

## Investigation of the influence of winter wheat's location on plant's germination energy

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**Summary.** This article deals with the increase of winter wheat yield by providing optimal conditions for intensive germination of seed material and rapid energy accumulation by the plant under conditions of adequate moisture and temperature conditions. Today the leaders of farmers more and more attention is paid to increase yields and improve grain quality. When sowing, a number of factors which significantly affect it.

One of the key factors to obtain good quality and yield of winter wheat is optimal depth and uniformity placing grain in soil.

After some investigation on the basis of one of the farms Sumy region, it was found that during sowing must be considered a very important factor - a "galloping" (bouncing) when sowing grains in line with its initial contact with the ground. The uneven impact on reducing crop field seed germination and therefore reduces yield. This can be explained by the fact that those plants that are best placed in the soil require less time to germinate, and those who are randomly (ie, where the galloping), there is competition between them in the early stages of development. This indicates that the better developed plants spike will be larger and less-developed plants - smaller, so we'll get worse yield.

We have conducted research aimed to establish the intensity of germination and subsequent development of the root system and nadruntovoyi of wheat depending on the location of the seed in the soil. During the studies found that seed must be placed vertically in line to the embryo was from above, which in turn accelerates sprout germination and increases the intensity of its development. If a grain is vertically or across a bed of seed - sprout needs more time to germinate because the embryo is farther from the surface of the soil and it should make a trajectory before becoming vertically and grow.

Optimal placement and seeding technology in the soil will result in greater productivity, while spending less and seed funds.

**Key words:** optimal, rapid, energy, grounding, intensity, development, yield, seedlings, winter wheat, "galloping".

### CHALLENGE PROBLEM IN GENERAL TERMS

In recent times we observe decrease of ground productive moisture in the soil in the period after winter. It's connected with decreasing amount of snow in winter period and low amount of precipitations in spring period. It's necessary to take into account (point out) unstable meteorological conditions, which sometimes prevent from

good and duly sowing [1, 2]. Therefore the time for sowing is very limited. For this reason the question of creating and implementing measures for intensive germination and further plant's development is of high priority. Only providing necessary conditions for seed material we will obtain quick and harmonious seedlings [3].

The problem is that failure to comply with the main task of sowing – provision of optimal plants amount on 1 sq. m and their effective location in the seed's bed (the location, which allows to obtain get quick seedlings), can lead to the yield lost, seedlings increase and labor and means expenditure [4, 5].

### ANALYSIS OF THE LATEST INVESTIGATIONS AND PUBLIKATIONS

Agrarian and industrial potential of Ukraine is very large. Agrarian field has to provide provisions, fodder, raw materials for industrial processing not only domestic needs of Ukraine, but can become a reasonable, perhaps in the perspective, exporter of its products [1, 5].

Due to the modern farming system almost all plough lands are covered by seeds, moreover cultivated area often exceeds the plough area, seeds of arable and catch crops are widely used. These systems are characterized by active action on the soil in order to increase its fertility with help of means, which the industry produces [2].

In all Ukrainian zones at the minimal rate of seeds sowing (2-3 mln/ha), in comparison with optimal, only the upward trend of the protein and fibrin load in the seed and yield decreasing is observed.

Seed's quality under the influence of sowing terms differs. While sowing at very early or late terms the protein and fibrin load increases. Nevertheless, despite the fact that under these terms protein and fibrin load increasing occurs in the seed, such terms lose their production practical use as the yield immensely decreasing, sometimes more than in twice, in comparison with the yield of optimal terms [3, 1].

While growing winter wheat one of the main tasks is saving its high yield. In scientific works of V.V. Lykhochvor [5], I.M. Svydyniuk, O.V. Shmorhun [6]. V.M. Zubko [4] and others the issues of sowing technologies improvement and optimal winter wheat development and growth conditions provision were deeply investigated, methods and measures for creating the best conditions for plant's growth and, as a result, getting of high yield, were developed [7, 8, 9, 10, 11, 12].

Optimal plants growth's conditions are created at correct definition of sowing terms, sowing norms, area of plant nutrition and sowing technology and the most important – seed location.

Grounding is the final sowing stage, in which take place changes of seed's properties and create conditions for its germination. Sowing machines have to provide implementation of these conditions. [7].

#### FORMULATION OF THE OBJECT OF THE ARTICLE

The object of this article is to investigate plants' development in order to substantiate optimal seed location in the seed's bed for accelerating intensity of germination, root system and above-ground plant's part.

#### PRESENTATION OF CORE MATERIAL

For the present, wheat takes the leading place in our country. With intensive growth technologies increase, much more attention is paid to yield increasing and improving of seed's quality. While sowing many factors occur, which, in their turn, substantially affect it: uneven field surface, seed spacing, quality of seed's bed preparation, depth of grounding, influence of seeding machines on physical and chemical content and properties of soil etc [13-15].

One of the main factors for getting high and qualitative yield of winter wheat is optimal depth and evenness provision [16]. But, unfortunately, not every seeding machine can provide perfect location of the seed in the soil, as while sowing it's necessary to take into account one more very important factor – “galloping” (deviation, bouncing, flying away) while seeds sowing in the row at their first contact with the soil. It occurs when a seed falls down from the opener to the soil, because there

is a distance between them. The seed can fall down either exactly in the row, or across, or stand vertical or “fly away” at all. Even if one digs up the seed row in the field – it's clearly seen that wheat is located in a random way; there is no straight position or line, which can be observed. At that, unevenness along the depth of seeding of the seeding material is observed [17].

Investigations were made to clarify how the seed must be located in the soil and in what way we can achieve it. For providing these conditions we shall use such seeding machines, which would allow us to achieve the straight seed's location in the soil and prevent “galloping”.

Because of unevenness of sowing field germinating ability of seeds is decreasing and, consequently, yield is decreasing too. It's explained, first of all, by the fact that those plants, which are optimally located in the soil need less time for germination, and those plants, which lie in a random way, or deviated from the row center (in other words, where the galloping takes place), occurs competition among them on early stages of their development. And this, in its turn, will lead to the situation, when better developed plans will have bigger heads, and less developed plants – smaller heads, that is why of this we will obtain worse yield [18].

We have conducted a range of investigations directed to define intensity of germination and further development of root system and above ground part of wheat depending on seed's location in the soil. According to the results of investigations it has been defined that a seed should be located vertically in the row to have a seedling be on the top, which in its turn accelerates germination of the seedling and enlarge intensity of its development. If a seed lies vertically, or across in the seed's bed – a seedling needs more time for germination, as it's located far from the ground and it must make its pathway before it stand vertically and germinate (Fig.1).



**Fig. 1.** Germinations of winter wheat's seedling.

Incorrect location of a seed extends not only the terms of seedlings appearance, but also seedlings can be very thick, the part of them, not having reached the surface, can die, plants' development in the first period is getting slower. Especially it's necessary to admit the fact that appearance of the seedlings is 2 days late.

According to the results of conducted investigations, it's clearly seen that under equal conditions of winter wheat sowing, plants' seedlings are different. At vertical location of a seed under the optimal weather conditions – a seedling appears in 35 hours. At random location – in 49 hours. On the average, the difference between the heights of sprout is appr. 2.09 cm (Fig. 2).

Conducted investigations allowed to discover one more important factor, which influence further plants'

development – it's a well-developed seedling's root system.

Wheat doesn't form the taproot. For the very beginning of germination seed has several almost equally developed rudimental roots. In the process of further growth and development additional or nodal roots begin to form from the lower stems, which create a fibrous root system.

Seed germinates a few roots: at first one root appears, in 3-4 days the second and the third roots appears above the first, then – the fourth and the fifth, which are located in the area in parallel to the scutellum of the seed beetles.

At vertical seed's location – root system is best developed, which will provide good hibernation [19, 20].



**Fig. 2.** Intensity of winter wheat's growth and development in accordance with the way of seed's location.

From the (Fig.2) it's seen that vertical sowing of winter wheat (with seedling upward) has benefits in germination and development. At such wheat's sowing even sprouts appears. As long as in autumn, because of unstable meteorological conditions every hour can play an important role for their germination. Germinated stems develop quicker, they are more resistant to decrease of temperature and also over-winter better.

According to the conducted results it has been proved that if you know exactly how to locate wheat's seeds in the seed's bed, then under condition of providing good sowing, it's possible to achieve all conditions for getting maximum yield.

#### CONCLUSION

On the basis of conducted investigations we can say, that the grain industry is the rationale of agricultural production. It provides completely the population of our country with food products and enriches state's income by

means of export. That's why improvement of cereal crop' yield is the most important task.

According to the analysis of the last investigations it's clearly seen that while germination of winter wheat, the whole yield potential isn't fully used. At uneven division of plants' number per unit of area – different conditions of development appear. Investigation of optimal location and technology of seed grounding give the opportunity to get higher yield, spending less seed material and money.

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#### ИССЛЕДОВАНИЕ ВЛИЯНИЯ РАЗМЕЩЕНИЕ ЗЕРНА ОЗИМОЙ ПШЕНИЦЫ НА ЭНЕРГИЮ ПРОИЗРАСТАНИЯ РАСТЕНИЯ

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Аннотация. На сегодняшний день руководители фермерских хозяйств всё больше и больше уделяют внимание росту урожайности и повышению качества зерна. При посеве возникает ряд факторов, которые значительно влияют на это.

Одним из основных факторов для получения хорошего и качественного урожая озимой пшеницы оптимальная глубина и равномерность размещения зерна в почве.

Проведя исследования на базе одного из фермерских хозяйств Сумской области, было обнаружено, что при посеве нужно учитывать очень важный фактор - это «галопирование» (отскакивание) во время посева зерен в строке при его первичном контакте с почвой. Неравномерность посева влияет на снижение полевой всхожести семян и, соответственно, уменьшает урожайность. Это можно объяснить тем, что те растения, которые оптимально размещены в почве требуют меньше времени для прорастания, а те, которые лежат хаотично, (то есть, где происходит галопирование), появляется конкуренция между ними на ранних этапах развития. Это свидетельствует о том, что у более развитых растений колос будет больше, а у менее развитых растений – меньше, поэтому мы получим худшую урожайность.

Нами были проведены исследования направленные на установление интенсивности прорастания и дальнейшего развития корневой системы и напочвенного части пшеницы в зависимости от расположения зерна в почве. В ходе исследований установлено, что семя нужно разместить вертикально в строке, чтобы зародыш находился сверху, что в свою очередь ускоряет прорастание ростка и увеличивает интенсивность его развития. Если же зерно лежит вертикально, или поперек в семенном ложе – росток требует больше времени для прорастания, так как зародыш находится дальше от поверхности почвы и он должен сделать определенную траекторию, прежде чем стать вертикально и прорасти.

Ключевые слова: оптимальный, быстрый, энергия, обоснования, интенсивность, развитие, урожайность, всходы, озимая пшеница, «галопирование».