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Rape and its phytosanitory properties

Aim Comprehensively to investigate the effect of rapeseed on forming to the microbiome of soil. Methods. Microbiological, biochemical, physical and chemical, statistical. Results Generally given in relation to the effect of winter-annual rape on the composition and biological activity of the ground microorganisms for growing it in a crop rotation and at a stretch. The amount of biomass of bacteria in a crop rotation comparatively with the variants of monoculture was increased by 1.8 times, the quantity of oligonitrophilic bacteria that participate in the transformation of remaining quantities of organic substances - in 2.3, streptomyceses - in 1.4 and more than times. Conclusions. Rape is winter-year-round for growing at a stretch and finds significant influence on the formation of the ground microbiota, here its biomass diminishes in soil. The high satiation of rape crop rotations that has been observed has not improved the last years, and significantly worsens the phytosanitary state of soil.

Key words: rape, crop rotation, ground microorganisms, biological activity.

Rape is a valuable predecessor, by a significant feed and by a sideral culture that improves the phytosanitary state of soil [13]. For the last decade, he has fixed the competition positions in the world market, he has grown substantially in the gross collections of his seed, and the markets for sales have been expanded. Areas under this oil-bearing culture increase annually. And now, after rape sowing areas, it occupies a 3rd place among the oil-bearing crops, yielding only sunflower and soy. However, in spite of the high enough profitability and use in many industries of production, the analysis of sowing of rape testifies to his defeat of causative agents of different etiology. It should be noted that the diseases of rape can entail a significant shortage of harvest and a significant decline in the quality of green mass and seed. Content of carotin, dry matter, cellulose, ash increases in staggered plants, however maintenance of vitamin C, protein, fat, sugar goes down largely.

Research and scientific data in relation to bacterial and viral diseases are littlenumeral. Failure to observe the basic requirements of the technology of growing to rape (predecessor, ploughing, quality sowing), and especially high satiation of crop rotations in this culture, which has been observed in recent years, results in a rise in percentage of plants, staggered precisely by bacterial causative agents that are no less harmful than mushrooms [15]. Negative factors are marked by higher effects and on the natural phenomenon of rape as the phytosanitary fields.

An aim of researches is a comprehensive study of the influence of rape on the formation of microbioma of soil.

Methodology of researches. Researches conducted in the course of a growing rotation for rape growing in winter-year-on-year in the conditions of the Forest-steppe North during the period from 2010 to 2013. Standards of soil taken away by winter-annual in a rape crop rotation: clover semipairs (a clover of 2nd is with one hay-crop), winter-annual rape, a winter wheat is a winter-annual + post-harvest cultures, corn on grains, buckwheat or barley with sowing of long-term herbares. In addition, the winter-annual rape analyzes of the standard of soil after the return of the rape are the same at 3-7 at the permanent sowing. Fertilizers brought in under the technology of growing rape winter-annual for this zone. Soil of the experienced field - meadow-chernozem carbonate. Provision of plants nitrogen and phosphorus - middle, by potassium - subzero. Object of researches - Rape is a winter-annual to the sort of Arion. The article describes the composition and biological activity of microflora of meadow-chernozem of carbonate soil for growing to winter-annual rape.

Microbiological analyzes are carried out using a method of breeding the ground suspensions with the use of nourishing selective environments [5]. We took into account the general quantity of ammonium bacteria on a meat pepper agar (MPA), spore-forming bacteria - meat-wort agar (MPA + CA), streptomyces and bacteria that master mineral nitrogen - starch ammonia agar (KAA), oligonitrophilic microorganisms on the environment of Ashby, cellulose-destroying on the environment of Gethchinson, microfunguss - wort agar (CA), in addition, took into account the amount of bacteria that grow on agarized to ground extraction (AND). During the study of specific composition of неспорових bacteria used such nourishing environment: 1 л of cabbage decoction (100 gs of cabbage are on 1 л of water), 25 mls of beer сусла, 1,25 mls of corn extract, pH environment 7,0-7,2 [5].

The microbal biomass was calculated on the basis of data after the amount and size of cages of a specific gravity of 1.08 gs / cm3 [6, 7]. The productivity of bacterial cages and products of biomass of bacteria was determined taking into account the increase of quantity or biomass of bacteria for the period of surveillance [1].

For finding out of typical and dominant types of microorganisms, we used averaged standards of soil, made from 25 to 30 tests taken in different places of the investigated area. At determination of typical and dominant types, the indexes of frequency of occurrence and abundance of types [17] were used. Typical conditionally counted types that were distinguished by more than one third of all standards (incidence over 33%), and the dominant are kinds which represented not less than 10% of all other types.

Quality composition of the bacteria was determined according to the descriptions, Bergi over brought in a determinant [16], microfungus - after standard methodsologies [7, 8]. Non-porcupine of the bacterium determined after Smirnov, Cyprian [14], streptomycetes - on a chart [3].

For the selection and cultivation of phytopathogenic bacteria, the determination of pathogenic properties of isolates, the account of aggressiveness of stamms and their cultural-physiological properties was studied after the generally accepted classical methods [9].

The intensity of "breathing" of the soil was determined after the selection of CO2 by a gas chromatographic method in the system, soil is an atmosphere [7].

The mathematical processing of experimental data was carried out in accordance with the methodology of Dospekhov [4].

Results of researches. By theoretical basis of the technology of growing to rape, there is the interaction of plants with the ground environment, in particular with the microorganisms that live in it. A microbe in the process of viability creates terms for the development of other higher forms of life. However, the complex of the issues related to the change of viability of microorganisms and biochemical processes that occur in the soil as a result of growing of plants, is quite difficult and in many cases still unclear [1, 10].

The analysis of changes in the general nutrient content of the soil, which is characterized by the development of basic ecological trophic groups of microorganisms, showed that different groups reacted differently to rape growing winter-annual at different satiations and in a crop rotation (Table 1). Return of him in a crop rotation before 7th years results in a decline in the amount of soil and biomass of the bacteria. Yes, the biomass of bacteria in a crop rotation comparatively with the variants of monoculture was increased by 1.8 times, the quantity of oligonitrophilic bacteria that participate in the transformation of remaining quantities of organic substances - 2.3, streptomyceses - in 1.4 and more than times. An amount of bacteria able to form colonies on the ground agar in a crop rotation was 2.1 times higher than in a monoculture.

1. Amount and biomass of microorganisms in the meadow-crop soil for growing to rape winter-annual in a crop rotation and at a stretch (there are middle data for 2010-2013)

The table of contents of mushrooms, opposite, increased 1.8 times during growing to rape, winter-annual in a monoculture comparatively with a crop rotation. Research on the specific composition of mushrooms was demonstrated in monoculture, the dominant being Alternaria of brassicicola, Alternaria of brassicae, Alternaria of tenuis, Phoma of lingam, Peronospora of brassicae, Fusarium of oxysporum, Botrytis of cinerea. They are causative agents of alternaria, fomos, fusariosis, peronosporosis, gray rot and others like that.

Increase of the amount of bacilli and streptomycetes in the soil of crop rotation testifies to the deeper destruction of organic matter. These groups of microorganisms master connections are often inaccessible for non-porous bacteria, and develop on the substrate is impoverished by accessible connections [11, 12]. The

index of mobilizational processes in soil are also cellulose-destructive microorganisms. From data of table. The maintenance of these microorganisms in a crop rotation is more than 2.6 times comparative with the permanent sowing. In a crop rotation, the amount of cellulosicidal microorganisms presented in 35.4, in monoculture is 13.3 thousand / g of dry soil. The results of our researches show that mobilizational processes in the soil for the duty of plants take place more intensively than at their permanent growth [11, 12].

Analogical changes have been discovered in the dynamics of quantity of microflora, which, of course, is predefined by certain processes of receipt and organic material curriculum. The most numerous group of saprophyte microorganisms is the bacilli and microfungues that prevail in the soil of crop rotation in the phase of forming the rape pods in winter-year, while the amount of oligonitrophilic bacteria in this time diminishes significantly. For a streptomycetes, the difference in the variation of experience is insignificant.

Results of the study of the biological activity of the microflora for growing rape in winter-year-round in a crop rotation and at a stretch is resulted in a table. 2. For growing this rape, the winter-year-round in a crop rotation comparatively with the constant sowing of the selection of CO_2 increases by 2.7 times. Decomposition of the lockram during 45 twenty-four hours in a crop rotation represented 32%, at constant growth - 21%. These data testify that during the growing of agricultural cultures in a less than desirable way, the conditions are created for the viability of microorganisms, which results in their biological activity.

The study of the specific composition of bacteria showed that in most cases the same types occurred for growing winter-annual rape in a crop rotation and at a stretch. However, the frequency of their occurrence and the closeness of species differed (table .3) substantially.

2. Intensity of selection of CO_2 by луговочорноземним soil for growing to ріпаку winter-annual in a crop rotation and at a stretch

3. To the type and dominant types of non-articular bacteria in the winter rice reaper rhizosphere for growing in a crop rotation and at a stretch

In the rhizosphere of the winter-year-old rape, which was grown at a stretch, it was more likely that Arhtrobacter of globiforvis, A. tumescens, Flavobacterium of suaveolens, Pseudomonas fluorescens, P. syringae pv. maculicol, Xanthomonas of campestris pv. ampersand It should be noted that for growing to rape, the growth of the rape was more frequent than the microorganisms of a variety of Pectobacterium that occurred in a crop rotation, Pseudomonas and Xanthomonas, and the types of Arhtrobacter dominated in the variant of crop rotation, Brevibacterium, Nocardia and others like that, which is distinguished by high biochemical activity.

Population of causative agents of rabies bacterial diseases in the wild heterogeneous - 78% highly- and medium-aggressive and 11% - low-aggressive stamms [2]. It should be noted that among the isolates distinguished by us the causative agent of mucous subteriosis Pectobacterium appeared most aggressive carotovorum subsp. Saratovorum, the least aggressive is a polyphage of Pseudomonas fluorescens. All stamms investigated by us are aggressive enough on rape and on basic morphological and biochemical properties of the family with the basic causative agents of the backtheriosis of chums of Xanthomonas of campestris pv. campestris, mucous backtheriosis of Pectobacterium of carotovorum subsp. Saratovorum and Pseudomonas fluorescens.

Growing its rape, winter-annual at a stretch, resulted in a decline in its productivity (table 4). Dimensioning the productivity in the variant of the permanent seed by comparison with a rotation was 60%. The significant decline in productivity was observed in the winter-yearly rape return on the same field in 3 years (24%) ..

4. Productivity of rape is winter-annual for growing at a stretch and in a crop rotation

Conclusions

On results researches, rape is a winter-year-old for growing at a stretch, and finds significant influence on the formation of the ground microbiota, here is the diminution of its biomass in soil. The amount of bacilli goes down, oligonitrophilic and cellulose-destroying microorganisms and biological activity of soil. Certain changes are observed in the quantity of microorganisms, which is predetermined by the originality of organic matter receipt and curriculum processes in a rotation. Mobilizational processes in the soil of a variant of crop rotation take place more intensively than for rape growing at a stretch. In addition, the accumulation of causative agents of rape backtheriosis of the winter-annual Xanthomonas of campestris pv. campestris,

mucous backtheriosis of Pectobacterium of carotovorum subsp. carnotovorum and Pseudomonas fluorescens, and also increase 1.8 times of microfunguss during growing to rape, winter-annual in a monoculture by comparison with a crop rotation, in particular mushrooms of Alternaria of brassicicola, Alternaria of brassicae, Alternaria of tenuis, Phoma of lingam, Peronospora of brassicae, Fusarium of oxysporum, Botrytis of cinerea, which are the causative agents of alternaria, fomos, fusariosis, peronosporosis, gray rot and others like that, testify to the loss of phytosanitary properties of rape. Failure to observe the basic requirements of the technology of growing rape and, especially, the high saturation of crop rotations this culture, which has been observed in recent years, does not improve, and significantly worsens phytosanitary state of soil.

Bibliography

1. *Аристовская Т.В.* Теоретические аспекты проблемы численности, биомассы и продуктивности почвенных микроорганизмов. Вопросы численности, биомассы и продуктивности почвенных микроорганизмов/Т.В. Аристовская. — Л., 1972. — С. 7–20.

2. *Захарова О.М.* Бактеріальні хвороби ріпаку/О.М. Захарова, М.Д. Мельничук, Л.А. Данкевич, В.П. Патика//Мікробіологічний ж-л. — 2012. — 74. — № 6. — С.46–52.

3. *Валагурова Е.В.* Актиномицеты рода *Streptomyces* (описание видов и компьютерная программа их идентификации)/Е.В. Валагурова, В.Е. Козырицкая, Г.А. Иутинская. — К.: Наук. думка, 2003. — 648 с.

4. *Доспехов Б.А.* Методика полевого опыта/Б.А. Доспехов. — М.: Колос, 1973. — 336 с.

5. *Експериментальна* ґрунтова мікробіологія: монографія/В.В. Волкогон, О.В. Надкернична, Л.М. Токмакова та ін.; за ред. В.В. Волкогона. — К.: Аграр. наука, 2010. — 464 с.

6. *Звягинцев Д.Г.* Плотность (удельный вес) клеток микроорганизмов/Д.Г. Звягинцев, Л.М. Рогачевский//Микробиология. — 1973. — Т. 42, № 5. — С. 892–898.

7. *Кириленко Т.С.* Атлас родов почвенных грибов/Т.С. Кириленко*;* под ред. Н.М. Пидопличко. — К.: Наук. думка, 1977. — 128 с.

8. *Методы* изучения почвенных микроорганизмов и их метаболитов. — М.: Изд-во МГУ, 1966. — 216 с.

9. *Методы* исследования возбудителей бактериальных болезней растений/К.И. Бельтюкова, М.С. Матышевская, М.Д. Куликовская, С.С. Сидоренко. — К.: Наук. думка, 1968. — 316 с.

10. *Патика В.П.* Мікроорганізми і альтернативне землеробство/В.П. Патика, І.А. Тихонович, І.Д. Філіп'єв та ін.; за ред. В.П. Патики. — К.: Урожай, 1993. — 176 с.

11. *Патыка Н.В. Роль Linum usitatissium l.* в формировании микробных сообществ подзолистых почв/Ю.В. Круглов, А.М. Бердников, В.Ф. Патыка//Мікробіологічний ж-л. — 2008. — Т. 70. — № 1. — С. 59–70.

12. *Рослинництво.* Технології вирощування сільськогосподарських культур/В.В. Лихочвор, В.Ф. Петриченко, П.В. Іващук, О.В. Корнійчук; за ред. В.В. Лихочвора, В.Ф. Петриченка. — 3-є вид. — Львів: НВФ «Українські технології», 2010. — 1088 с.

13. *Симочко Л.Ю.* Роль *Capsicum annum L.* у формуванні мікробної спільности дерново-підзолистих ґрунтів Закарпаття/Л.Ю. Симочко, С.М. Кормош, В.П. Патика//Вісн. Харківського НАУ. Серія біологія. — 2011. — Вип. 2 (23). — С. 95–104.

14. *Смирнов В.В.* Бактерии рода *Pseudomonas/В.В. Смирнов, Е.А. Киприанова.* — К.: Наук. думка, 1990. — 264 с.

15. *Фітопатогенні* бактерії. Бактеріальні хвороби рослин/Р.І. Гвоздяк, Л.А. Пасічник, Л.М. Яковлева та ін.; за ред. В.П. Патики. — К.: ТОВ «НВП «Інтерсервіс», 2011. — 444 с.

16. *Boore D.R.* Bergey's manual of systematic bacteriology/*D.R. Boore, R.W. Castenholz;* ed. *G.M. Garrity,* editor-in-chief. — 2nd ed. — New York, Berlin, Heidelberg: Springer, 2005. — V. 2, Part C. — 1388 p.).

17. *Tresner H.D.* Soil microfungi in relation to the hardwood forest continium in Sourher Wisconsin/ H.D. Tresner, V.H. Backus, J.T. Curtis. — Mycologia. — 1954. — 46, № 3. — P. 314–333.