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ЗАГОЛОВОК:
Вплив позакореневого внесення регуляторів росту Brassiaca juncea L. Czern в умовах Сумської області.doc

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SNAU

ДАТА ЗАВАНТАЖЕННЯ ФАЙЛУ:
2020-07-07 15:18:31

ПРОПУЩЕНІ ВЕБ-СТОРІНКИ: ⓘ

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Зверніть увагу, що високі значення коефіцієнта не автоматично означають плагіат. Звіт має аналізувати компетентна / уповноважена особа.

28,17% КП 1 ⓘ
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25
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11426
Кількість слів

73403
Кількість символів

Перелік можливих спроб маніпуляцій з текстом

У цьому розділі Ви можете знайти інформацію щодо модифікації тексту, яка може бути спрямована на зміну результатів аналізу. Невидимі для особи, яка оцінює вміст документа у роздруківці чи файлі, вони впливають на фрази, порівнювані під час аналізу тексту (викликаючи передбачувані помилки), щоб приховати запозичення, а також підробити значення у звіті про подібність. Слід оцінити, чи є модифікації навмисними чи ні.

Заміна букв кількість символів з інших алфавітів може означати спробу обману, уважно перевірте!	6	показати в тексті
Інтервали кількість збільшених відстаней між літерами - будь ласка, перевірте, чи вони імітують пробіли, викликаючи приєднання слів до звіту	0	показати в тексті
Мікропробіли кількість пробілів із нульовою довжиною - будь ласка, перевірте, чи вони розміщені всередині слів та спричинили поділ слів у тексті	0	показати в тексті
Білі знаки кількість символів з білим кольором шрифту - будь ласка, перевірте, чи використовуються вони замість пробілів, викликаючи приєднання слова (у звіті колір літер змінено на чорний, щоб показати їх)	0	показати в тексті

Подібності за списком джерел

Прокручуйте список та аналізуйте, особливо, фрагменти, які перевищують КП 2 (позначено жирним шрифтом). Скористайтеся посиланням "Позначити фрагмент" та перегляньте, чи є вони короткими фразами, розкиданими в документі (випадкові схожості), численними короткими фразами поруч з іншими (мозаїчний плагіат) або великими фрагментами без зазначення джерела (прямий плагіат).

10 найдовших фраз (17,52 %)

Десять найдовших фрагментів знайдений у всіх доступних ресурсах.

ПОРЯДКОВИЙ НОМЕР	НАЗВА ТА АДРЕСА ДЖЕРЕЛА URL (НАЗВА БАЗИ)	АВТОР	КІЛЬКІСТЬ ІДЕНТИЧНИХ СЛІВ		ВИДАЛИТИ ВСІ ПОЗНАЧКИ
1	Вплив передпосівної обробки насіння Brassika juncea L. Gzern в умовах Сумської області. *Sumy National Agrarian University (SNAU)*	Лі Жуйцзе	829	7,26 %	показати в тексті
2	Вплив передпосівної обробки насіння Brassika juncea L. Gzern в умовах Сумської області. *Sumy National Agrarian University (SNAU)*	Лі Жуйцзе	430	3,76 %	показати в тексті
3	Використання регуляторів росту при вирощуванні Sinapis alba в умовах Сумської області.doc *Sumy National Agrarian University (SNAU)*	Лі Джіавей	155	1,36 %	показати в тексті
	Вплив передпосівної обробки насіння				

4	Brassika juncea L. Gzern в умовах Сумської області. *Sumy National Agrarian University (SNAU)*	Лі Жуйцзе	112	0,98 %	показати в тексті
5	http://www.zs-chemical.com/news/7.html		107	0,94 %	показати в тексті
6	Використання регуляторів росту при вирощуванні Sinapis alba в умовах Сумської області.doc *Sumy National Agrarian University (SNAU)*	Лі Джіавей	92	0,81 %	показати в тексті
7	Вплив передпосівної обробки насіння Brassika juncea L. Gzern в умовах Сумської області. *Sumy National Agrarian University (SNAU)*	Лі Жуйцзе	80	0,70 %	показати в тексті
8	Вплив передпосівної обробки насіння Brassika juncea L. Gzern в умовах Сумської області. *Sumy National Agrarian University (SNAU)*	Лі Жуйцзе	80	0,70 %	показати в тексті
9	Використання регуляторів росту при вирощуванні Sinapis alba в умовах Сумської області.doc *Sumy National Agrarian University (SNAU)*	Лі Джіавей	59	0,52 %	показати в тексті
10	Вплив передпосівної обробки насіння Brassika juncea L. Gzern в умовах Сумської області. *Sumy National Agrarian University (SNAU)*	Лі Жуйцзе	58	0,51 %	показати в тексті

з бази даних RefBooks (0,00 %)

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ПОРЯДКОВИЙ НОМЕР	ЗАГОЛОВОК	АВТОР	КІЛЬКІСТЬ ІДЕНТИЧНИХ СЛІВ (КІЛЬКІСТЬ ФРАГМЕНТІВ)	ВИДАЛИТИ ВСІ ПОЗНАЧКИ

НЕМАЄ ПОДІБНОСТЕЙ

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ПОРЯДКОВИЙ НОМЕР	ЗАГОЛОВОК	АВТОР	ДАТА ІНДЕКСАЦІЇ (АРХІВАЦІЇ)	КІЛЬКІСТЬ ІДЕНТИЧНИХ СЛІВ (ФРАГМЕНТІВ)		ВИДАЛИТИ ВСІ ПОЗНАЧКИ
1	**Вплив передпосівної обробки насіння** Brassika juncea L. Gzern **в умовах Сумської області.** *Sumy National Agrarian University (SNAU)*	**Лі Жуйцзе**	2020-06-19	2 532 (63)	22,16 %	**показати в тексті**
2	**Використання регуляторів росту при вирощуванні** Sinapis alba **в умовах Сумської області**.doc *Sumy National Agrarian University (SNAU)*	**Лі Джіавей**	2020-07-07	495 (16)	4,33 %	**показати в тексті**

з програми обміну базами даних (0,00 %)

Всі фрагменти знайдені в базі даних інших установ.

ПОРЯДКОВИЙ НОМЕР	ЗАГОЛОВОК *НАЗВА БАЗИ ДАНИХ*	АВТОР	ДАТА ІНДЕКСАЦІЇ (АРХІВАЦІЇ)	КІЛЬКІСТЬ ІДЕНТИЧНИХ СЛІВ (КІЛЬКІСТЬ ФРАГМЕНТІВ)	ВИДАЛИТИ ВСІ ПОЗНАЧКИ

НЕМАЄ ПОДІБНОСТЕЙ

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ПОРЯДКОВИЙ НОМЕР	ДЖЕРЕЛО URL	КІЛЬКІСТЬ ІДЕНТИЧНИХ СЛІВ (ФРАГМЕНТІВ)		ВИДАЛИТИ ВСІ ПОЗНАЧКИ
1	http://www.zs-chemical.com/news/7.html	132 (3)	1,16 %	**показати в тексті**
2	https://www.sailingagro.com/info/what-are-the-characteristics-and-advantages-of-45687131.html	55 (3)	0,48 %	показати в тексті
3	http://journals.uran.ua/sr_bio/article/view/153463	5 (1)	0,04 %	показати в тексті

Вміст пошуку - позначення подібності:

Будь ласка, зверніть увагу на те, що система не дає остаточної оцінки. Якщо виникають підозри, Звіт Подібності повинен бути переданий на ретельний аналіз.

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY

Department of Horticulture and Forestry

THESIS

Degree - Master
on: «Influence of foliar application of growth regulators of Brassica juncea L. Czern within Sumy region conditions»

Completed: student of

Mei Zheng

Superviser Andrii Melnyk
Doctor of Agricultural Sciences, Professor, Academician of the Academy of Sciences of Higher School of Ukraine

Reviewer

Sumy - 2020

SUMY NATIONAL AGRARIAN UNIVERSITY

Faculty
Department Department of Horticulture and Forestry

Education degree «Master»
Speciality

Approved:
Head of Department Dr. Sc.,Ass. Professor
«____» _____ 2020

TASK
on thesis for student
Mei Zheng
1 1.Theme of Thesis: Influence of pre- sowing treatment of seeds of Brassica juncea L.Czern within Sumy region conditions

2 Superviser Doctor of Agricultural Sciences, Professor Andrii Melnyk
approved by the university from December, 11 2018 No 3445- н
2. Deadline for student completed project (work) 20.06.2020
3. Background to the project (work): information materials, laboratory and field research, results of statistical analysis
4. Contents of settlement and explanatory notes (the list of issues to develop):
-Effect of foliar fertilizer 1 of plant growth regulators on morphological parameters of mustard yellow; -Effect of foliar fertilizer of plant growth regulators on chlorophyll content of mustard yellow; - Effect of foliar fertilizer of plant growth regulators on productivity of mustard yellow; - Effect of foliar fertilizer of plant growth regulators 2 on yield of mustard yellow.
5. Date of assignment December, 11 2018

PLAN
No Title the stages of the degree project (work) Date of performance project stages Note
1 Definition of the theme of the thesis March, 2019 done
2 Approval of the topic March, 2019 done
3 Determination of the thesis plan and agreement with the scientific supervisor April,2019 done
4 Selection and analysis of literary sources on the topic ofthesis April,2019 done
5 Selection of research methods May 2019 done
6 Formation of the program of pre- diploma practice based on the theme of the thesis May- November 2019 done
7 Laying an experiment /An analysis of the current state of the research area December 2019 done
8 Collection of primarydata / Field studies June- September, 2019 done
9 Mathematical treatment of research results /Data processing of research results on a computer May, 2020 done
10 Report on pre- diploma practice- as the basis for writinganexperimentalpartofthethesissemester May, 2020 done
11 Testing the results of the study June,1, 2020 done
12 Completion of the project part of the thesis, design chapters June, 2020 done
13 Processing of comments of the spervisor June, 2020 done
14 Review the thesis June, 2020 done
15 Preparation of the report andpresentations for the thesis June,30, 2020 done
16 Defending the thesis July,09, 2020 done

Student Mei Zheng

(signature)
Superviser of science work Melnyk A.V. Zherdetska S.V.

(signature)
Checking the authenticity conducted. Thesis allowed to protect

(signature)

CONTENT

Introduction
Mustard is a common oil crop, it is widely distributed in the world, such as Canada, China, Ukraine, Russia, Brazil, and other large areas. Mustard plays a crucial role in ensuring the safe supply of edible oil in Ukraine. Therefore, the development of light and simplified cultivation model is the only way to the sustainable production of mustard in Ukraine.
Plant hormone refers to the trace organic substances naturally existing in plants, it has significant effects on plant growth and development. It is also called plant natural hormone or plant endogenous hormone. Its existence can affect and effectively regulate the growth and development of plants, including the whole process of plant life from the cell growth and division to rooting, germination, flowering, fruiting, maturation, and shedding. Plant growth regulator of the structure and action mechanism of the natural plant hormones, through artificial synthesis and physiological and biological effects of plant hormones with similar material, used in agricultural production, to effectively adjust the growth process of crops, to achieve stable production, improve quality, enhance crop resistance, etc. Brassica is an annual herbaceous plant of the genus brassica in the cruciferous family, which is an important cash crop in Ukraine. Mustard seeds are the seeds of the cruciferous plant mustard. Mustard has been cultivated and bred for a long time. In addition to the mustard (whose seeds are called "yellow mustard"), there are white mustard (whose seeds are called "white mustard") of Europe and North America and black mustard (whose seeds are called "black mustard") of southern Italy [1, 2].
Mustard has important economic value. Dried seeds are an important part of food processing. **Mustard seed is also a good oil crop,** rapeseed oil, rich in vitamins and fats, is one of the raw materials for human oil. Mustard is also a good field crop. The root system of mustard is relatively developed, and the organic acid secreted during the growth process can dissolve the insoluble phosphorus in the soil, so as to improve the soil available phosphorus content [3]. The mustard greens are ripe once a year. Rapeseed is particularly suitable for crop rotation with cereal crops because it improves the soil. Mustard root system can secrete a variety of organic acids, dissolve the soil phosphorus difficult to dissolve, improve the effectiveness of phosphorus [4]. Therefore, mustard is a good crop for land cultivation and soil improvement, and the straw and residual roots generated during the growth of mustard are returned to the field, which can significantly improve soil fertility and structure. Mustard flowering period as long as a month, can provide good honey for beekeeping industry. Therefore, the development of mustard production has broad prospects. Mustard is also an important fresh vegetable and an important agricultural by product. Ukraine produces about two quarters of the country's mustard. As a light and simplified cultivation technique, direct seeding mustard has developed rapidly in recent years. Mustard, however, different crops of wheat, rice, corn, due to a lack of good growth regulator, so can't resist longer waterlogged stress especially mustard is very sensitive to wet, therefore, further study of response to mustard and mustard plant growth regulator control mechanism, cultivation techniques and stain resistant varieties to develop resistance to stains, for stable Ukraine mustard planted area and to ensure the safety of edible oil has very important practical significance [5, 6, 7].
Purpose of this study. The effects of different growth regulators on yellow mustard were studied and compared. The results showed that mustard growth regulator could **make mustard** growth **more stable and** yield higher, so the **optimal growth regulator was selected.**
Scientific and practical significance of the obtained results.
Keywords: **Yellow mustard,** Plant growth regulator, Stable high yield

SECTION **1**
REVIEW OF RESEARCH LITERATURE
1.1. National importance of mustard yellow

Mustard is a common oil crop, it is widely distributed in the world, such as Canada, China, Ukraine, Russia, Brazil and other large areas of mustard [8].
In 2017, the total output and planting area accounted for about 30% of the whole country, ranking the second in the world. Its planting area was second only to corn and wheat. It was a cash crop with high yield. According to statistics, the proportion of rapeseed oil in the edible oil in Ukraine is increasing continuously, which has exceeded 67% by 2009, playing a crucial role in ensuring the safe supply of edible oil in Ukraine [9]. However, in recent years, the production of mustard in Ukraine is facing severe challenges, and the planting area shows an obvious downward trend, mainly because of the large amount of labor for mustard production, the continuous increase in production cost and the significant decline in production efficiency. Therefore, the development of light and simplified cultivation model is the only way to sustainable production of mustard in Ukraine [10]. Mustard seeds for the cruciferous plant mustard seeds, seeds have yellow mustard seeds, white mustard seeds, medicinal or crushed into condiments (mustard), yellow mustard seeds are more used for condiments, white mustard seeds are more medicinal; Young stems and leaves can be used as vegetables. The main components of yellow mustard are Singrin**O????O** and a small amount of myrosinase **O???O**. In addition also contains erucic acid, fat, protein and so on. Glucosinolytic enzymes to produce acrid mustard oil, components are isothiocyanate methyl ester, isopropyl ester, butyl ester etc. [11,12]. Edible mustard seed is 100%, each hectogram contained 7.2 g of water, protein 23.6 grams, 29.9 grams fat, carbohydrates, 28.1 grams, 0.19 mg carotene, vitamin B1, 0.17 mg vitamin tunnel 0.38 mg, 4.83 mg niacin, vitamin E9.83 mg, potassium 366 mg, 7.8 mg of sodium, calcium 656 mg, 321 mg of magnesium, iron 17.2 mg, 3.05 mg of manganese, zinc 3.62 mg, 0.63 mg, copper phosphorus 530 mg, seed also contain black mustard glucoside, mustard and mustard acid alkali, phlegmatic etc. The volatile oil obtained after enzymatic hydrolysis is called mustard oil, which contains methyl ester, isopropyl ester, allyl ester, butyl ester and sec- butyl ester of isothiocyanate Traditional medicine thinks: mustard seed taste xin wen, enter lung, stomach classics. Good ability benefit qi huo phlegm, warm in dispersing cold, tong luo analgesic, often used in the treatment of phlegm drink cough and asthma, chest and side swelling pain, numbness of limbs, joint pain, gangrene swollen poison and other diseases. "Compendium of medica" records the treatment of common diseases and stubborn phlegm diseases commonly used by physicians throughout the ages. In recent years, it was found that mustard seed contains isothiocyanate, erucic acid, phenolic substances and other chemical components, which have anti- cancer, anti- bacterial and other physiological functions. Mustard seed processing products are very popular condiments[13,14,15].
1.1.1. Morphological features of mustard
Mustard is an annual herb, 30- 150 cm tall, often glabrous, sometimes young stems and leaves with bristles, with powder cream, spicy; Stems erect, branched.
Basal leaves broadly ovate to obovate, 15- 35 cm long, apically obtuse, basally cuneate, great head pinnate, with 2- 3 pairs of lobes, or undivided, margin notched or toothed, **petioles 3- 9 cm long, with** minute lobes; Stems with smaller lower leaves, margins notched or toothed, sometimes round and obtusely serrated, not clasped; Stem **upper leaves narrow lanceolate, 2.5-5 cm long, 4-9 mm wide, margin** inconspicuously sparsely toothed or entire[16,17].
Racemes terminal, flowers elongate; Flowers yellow, **7-10 mm in diameter; Pedicels 4-9 mm long; Sepals pale yellow, oblong-elliptic, 4-5 mm long,** spreading **erect; Petals obovate, 8-10 mm long,** 4- **5 mm long.** Long senges linear, **3-5.5 cm long, 2-3.5 mm wide,** fruit **petals with** 1 prominent midrib; Beak length **6-12 mm;** Fruit stalks **5-15 mm long. Seeds globose, ca. 1 mm in** diameter, **purple-brown.** Flowering **from march to may, fruiting from may to June**[18].
Mustard seeds spherical, very small. **The 1000 - grain weight of mustard** was about **6.5g. The 1000 - grain weight of** black **mustard is** only **1.3** g, and the volume is half as weak as that of yellow mustard. **They all have a strong, spicy** and stimulating taste.25 % to 35 % fat, press to remove. Yellow mustard **seed does not contain volatile oil, its main component is** yellow mustard glucosinolates**O????**, after water due to the action of enzymes to produce a strong pungent spicy disulfide yellow mustard glucosinolates, [19] yellow mustard glucosinolates oil and other substances. Black mustard seeds contain volatile essential oil 0.25-1.25 %, its main component is black glucosinolates or black glucosinolates potassium sulfide, after water, the production of isothiocyanate and potassium bisulfate with pungent spicy substances [20,21].
1.1.2. Biological features of mustard
Shepherd's purse is a hardy plant, fond of cold climate, can withstand - 5 ~ - 7 oC low temperature. The optimum temperature for seed germination is 20 ~ 25 oC. When seeds germinate or seedlings grow, it takes 2 ~ 5 oC for 10 ~ 20 days to pass the vernalization stage. Under the condition of high temperature and long sunshine, moss can be extracted and flowering. Its roots are well developed, and the main roots are distributed in about 30cm soil layer. Like fertilizer, **nitrogen, phosphorus and potassium fertilizer** demand is larger. The suitable temperature for growth is **15-22** oC. **When the temperature is higher than 25** oC, growth retardation will occur, affecting **the quality of dishes; When the temperature is lower than 12** oC, plant growth will be inhibited, resulting in poor vegetative growth, weak growth potential and poor leaf quality [22, 23] In the appropriate **temperature range, the higher the temperature, the faster the growth, the shorter the growth period,** and vice versa. **Mustard is not very strict** to **soil conditions, but** suitable for cultivation in **fertile soil, deep soil, good irrigation and drainage conditions, sufficient light,** permeability is better, water and fertilizer retention loose clay loam.
1.2. Definition of plant growth regulators
Plant hormone refers to the trace organic substances naturally existing in plants that have significant effects on plant growth and development. It is also called plant natural hormone or plant endogenous hormone.Its existence can affect and effectively regulate the growth and development of plants, including the whole process of plant life from cell growth and division to rooting, germination, flowering, fruiting, maturation and shedding [24].
Plant growth regulator is in the knowledge of the structure and action mechanism of the natural plant hormones, through artificial synthesis and physiological and biological effects of plant hormones with similar material, used in agricultural production, to effectively adjust the birth process of crops, to achieve stable production, improve quality, enhance crop resistance, etc. [25].
Plant growth regulators are synthetic chemicals that regulate the growth and development of plants and natural plant hormones extracted from organisms. It's called a plant growth regulator.
Plant growth regulators are substances with similar physiological and biological effects as plant hormones. With functions of regulating plant growth and development of material have been found fresh with amine ester (DA - 6), compound sodium nitrate of phenol, ethylene, auxin, gibberellin, cytokinin, abscisic acid, br, salicylic acid, jasmonic acid, multi- effect azole and polyamine, and as a plant growth regulator has been applied in the agricultural production is mainly in the first nine categories [26].
The use of plant growth regulators generally does not pose a risk to human health in accordance with the dosage, duration and method indicated on the registration approval label [27] If the use of non - standard, may make the

crop growth too fast, or make the growth is inhibited, or even death. Will have certain influence to the quality of agricultural products, and produce harm to human health.

1.2.1. Composition mechanism of plant growth regulators

Plant growth regulator is the product of organic synthesis, microanalysis, plant physiology and biochemistry, modern agriculture, forestry, horticulture and so on. From 1920s to 1930s, trace amounts of natural plant hormones such as ethylene, 3- indoleacetic acid and gibberellin were found in plants, which could control growth and development. In the 1940s, the research on synthetic analogues began, and 2, 4-d, aminoester (da-6), clopidourea, sodium complex nitrophenol, p-naphthalene acetic acid, and yaludan were successively developed, which were gradually popularized and used to form a category of pesticides [28]. Over the past 30 years, there have been more and more synthetic plant growth regulators, but due to the complex application technology, the development is not as rapid as pesticides, fungicides and herbicides, and the application scale is also small. But from the need of agricultural modernization, plant growth regulator has great development potential, has accelerated the trend of development in the 1980 s.

For target plants, plant growth regulators are exogenous, non- nutritive chemicals that can be transmitted to the site of action in the plant body, and at very low concentrations can promote or inhibit certain links in its life process to meet the needs of human development. Each plant growth regulator has a specific purpose, and the application technology is quite strict, only under certain application conditions (including external factors) can produce a specific effect on the target plant [29]. Changes in concentration often have the opposite effect, such as promoting at low concentrations and inhibiting at high concentrations. Plant growth regulators have many USES, depending on the variety and target plant. For example, controlling germination and dormancy; Promote rooting; Promote cell elongation and division; Control lateral bud or tiller; Control plant type (short and strong to prevent lodging);Control flowering or sex of male and female, induce fruitless fruit; Sparse flower sparse fruit, control fruit drop; To control the shape or ripening of the fruit; Increased stress resistance (disease resistance, drought resistance, salt resistance, frost resistance);Enhance the ability to absorb fertilizer; Increase sugar or change acidity; Improve fragrance and color; Promote latex or resin secretion; Defoliation or valuation (convenient for mechanical harvesting); Preservation, etc. Some plant growth regulators become herbicides when used in high concentrations, and some herbicides have growth- regulating effects at low concentrations.

1.2.2. **2 Characteristics and advantages of plant growth regulators**

Characteristics and advantages of plant growth regulators is:

1. **1 A wide range of applications. Plant growth regulator can be applied to almost includes all the higher and lower in the planting industry plants, such as field crops, vegetables, fruit trees, flowers, trees, kelp, seaweed, edible fungus, etc., and through the regulation of plant photosynthesis, respiration, material, absorption, distribution and function, signal transduction, stomatal opening and closing, osmoregulation, transpiration processes such as regulation and control of plant growth and development, improve the relationship between plants and the environment interaction, enhance crop resilience, increase crop yield, improve quality of agricultural products, make crop agronomic traits expressed according to the demand by people in the direction of development.**
2. **The** dosage is small, the speed is fast, the benefit is high, the residue poison is little, most crops need only according to the regulation time spray to use once.
3. Can be the external characteristics of the plant and internal physiological process for double regulation.
4. **Targeted** strong, strong **professional.** It can solve **problems that are difficult to** solve by other means, **such as seedless fruit formation,** preventing and **2 controlling wind, controlling plant type, promoting rooting of cuttings, ripening and coloring of** fruits, **inhibiting axillary** bud **1 growth, and promoting cotton leaf shedding.**

2 5. The effect of plant growth regulator **is** influenced **by many factors,** but **it is difficult to achieve the best.** Climatic **conditions, application time, dosage, application method, application site and 1 the absorption, operation, integration and metabolism of** the crop itself will affect its effect.

1.2.3. Effects of plant growth regulators on crop growth

The effects of plant growth substances on the growth and development of crops are mainly expressed in two aspects: promotion and inhibition. However, the effects of promotion and inhibition often depend on plant species and age, environmental conditions, and the concentration and method of exogenous hormones [30]. There are five recognized classes of plant hormones and their biological functions are as follows:

Auxin(IAA), which mainly promotes the elongation of cells, causes the plant to grow towards the light, maintains the apex dominance, promotes the occurrence of adventitious roots, induces unisexual fruiting, induces callus formation, induces female flower formation, delays the formation of the separation layer, and delays or inhibits the shedding of nutrients by organs.

Gibberellin (GA3), mainly promotes cell elongation and division to reverse the plant's heritable dwarfism to inhibit advance roots from breaking dormancy, to promote the germination of seeds and other dormant organs to promote the flowering, fruiting and fruit growth of long- day plants to induce the occurrence of male flowers.

Cytokinins (CTK) are mainly used to promote cell division, tissue differentiation and morphogenesis to promote cell expansion and growth.

Abscisic (ABA) acid is mainly used to induce dormancy, inhibit the germination of seeds and buds, promote stomatal closure and induce shedding, promote senescence and maturation, enhance stress resistance and inhibit growth.

Ethylene (ET), mainly to change the growth habit to promote fruit ripening to inhibit elongation to promote growth and senescence to control sex, is conducive to the formation of female flowers.

The application of appropriate amount of plant growth regulators during the growth and development period can promote the growth of food crops, cash crops and vegetables

1.2.4. Application of plant growth regulator in agricultural production

Plant growth regulators are divided into auxin class, gibberellin class, cytokinin class, ethylene release agent, growth inhibitors, growth retardants.

Since the 80 s, the study of plant growth regulator at home and abroad, and quickly applied to production such as agriculture, forestry and gardening, sums up several main areas (table 1).

Table 1

The role of plant growth regulators in agriculture

Objective	Medicament	Using object	Using Method
Break dormancy and promote growth	GA3	Lettuce	100mg/LSoak the seeds for 2- 4 hours
		Potato	0.3-0.5 mg/LSoak tuber 5- 10min
Prolong dormancy and inhibit germination	MH	Onions	2500 mg/L Blade 3- 6cm jet blade
		Potato	tuber 2000-3000 mg/LSoak before harvesting

Promote the rooting of cuttings NAA Sweet potato 50-1000 mg/LDip roots before planting
IBA Mulberry, tea 20-200 mg/L Soak base for 12- 24 hours
Adjust flowering GA3 Hybrid rice sterile line 80mg/L Spray at the head stage
Promote nutrient growth and increase yield GA3 Celery, spinach 50-100 mg/L Spray 10- 15 days before harvest
Promote female flower differentiation ethephon Cucumber, pumpkin 50-250 mg/L Spraying on the leaf stage
Promote male flower differentiation GA3 Cucumber, pumpkin 50-150 mg/L Spraying on the leaf stage
Sparse flower sparse fruit, promote fall off NAA Apples, pears 40 mg/L Local spraying
Keep flowers and fruits from falling off NAA Cotton 10 mg/L Spray in bloom
6- BA Citrus 400 mg/L Spray on young fruit
Promote fruit ripening ethephon Tomato 50-150 mg/L Before spraying fruit picking
continuation of table 1
Plants are dwarfed and robust CCC Wheat 300 mg/L Spray at the beginning of jointing
PP333 Soybean 200 mg/L Spraying on the leaf stage
Improve stress resistance, prevent and increase production BR The rice seedlings 0.0001 mg/L Soak roots for 24 hours before transplanting
PP333 Wheat 100-300 mg/L Spray before jointing

Plant growth regulator has been widely used in fruit trees, vegetables, flowers and so on, and has obtained huge social and economic benefits [30]. In the early 1930 s, many plant physiology scholars began to study on plant hormones in agricultural production application, but they are mainly limited to indole acetic acid, auxin, indole butyric acid and synthetic rootone, become a plant growth regulator on the agricultural application of an obvious turning point, to 40- 50 s, with the continuous synthesis of growth regulators, make the application and development of plant growth regulator has entered a new field [31].

1.3. Application of plant growth regulators at home and abroad

Plant growth regulators are one of the most active subjects in the field of plant physiology. According to the report of the 14th annual plant growth conference in the United States, the application level of plant growth regulators occupies the first place in the growth rate of international annual pesticide consumption [32]. The application of plant growth regulator has maintained a growth rate of more than 10% for more than 20 years. Annual sales are 300-400 $ million. With the continuous introduction of new plant growth regulators in the world, China has promptly introduced and developed them, actively participating in international exchanges and making innovations [33]. In the 1940s and 1950s, China began to use auxin agents like caiacetic acid, such as promoting the setting of tomatoes in the greenhouse and inducing seedless fruits. This work has continued until now and has become an important measure in greenhouse production. At the beginning of 1960s, the introduction of dwarf hormone was applied and popularized in preventing lodging of wheat. Methylene naphthalene acetate and cyan had good effect on inhibiting the germination of potato during cellaring.

In the early 1970 s, the large - scale application experiments of gibberellin, nucleic acid hydrolysate and petroleum growth promoter were started. At the same time, etheophilic reagent has been successfully used to promote rubber rubber, pineapple flowering and ripening, and has played a certain role in the production. However, some of the application of plant growth regulators do not pay attention to the specific principle of action, excessive or blind use, the production has brought many side effects, so that the application of plant growth regulators once appeared a landslide phenomenon. In the late 1980s, the introduction of tantamount amine, pyrazole, enizolium, alcohol, etc., under the guidance of scientific and technical personnel, has been promoted and applied. The main targets of plant growth regulators in China are crops, such as rice, wheat, corn and cotton, which play an important role in agricultural production. This is also rare in the international.

SECTION 1 2

CONDITIONS, MATERIAL AND METHODOLOGY OF RESEARCH

Field research was conducted in the research field of NNVK (**educational, research and production complex) of Sumy National Agrarian University during 2019-2020** of Ukraine. The **experimental plots of Sumy NAU are located within the city of Sumy (latitude 50O52.742N, 34O46.159E Longitude and 137.7 m above sea level) and belong to the north- eastern part of the Forest- Steppe.**

Research work was performed according to the thematic plans and within the framework of state **scientific topics: Sumy National Agrarian University "Optimization of elements of mustard cultivation technology in the north- eastern forest- steppe of Ukraine" , state registration number 0115U001051.**

2.1. Soil and climatic conditions of research

The zone of **the north-eastern Forest Steppe is favorable for normal growth and development of spring plants. In particular, high soil fertility, their satisfactory water and air permeability, sufficient rainfall and temperature. Characteristics of the soil** - chernozem **typical deep medium- humus coarse- dusty- medium loam on forest rocks. The content of humus according to Tyurin is 4.1-4.5 %; pH salt 6.0-6.2. The content of easily hydrolyzed nitrogen according to Cornfield is 120 mg / kg, mobile compounds P2O5 and K2O according to Chirikov are 202 mg / kg and 85 mg / kg, respectively. Soil selection and agrochemical analysis were carried out directly** at the experimental site.

The climate of the north-eastern forest steppe of Ukraine is **2 temperate- continental. The beginning of winter from mid - 1 November. The weather during this period is very erratic, frosts are replaced by warming, snow - rain. From mid- December, snow cover is established, which has a height of 20-35 cm until February. The average temperature of the coldest month (January) is minus 7-8 °C. Winter in Sumy region is unstable: cold periods up to 20 °C of frost can be replaced by short- term thaw. At the same time the air temperature can rise to +4, + 5 °heat, and snow in the fields can disappear completely. From the end of March the beginning of spring is fixed. The beginning of summer in the area falls in mid- May. Summer is moderately warm. The warmest month is July. Its average daily temperatures in the north are +18.6 °C, in the south + 20 °C. In summer the air temperature can rise to +32 °C, + 37 °C.**

The **average annual rainfall in the region varies between 510 and 590 mm, more than half of the precipitation (about 60%) falls in the warm season. The rainiest month is July (60- 80 mm), the least precipitation falls in February (25- 30 mm).**

The growing season in 2019 was characterized by high temperatures and insufficient rainfall for all months, according to the hydrothermal **coefficient of the growing season conditions are very arid** (SCC = **0.42).**

In April and May, the amount of precipitation was lower than the long- term average by 16.1 and 13.3 mm, respectively. In July, precipitation decreased by 18.6 mm. The largest deficit of moisture was observed in July and August, precipitation was less by 50.2 and 52.5 mm, respectively (Fig. 2.1).

Fig. 2. 1. Deviation from the average long- term data of temperatures and precipitation (2019)

The air temperature exceeded the long- term indicators in April and June by 2.0 and 2.4 °C. In July and August the air temperature was higher by 0.9 and 2.3 oC. The highest temperature indicators exceeded the average annual data in May - by 4.2 oC
The sum of positive temperatures during the analysis period was 2902.2oC, the sum of active temperatures was 2825.0 oC, the amount of precipitation was 143.3 mm.
Thus, the north-eastern forest steppe of Ukraine is characterized by the following adverse climatic phenomena: droughts, dry winds, gusts of wind, ice and more. The most dangerous phenomenon is drought. Great damage is caused by frost in the spring - morning and evening drops in air temperature below 0oC at positive temperatures during the day.

2.2. Object, scheme and methods of research

Object of study - the process of optimizing the formation of productivity of mustard blue depending on the species characteristics, seed treatment with growth regulators and weather conditions.
Subject of study - blue mustard (Brassica juncea L) Prima variety; Felicia, types of growth regulators for seed treatment (Albit, Vermistimd, Antistress, Agrios, Regoplan, Biofoge, Stimulate, Fast start), weather conditions, economic and energy efficiency of the studied elements of cultivation technology.
Prima variety. The duration of the growing season is 90 days. Plant height - 125-185 cm (depending on weather conditions). The weight of 1000 seeds is 3.1 g. The oil content in the seeds is 43 %. The content of essential (allyl) oil is 0.9%. Potential yield - 2.8 t / ha. Gray mustard variety of the sleeveless direction, erucic acid content - 0.0-1.0 %, intended for obtaining edible oil and mustard powder. The variety is resistant to lodging of plants and shedding of seeds, medium resistant to diseases and pests. Technological, suitable for mechanized cultivation. Recommended for growing in the steppe and forest- steppe zones of Ukraine. It has a clear morphological feature - a strong waxy coating on the leaves and stems of plants. The variety was registered in the State Register of Varieties Suitable for Distribution in Ukraine in 2014 [36].
On the topic of the master's work, field research was conducted according to the following scheme.
The scheme of the experiment. Factor A - gray mustard variety - Prima, Felicia; factor B - seed treatment: control (without fertilizers); Albit, Vermistimd, Antistress, Agrios, Regoplan, Biofoge, Stimulate, Fast start.
Experiment parameters 1: la = 4, lв = 4; n = 4, the area of the accounting area of 15 m2. The plots are arranged by the method of organized repetitions in four tiers.
During the research, mustard cultivation technologies were generally accepted for the research area, except for the elements studied [37, 38]. Predecessor - grain ears. Method of sowing - row with a row spacing of 15 cm. The seeding rate is 1.5 million pieces. seeds per hectare.
Mustard seedlings against cabbage fleas were sprayed with Fastak, 10% kE (0.1–0.15 l / ha), and rapeseed leafhopper, cabbage whitefly caterpillars - Decis (Stefesin, 0.3 l / ha), or F ' Yuri (0.1 l / ha) [39]. Glisol (4–6 kg / ha) or butizan 400 (1.75–2.5 kg / ha) are used to control weeds [40].
Field experiments were performed according to the Method of field experiment according to Dospekhov and Moisenchenko [41, 42]. Phenological observations of the growth and development of plants of oilseeds of the family Brassicaceae were carried out in accordance with the "Methods of State varietal testing of crops" [43].
Measurements were performed at the onset of developmental phases: rosette, budding, full flowering, pod formation.
Determination of the dynamics of linear growth was performed on pre- labeled plants. Determination of leaf area was performed by the method of "cuttings" [44], which is based on determining the area and weight of 50 cuttings, as well as the mass of the leaf surface of the entire sample in the laboratory on cut plants and subsequent calculations by the formula.
, where
S - total leaf area, см2; S1 -area of one die, см2; P - total weight of leaves, g;
P1 -mass of cuts, g; n -number of cuts, pcs.
The chlorophyll content in the leaves was determined by preparing a solution in an alcohol extract followed by determination on a ULAB 102 spectrophotometer [45]. Laboratory germination, weight of 1000 seeds - according to DSTU 4138-2002 [46]. Harvest accounting was performed continuously from each accounting area.
Elements of crop structure were determined by the "Method of state varietal testing of crops" [43]. To determine the structure of the crop and chemical analysis of white mustard seeds from each variant of the experiment were selected two model sheaves, which contained typical of the variant plants, and dried them to air- dry state. The number of first- order fruit branches, the number of pods per plant, the number of seeds per pod, and the total seed productivity of the plant were counted. The analysis of the crop structure was performed according to the "Method of state varietal testing of crops." Culture was collected in sections by direct combining during the period when the color of the main stem and pods was yellow and the leaves fell off, with simultaneous weighing of seeds according to experimental variants and sampling to determine moisture and purity. The yield was brought to 100% purity and 10% moisture of seeds. The oil content was determined on an infrared analyzer SupNir 2750 [47].
Statistical analysis of research results was performed using analysis of variance, correlation and regression using computer programs Exell, Statistica- 10 [48, 49].
Economic evaluation of the studied factors was performed according to the method of determining 2 economic efficiency in agriculture at prices prevailing in October 2018. Determined the cost per 1 ha, the cost of 1 ton of seeds, net profit and profitability [50]. Energy assessment 1 was performed according to the methods of AK Medvedovsky and PI Ivanenko and others [51].

CHAPTER 3
RESULTS OF THE RESEARCH

3.1. Effect of treatment seeds of plant growth regulators on morphological parameters and chlorophyll content of mustard

Agronomic characters mainly include plant height, stem diameter, number of main stem and leaves, number of fruit branches, number of leaves and width of leaves.Under certain conditions, plant height was one of the indexes reflecting the growth potential of mustard. The main on morphological parameters in plant is Analyses of table 2. The change of plant height has a good synchronous relationship with the formation of organs, which is also closely related to the physiological changes of mustard. At the same time, plant height and index system are the most

sensitive responses to the growth status of mustard leaves, among which the most commonly used indicators. Therefore, the study of mustard plant height is beneficial to the diagnostic index of mustard plant height and has good practical value for the scientific management and advanced guidance and control of mustard
In the case of different regulators, plant height can be measured to determine the growth of crops.Branch number and pod number **per plant are the key factors affecting yield.**
The growth regulators Albit, Antistress, Agrinos, Biofoge, Fast Start, Regoplan, Stimulate and Vermistim D were used to treat Prima and Felicia seeds, and the plant height, number of branches and number of pods per plant were **measured, as shown in Table** 2.

Table 2
Effect of foliar fertilizer **of plant growth regulators on morphological parameters of mustard**
Factor A Varieties Factor B Regulators and control **Height plant, cm Quantity branches in one plant Number of pods**
Prima Control 129.9 **4.3** 143.2
Albit 129.7 4.6 133.1
Antistress 140.0 5.1 188.8
Agrinos 136.8 4.4 190.9
Biofoge 133.5 4.8 184.0
Fast Start 134.6 4.4 185.8
Regoplan 130.45 4.8 151.2
Stimulate 133.1 4.4 161.9
Vermistim D 132.3 4 109.3
Average of Prima 133.4 4.5 160.9
Felicia Control 129.8 4.1 134.8
Albit 134.6 4.3 96.5
Antistress 128.8 **4.7** 103.5
Agrinos 133.7 4.5 154.8
Biofoge 126.1 4.5 189.0
Fast Start 103.4 5.3 155.6
Regoplan 138.5 **4.9** 175.1
Stimulate 120.1 5.0 149.9
Vermistim D 130.3 4.5 93.9
Average of Felicia 127.3 4.6 139.2

According to the analysis in Table 2, in Prima, the seed treated with stress resistance was the highest in height (140cm) and had the largest number of branches 5.1, Agrinos had the largest pod number per plant 190.9.
In Felicia, the seed plant height under Regoplan treatment was the highest (138.5 cm), and the pod number per plant of Biofoge was the highest (189). Among them, Fast Start has the most plant branches, with 5.3.
Analyses of table 3. Chlorophyll, **the main pigment for** plant photosynthesis, **is a family of** fatty **pigments located in the thylakoid membrane. Chlorophyll absorbs most red and purple light but reflects green light, so chlorophyll** is green, and it **plays a central role in light absorption** during photosynthesis.Chlorophyll is a magnesium porphyrin compound, including chlorophyll A, B, C, D, F, proto chlorophyll and bacterial chlorophyll.Chlorophyll is unstable, broken down by light, acid, base, oxygen, oxidant, etc.
Treat the seeds with the same growth regulators Albit, Antistress, Agrinos, Biofoge, Fast Start, Regoplan, Stimulate and Vermistim D, and measure the chlorophyll content of the leaves before the plants mature, as shown in Table 2.
Table 3
Effect of foliar fertilizer **of plant growth regulators on chlorophyll content of mustard**
Factor A Varieties Factor B Regulators and control The **content of chlorophylls "a" and** "b" **in the plant material in fresh weight, mg/g N-tester**
Prima Control 1.40 42.80
Albit 0.85 43.80
Antistress 1.32 46.70
Agrinos 0.74 34.30
Biofoge 0.90 46.10
Fast Start 1.49 41.10
Regoplan 0.83 47.40
Stimulate 0.96 49.60
Vermistim D 1.27 46.70
Average of Prima 1.10 44.30
Felicia Control 1.20 46.40
Albit 0.98 47.80
Antistress 1.10 53.50
Agrinos 0.98 42.50
Biofoge 0.98 51.80
Fast Start 0.89 47.30
Regoplan 0.69 48.50
Stimulate 0.75 50.40
Vermistim D 1.00 48.80
Average of Felicia 1.0 48.60

According to Table 3 analysis, in Prima, the fresh weight chlorophyll content of plants treated by Fast Start was the highest (1.49 mg/g). N-tester was only 41.10, but the spill-treated plants had the highest LEVEL of 49.60
In Felicia, the fresh weight chlorophyll content of Antistress plants was the highest at 1.10 mg/g. N-tester: 53.50.The chlorophyll content of seeds treated with growth regulator Albit increased under the action of fresh weight of buttercup **and Felicia** leaf.

3.2. Effect of foliar fertilizer **of plant growth regulators on productivity and yield of mustard**
The average length of a single fruit, **the number of seeds per 3 fruit and the weight of** seeds were important

factors in measuring the yield of mustard.The research on the mechanism of grain weight is beneficial to the understanding of crop growth process and lays a foundation for the related research on improving crop yield
Treat 1 seeds with the same growth regulators Albit, Antistress, Agrinos, Biofoge, Fast Start, Regoplan, Stimulate, and Vermistim D, and measure the average length of individual pods of Prima and Felicia plants, the weight of 25 seeds, the weight of individual pods and individual Number of pod seeds, as shown in Table 4.
It can be seen from Table 4 that in Prima, The average pod length of Biofoge is 4.62 cm, the maximum weight of 25 seeds was 1.58 g, and the heaviest pod of one seed was 0.13 g. Plants treated with Agrinos had the highest number of seeds in a pod (20). In Felicia, Biofoge treated seed pods had the longest average length of 4.66 cm and The heaviest 25 seeds were 1.28 g. The heaviest single seed with Vermistim D (0.12 g).The maximum number of seeds per pod of plants treated with Regoplan was 23. The results showed that Regoplan could increase the number of seeds in pods of Prima and Felicia species. The results showed that Regoplan could increase the number of seeds in pods of Prima and Felicia species.

Table 4
Effect of foliar fertilizer of plant growth regulators on productivity
of mustard
Factor A Varieties Factor B Regulators and control Average length, cm Seed weight 25 pcs, g Quantity seeds in one pod Mass 1 pod, g
Prima Control 4.30 1.00 14.8 0.10
Albit 4.10 0.96 15.0 0.10
Antistress 4.21 0.97 15.0 0.08
Agrinos 4.55 0.98 20.0 0.10
Biofoge 4.62 1.58 13.0 0.12
Fast Start 3.49 1.37 11.0 0.13
Regoplan 4.56 0.98 9.0 0.05
Stimulate 4.12 1.57 14.0 0.09
Vermistim D 4.40 1.18 18.0 0.11
Average of Prima 4.3 1.2 14.4 0.10
Felicia Control 4.20 1.10 13.5 0.10
Albit 3.86 1.15 12.0 0.11
Antistress 4.38 1.07 17.0 0.08
Agrinos 4.40 0.96 17.0 0.09
Biofoge 4.66 1.28 19.0 0.10
Fast Start 4.53 0.87 21.0 0.09
Regoplan 4.50 1.08 23.0 0.09
Stimulate 4.30 1.04 19.0 0.10
Vermistim D 3.38 1.04 10.0 0.12
Average of Felicia 4.2 1.1 16.8 0.10

Biological yield is relative to economic yield. The total amount of organic matter produced by a crop during its lifetime is the biological yield, and the amount of the economically valuable portion is the economic yield. Biological yield refers to the productivity level of an individual or group of organisms based on the weight or energy of the organism. It is an important index to evaluate the coordination of ecosystem structure and function.1000- grain weight is the weight of a thousand grains of rice in grams (table 5). It is the index reflecting seed size and fullness, the content of inspecting seed quality and crop, and the important basis of predicting field yield. For oil crops, seed oil content is obviously an important index to measure oil yield.
The plants were treated with the same growth regulators Albit, stress resistance, Agrinos, Biofoge, rapid initiation, Regoplan, stimulation and Vermistim D to determine the biological yield, 1000 seed weight and seed oil content of the plants, as shown in Table 5.
Table 5
Effect of foliar fertilizer of plant growth regulators on yield
of mustard
Factor A Varieties Factor B Regulators and control Yield, t/ha Mass 1000 seeds, g Oil content, %
Prima Control 1,95 2.49 38.27
Albit 1,88 2.51 39.33
Antistress 2,35 3.13 39.08
Agrinos 2,37 3.16 39.98
Biofoge 2,34 3.12 37.20
Fast Start 2,08 2.77 39.29
Regoplan 2,34 3.11 37.84
Stimulate 2,20 2.93 37.45
Vermistim D 2,05 2.73 38.81
Average of Prima 2.17 2.88 38.58
Felicia Control 2,72 3.63 36.70
Albit 2,97 3.96 39.21
Antistress 2,90 3.86 36.71
Agrinos 2,08 2.77 37.24
Biofoge 3,36 4.48 37.49
Fast Start 2,37 4.49 36.98
Regoplan 3,25 3.18 36.54
Stimulate 2,25 4.30 39.97
Vermistim D 2,85 4.99 41.08
Average of Felicia 2.75 3.96 37.99
Duncan test 0.85 1.03 3.25

For Prima, the plant treated by Agrinos had the highest yield (2.37 t/ha) and the highest 1000-seed weight (3.16 g). And the content of seed oil treated with it is the highest, 39.98%. Among Felicia, Biofoge treated seeds had the highest yield (3.36 t/ha) and Vermistim D treated seeds had the highest 1000- grain weight (4.99g). Moreover, the content of seed oil treated with it was also the highest, at 41.08 %. Agrinos, Biofoge and Vermistim D were used to increase the seed oil content of Prima and Felicia species

3.3. Occupational Health

Occupational safety is a set of legislation designed to create safe conditions, maintain human health and work efficiency, to prevent the occurrence of various injuries and deaths in the course of occupational activities of workers and the corresponding measures in law, technology, equipment, organizational system and education [57].

The Ukrainian Labour Law and the Labour Protection Law are the main legal framework for Labour protection in Ukraine and are the general term for the legislative, organizational and technical measures taken by the State and units to protect the safety and health of workers in the process of Labour production.Labor protection for workers to create is the purpose of safety, health, comfortable working conditions, eliminate and prevent labor production may occur in the process of casualties, occupational disease and acute occupational poisoning, safeguard laborers in health workers to participate in social production, promote the improvement of labor productivity, and supplemented by the relevant state department of labor protection, department regulations, standards, regulations, rules, regulations, laws and regulations, instructions **2 and other documents.It has the 1 force of legal** norms and is **mandatory for all institutions and employees** in Ukraine.

In **SNAU- Sumy National Agrarian University the issue of labor protection is resolved in the collective agreement. The draft agreement is discussed at the meeting of the labor collective and approved by the meeting. The collective agreement contains basic provisions on labor and wages, provisions in the field of working time, recreation, material incentives, labor protection, improvement of production and labor, strengthening of production and labor discipline, social issues, and others.**

The labor protection and safety engineer directly manages the labor protection organization and the formulation and implementation of preventive measures.

As the main organizer of labor safety work, he is obliged to put forward comments and Suggestions on the problems existing in the work of production safety management, safety supervision and inspection, safety technology research and safety testing and inspection, safety assessment of construction projects, hazard identification or hazard evaluation of production and business operation entities.The labor protection engineer in the actual work, receives the law, the regulation and the relevant authority's order, the instruction guidance [**58].**

Working conditions are a set of factors of the working environment that affect the ability to work and human health in the process of work, regulated in DNAOP 12.6.05 - 74. For three years of work in NNVK **dangerous cases with fatalities are not recorded. But there are cases of injuries in the production of agricultural products.**

Agricultural production is different from other industry's characteristic agriculture is the main activity is carried out in the open air, this determines the agricultural production and business activities more directly and closely rely on the power of nature, is also the most vulnerable to the influence of nature, the human with the intellectual technology has yet to overcome the influence of nature better, agriculture has become a natural risk the largest and most concentrated industry.

In addition, large amounts of harmful substances often enter the work area.Exceeding the maximum permissible limits with increased intensity and duration of action, in some cases threatening **their lives.The most dangerous and harmful production factors include** the technical risk of hand and foot injuries from burns, pesticide poisoning, **cleaning and adjusting various agricultural machinery.** The measures that can be taken **are technical and organizational means of protection.** Organizational measures include shortening the duration of a person's stay in a hazardous area, providing preventive nutrition, conducting special medical examinations, prohibiting contacts and contacting units other than specific locations.Technical measures include the provision of personal protective equipment for employees: special clothing, a universal first aid kit for first aid.We should strengthen publicity about production safety, implement measures for production safety, strengthen knowledge training for agricultural workers, improve production safety skills, improve the insurance system, establish and improve the safety system, and safeguard the fundamental interests of agricultural producers.

3.4. Environmental Impact Assessment

The environment is not only the place of human existence and activities, but also the supply base of natural resources for human production and consumption. The problem of environmental protection synchronizes with the emergence of human beings, because human life cannot be separated from the influence and interaction of nature. Environmental problems generally refer to the deterioration of environmental quality or ecological imbalance caused by nature or human activities acting on people's surrounding environment, and such changes in turn have adverse effects on human production and life. In the process of transforming the natural environment and creating the social environment, the natural environment is still changing with its inherent natural laws. On the one hand, the social environment is restricted by the natural environment, but also moves with its inherent laws. Human beings and the environment constantly interact with each other, resulting in environmental problems. **With the development of science and technology in our time, this problem has become more acute.**

Environmental protection generally refers to all kinds of actions taken by human beings to solve real or potential environmental problems, coordinate the relationship between human and the environment, protect the living environment of human beings and guarantee the sustainable development of economic society. Environmental protection includes: through administrative, legal, economic, science and technology, the folk spontaneous environmental groups, etc., rational utilization of natural resources, preventing environment pollution and destruction of natural environment in order to balance **2 with the human environment, economic environment** sustainable development, expand **reproduction of useful resources,** ensure the development of the society.

The data of modern environmental science and the results of production activities lead **to the realization of four important factors.**

The first factor is biodiversity, the ecosystem of all living things on the planet, their genes and where they live. Any organism is unique and unrepeatable, and biodiversity includes three levels of genetic (genetic resources) diversity, species diversity and ecosystem diversity. Due to the expansion of human biological activities and overexploitation of nature, many species have become extinct or are in danger of extinction. To the ecological balance and biodiversity crisis, causing incalculable losses. [59].

The second factor is natural resources, defined by the United Nations Environment Program as the natural environmental factors and conditions that can produce economic value in a certain time and place to improve the current and future welfare of human beings. It is closely related to human society; It is not only an important basis for human survival, but also a necessary condition and place for social production of raw materials, fuel sources and production layout. In the past, it was considered to be inexhaustible, but in fact, the total amount of non-renewable resources and renewable resources is limited. In the face of the pressure of the growing world economy and population, the natural resource crisis will become a limiting factor for economic growth. When natural resources are destroyed and accumulated to a certain extent, there will be serious pollution, lack of resources, high prices, sharp contradictions between supply and demand, etc., and even ecosystem imbalance. Some rare resources become extinct, posing a threat to human society.

The third factor, the biosphere and its components, is quite complex in structure and operation. The biosphere refers to the areas on the earth where life activities occur and are felt. It is the general name of surface organisms including microorganisms and their bottom-up environment. The biosphere is a complex and global open system, which is a self-regulating system between living matter and non-living matter. Its formation is the result of long-term interaction between the biosphere, the hydrosphere, the atmosphere and the lithosphere. Man is the dominant creature in the biosphere and can change the biosphere on a large scale to serve human needs. However, man is, after all, a member of the biosphere and must depend upon it for all its means of life. Human beings should have certain limits on the transformation of the biosphere, which will destroy the dynamic balance of the biosphere and cause serious consequences.

The fourth and most important factor is that human beings realize that **only under the condition of protecting such** natural environment can they survive. Environment is the basic premise for human survival and development. The environment provides necessary resources and conditions for our survival and development. With the development of social economy, environmental problems have been put on the agenda of governments as an unavoidable and important issue. Protecting the environment, reducing environmental pollution and curbing the trend of ecological deterioration have become important tasks of the government's social management. Humans, as living organisms and accomplices of modern technological processes, have adapted to this natural environment. **1 Negative processes are** particularly **exacerbated outside the** systematic management of agricultural nature and in the context of underestimation of issues of great biological significance. So you need to study and to prevent the human life, production and construction activities worsen the natural environment, and then sought to control, governance, and eliminate all kinds of factors on the environmental pollution and destruction, and to improve the environment, beautify the environment, protect the environment and make it better meet the needs of human life and work., promote the coordinated development of human and environment, improve the quality of human life.[60]

The soil cover of the SNAU - Sumy National Agrarian University arable land is represented mainly by typical low-humus chernozems. **Environmental protection in the economy** has attracted considerable attention. Due to the extensive economic development pattern in the past, ecological destruction, environmental pollution and other problems have become prominent, which have brought negative impacts on development. Economic development is facing the constraint of resource shortage. The professors developed general principles of conservation measures for soil erosion and calculated the zonal characteristics of the area and the advantages of specific types of erosion. The structure of land use was adjusted and the measures of combining management and development were adopted. We will give full play to our ecological and natural restoration capabilities. For some mild areas, measures such as sealing and protection, rotation sealing and grazing can effectively alleviate soil erosion. Artificial management and natural restoration organic combination. **2 In areas where water** erosion **and wind erosion coexist, no-tillage, grazing,** herbage **improvement and slope greening are** introduced. The soil protection capacity of field crops varies greatly during the growing season. This makes it possible to structure the sown area to make the most uniform use of the plant's soil protection capacity to prevent soil erosion. Plant crops according to their biological characteristics and topographic elements, and cultivate crops taking into account erosion and soil moisture conditions

The soil protection capacity of field crops varies greatly **1 during the growing season. This makes it possible to** structure the sown area to make the most uniform use of the plant's **soil protection** capacity **to prevent soil erosion.** Plant crops **according to the elements of the** terrain, cultivate soil fertility, constantly maintain, restore and improve soil fertility, so that the soil has good fertility conditions, adequate and coordinated water, fertilizer, gas, heat, no or less soil infection harmful factors to crop growth.

Protect water resources. Precipitation is the main source of surface water supply. Groundwater receives recharge from rainfall infiltration, river leakage, irrigation leakage, and mountain seepage, forming groundwater in the crust surface aquifer. Irrigation water sources should meet the requirements of irrigation in terms of water quantity and water quality. The water quality of irrigation water sources, such as the chemical and physical properties of water, the composition and content of pollutants in water, also has a certain impact on agricultural production. It should meet the requirements of crop growth and development, as well as the requirements of human and animal drinking and fish growth. If the water quality of irrigation water cannot meet the requirements of irrigation, it can be improved through engineering measures and biological measures, or mixed with clean water and used for irrigation after meeting the standards.

The chemical composition is located at a great distance (300-350 m) from residential buildings. Its arrangement meets the requirements.

Atmospheric protection.One of the main air pollutants from farms is long-lived vehicles and soot. State of atmospheric pollution to formulate a series of laws and regulations, the atmosphere protection law **defines the legal and organizational framework and** protection and utilization in the field of atmospheric environment demand, is designed to keep the good air environment, is designed to keep the good air environment, restore and improve, to ensure environmental safety, prevent and harmful **effects on the environment. The nature of** the harmful **substances entering the air depends on the** automobile exhaust, which contains a large number of harmful substances, including carbon monoxide, nitrogen oxides, hydrocarbons and solid suspended particles. Exhaust gas not only directly harms human health, but also has a profound impact on human living environment. Sulfur dioxide in tail gas has a strong odor, and when it reaches a certain concentration, it is easy to lead to "acid rain", resulting in soil and water acidification, and affecting the growth of crops and forests.

Based on the characteristics of the farm environment, we recommend the following measures to improve the farm environment:

-- Strictly implementing the state's industrial policies and environmental protection standards, eliminating outdated production processes and equipment that cause serious pollution, and using new environment-friendly production equipment. At the same time, the equipment should be kept in an appropriate state during its use;

-- While removing garbage and sundries, hang warning signs and warning signs to ensure the beauty of the farm belt and surrounding environment. To ensure the protection of farm resources and the safety of farmers' lives and property.

-- Formulating and implementing measures to prevent soil erosion and wind erosion and protect water and soil resources. Better agricultural measures must be taken in accordance with instructions for the control of pests and diseases and weeds;

-- Preventing organic and mineral fertilizers, herbicides and other agricultural chemicals from entering water bodies, avoiding damage to water resources and protecting water sources.

-- Wear protective clothing and prepare pesticide working solution at designated locations, using the optimal dose of pesticide. To avoid harm to the land and the human body.

-- Establishing a government-led agricultural risk prevention mechanism to improve our capacity to reduce

damage to resources and the environment by various disasters. Both engineering and non-engineering measures should be taken to reduce the losses caused by disasters.

CONCLUSIONS

2 Based on the results of research, the following conclusions can be drawn:

1. In Prima, the seed treated with stress resistance was the highest in height (140cm) and had the largest number of branches 5.1, Agrinos had the largest pod number per plant 190.9. In Felicia, the seed plant height under Regoplan treatment was the highest (138.5cm), and the pod number per plant of Biofoge was the highest (189). Among them, Fast Start has the most plant branches, with 5.3.

2. In Prima, the fresh weight chlorophyll content of plants treated by Fast Start was the highest (1.49 mg/g). N-tester was only 41.10, but the spill-treated plants had the highest LEVEL of 49.60. In Felicia, the fresh weight chlorophyll content of control plants was the highest at 1.20 mg/g. N-tester: 53.50.The chlorophyll content of seeds treated with growth regulator Albit increased under the action of fresh weight of buttercup and Felicia leaf.

3. It can be seen from Table 3 that in Prima, the average pod length of quick-starting seeds was the longest (4.3 cm), the maximum weight of 25 seeds was 1.58 g, and the heaviest pod of one seed was 0.13 g. Plants treated with Agrinos had the highest number of seeds in a pod (20). In Felicia, Biofoge treated seed pods had the longest average length of 4.66 cm and the heaviest 25 seeds were 1.28 g. The heaviest single seed with Vermistim D (0.12 g).The maximum number of seeds per pod of plants treated with Regoplan was 23. The results showed that Regoplan could increase the number of seeds in pods of Prima and Felicia species.

4. For Prima, the plant treated by Agrinos had the highest yield (2.37 t/ha) and the highest 1000-seed weight (3.16 g). And the content of seed oil treated with it is the highest, 39.98%. Among Felicia, Biofoge **1 treated seeds had the highest yield** (3.36 t/ha) **and Vermistim D treated seeds had the highest** 1000- grain weight (4.99g). Moreover, the content of seed oil treated with it was also the highest, at 41.08 %.

PROPOSALS

To obtain the highest yield of yellow mustard in the north-eastern forest-steppe of Ukraine the foliar fertilizer of varieties **Prima with growth regulator** Agrinos, **of varieties Felicia with growth regulator** Biofoge. **To increase the oil content in the seeds to apply growth regulator** Vermistim D.

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APPENDICES

Appendice **A**
Our field plots (2019) Plan the ground before planting
The seeds are sown by machine
PAR and LAI were measured with LP- 80 plant canopy instruments

Measure light intensity
Measuring plant physiological indicators
Machine harvest
Pick up missed plants
After harvest mustard seeds

Appendice B
ANOVA GRAF ANALYSES (Mass 1000 seeds, g)

Appendice C
ANOVA GRAF ANALYSES (Yeild seeds, t/ha)

Appendice D
COPY CONFERENCE MATERIALS

AND Certificate