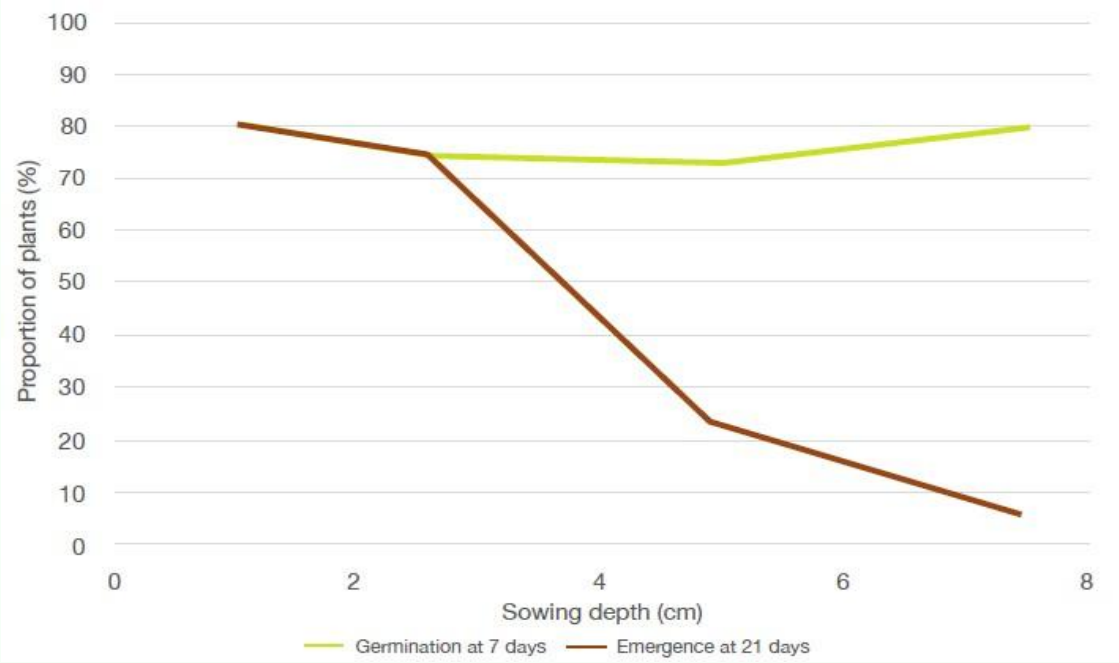

Picture 1. Findings from a study examining how planting depth affects plant germination and emergence.

After the field has been properly prepared, the next step is to sow the seeds, which is currently done with mechanical devices or pneumatic seed drills to ensure that everything on the farm runs efficiently. Without them, it would be very difficult and time-consuming to dig seeds into the ground and plant them in rows across a multi-hectare field. As a result, one of the most crucial agricultural tools on any farm is the seed drill. In this article, we will focus only on the first solution, namely the pneumatic seeder, because it is distinguished by a more advanced structure that gives us many possibilities.

There is intense competition between seedlings from the time of sowing, which usually involves 15 to 25 million individual seeds per hectare. 15 to 25 percent of the seedlings that germinate will make it through the first three months in a good establishment. Ten to fifteen percent of plants usually survive after a year. There are usually 300–400 plants per square meter in a mature, stable sward.

Grassland establishment seed rates range from 18 to 35 kg/ha. High seed rates have historically been employed as a safety measure to lower the chance of weed infestation or make up for low emergence rates. Uneven sowing depths, variations in seedbed quality, or low soil moisture levels that prevent germination can all cause these.

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An agricultural device with a novel sowing mechanism based on a vacuum or overpressure unit is called a pneumatic seeder. The blower, which creates a high air stream to move seeds in the coulters, is the primary component that sets the machine apart from a mechanical seeder. Depending on the model, the blower mechanism may be driven by the PTO shaft or hydraulically. Thanks to these pneumatic seed drills, they can work together with tractors that have less power.

Picture 2. Pneumatic anchor seeder.

A specialized sowing unit made up of coulters with discs, holes, scrapers, and press wheels makes up machines meant for seeding. In order for the seeds from the tank to pass through the coulters and reach the bottom of the furrow made by the prior movement of the discs, the sowing unit and pump work together to create a high air stream into the proper vacuum channels while the pump is operating. The pressure wheels crush the ground after it is introduced. This makes it possible to maintain the coulters' predetermined operating depth, guarantee good ground contact, and cover the sown seeds evenly with a layer of soil.

Pneumatic seeders were viewed negatively by many until recently because of their complex structure and higher failure rate. This isn't totally accurate, though, as new seeder models from different manufacturers who are always improving their designs come out along with creative solutions. Additionally, the machine's fundamental component, the seed distributing head, is firmly constructed from the best materials available, guaranteeing years of reliable operation. Small working components like air ducts, V-belts, or bearings may wear out, just like with any other used farm equipment, but replacing them is not too costly.

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Precision seeders offer innovative solutions to agricultural producers in search of efficiency and precision. Thanks to technologies such as electric drive, seed drills provide precise seed distribution control, better drug management, and lower costs. Precision seeders are designed to adapt to a wide variety of soil and crop conditions. Models with a width of 4 to 12 rows allow you to sow crops such as corn, sugar beet or soybeans with high accuracy.

A pneumatic seeder has many benefits, such as the ability to sow even tiny amounts of grain in the field, the location of the seed box and its larger capacity, precision of sowing comparable to that of mechanical seeders, and the elimination of the need to continuously check the number of seeds while working. It operates precisely at a width of 3 meters because it is powered by its own hydraulics and electronic control via a touch screen. More significantly, it has up to 24 sensor-equipped seed pipes. The model also shows how farmers can sow precisely at up to 20 km/h, from 1 kg/h to 400 kg/ha, with the aid of a pneumatic seeder.

CONCLUSION

Precision seed drills offer innovative solutions for both efficiency and precision. They provide precise control over seed distribution, improved fertilizer treatment, and reduced costs.

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