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THE CULTIVAR STUDIES OF BEETROOT IN ALMATY REGION

Annotation

In article the results of studies variety the table beet. Established the most productive varieties for the climatic conditions of Almaty region

Key words: table beet, variety, productivity, economic efficiency

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SPECIES COMPOSITION OF CAUSAL AGENTS OF POTATOES EARLY BLIGHT (CULTIVAR BERKUT) ON THE SOUTHEAST OF KAZAKHSTAN

Abstract

Potato brown leaf spot or early blight of potato leaf (*Solanum tuberosum* L.) is widely known throughout the world. Identification of the causative agent is often carried out on the basis of a specific accessory of the host plant or symptoms of the disease. The aim of the present study was to determine the species composition of brown spot pathogens of potato leaves (cultivar Berkut) on the southeast of Kazakhstan. In the study of herbarium material it found that there is a mixed infection on the leaves of potato cultivar Berkut. Species with small conidia, *Alternaria tenuissima* (Kunze) Wiltshire, from species complex *'Alternaria alternata*' is marked in most lesions. Species *Alternaria solani* Sorauer, characterized by large conidia and long acrogenous outgrowths with branches, is marked much less. Micro and macroconidia of *Fusarium oxysporum* Schltdl. are detected in the same lesions.

Keywords: leaf blight of potatoes, disease, potato, species complex, *Alternaria solani, A. tenuissima, Fusarium oxysporum.*

Introduction

Potato brown leaf spot or early blight of potato leaf (*Solanum tuberosum* L.) is widely known throughout the world. However, identification of the causative agent is often carried out on the basis of a specific accessory of the host plant or symptoms of the disease that does not give reliable knowledge about the composition of pathogens and their distribution [1, 2].

The aim of the present study was to determine the species composition of brown spot pathogens of potato leaves (cultivar Berkut) on the southeast of Kazakhstan.

Materials & methods

Collecting leaves of potato plants infected with agents of brown spots, carried out in 2016 at the experimental fields of the Kazakh Research Institute of Potato and Vegetable (south-east region of Kazakhstan). Leaves with typical symptoms of the fungal disease were placed in a moist

chamber for 5-7 days at a temperature of 20-25º C to stimulate sporulation. Previously they were washed with running water and disinfected with a weak solution (1%) of potassium permanganate.

Microscopy and photography of samples was carried out using Polyvar photomicroscope with Nomarski contrast interference optics.

The following parameters were taken into account in the study: the length and width of conidia, presence and length of the apical outgrowth, the shape of conidia, the number of transverse and longitudinal septa, the presence and severity of constrictions, the presence of secondary septa, and the color of conidia [3].

Results & discussion

In the study of herbarium material it found that there is a mixed infection on the leaves of potato cultivar Berkut. Species with small conidia, *Alternaria tenuissima* (Kunze) Wiltshire, from species complex *'Alternaria alternata*' [4] is marked in most lesions. Conidia in chains, colored (brown, gray-brown or olive-brown). There are 3-7 transverse septa in conidia (Figure 1.), and 1-2 partial longitudinal septa (usually only in the central cells). Some conidia have quite long (up to 70-75 m) acrogenous outgrowths. Secondary conidiophores may occur as lateral and apical. Chains of conidia under the microscope are usually scattered.

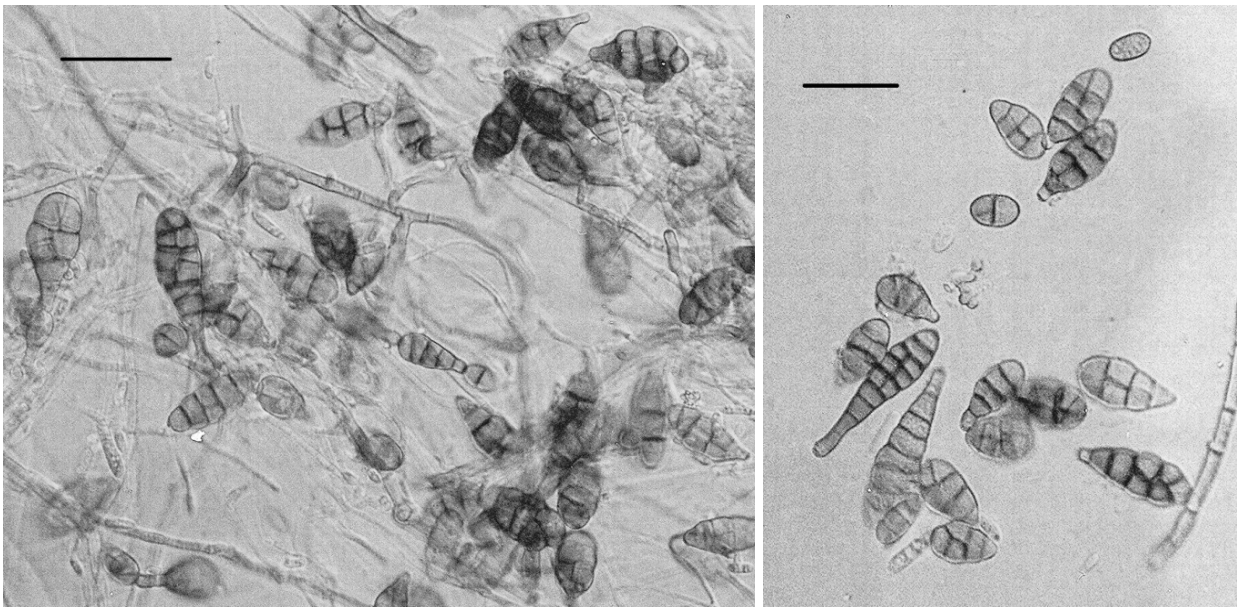

Figure 1 – Conidia of *Alternaria tenuissima* on the leaves of cultivar Berkut.
Bars = 25 μm

The sizes of conidia vary considerably (Table 1).

Table 1 – Sizes of conidia of species of the genera *Alternaria* and *Fusarium* on the cultivar Berkut (August, 2016), μm.

№	Name of the pathogen	Length of conidium		Width of conidium	
		min-max	M±m	min-max	M±m
1	*Alternaria solani*	70,4-167,1	115,3±27,6	18,1-26,1	20,6±1,18
2	*Alternaria tenuissima*	18,1-44,2	30,8±7,02	10,1-18,1	13,1±1,71
3	*Fusarium oxysporum* (microconidia)	8,0-14,1	10,41±1,34	4,0-6,0	5,52±0,72

4	*Fusarium oxysporum* (macroconidia without septa)	16,1-32,2	20,6±7,15	6,0-8,0	6,5±0,88

Alternaria solani Sorauer, is marked on this cultivar much less. The species is characterized by colored (from pale to olive-brown), clavate or elongate-clavate conidia (Figures 2-5) with 6-19 transverse septa and 0-8 longitudinal septa, in short chains [5, 6]. Sizes of conidia are (75-350 x 20-30) μm. The acrogenous outgrowths is very long, sometimes gives branches (Figure 2).

Fusarium oxysporum Schltdl. is detected in the same lesions. At the time of research microconidia (Figures 5, 6) and young macroconidia without septa (Figure 7) were observed, the size of which varied quite significantly (Table 1).

Thus, *Alternaria solani*, *A. tenuissima* and *Fusarium oxysporum* are marked as agents of early blight of potato leaf or potato brown leaf spot (cultivar Berkut).

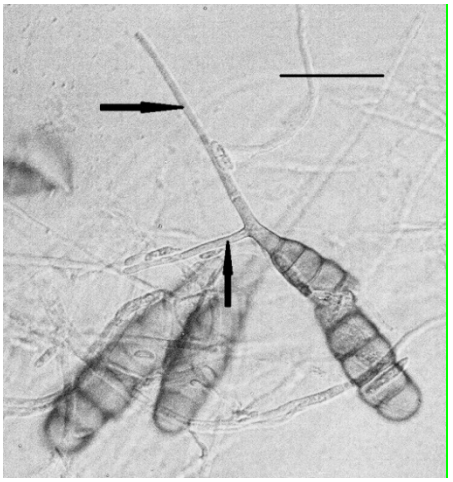

Figure 2 – Conidium of *Alternaria solani* with the branching acrogenous outgrowth (arrow). Bar = 50 μm

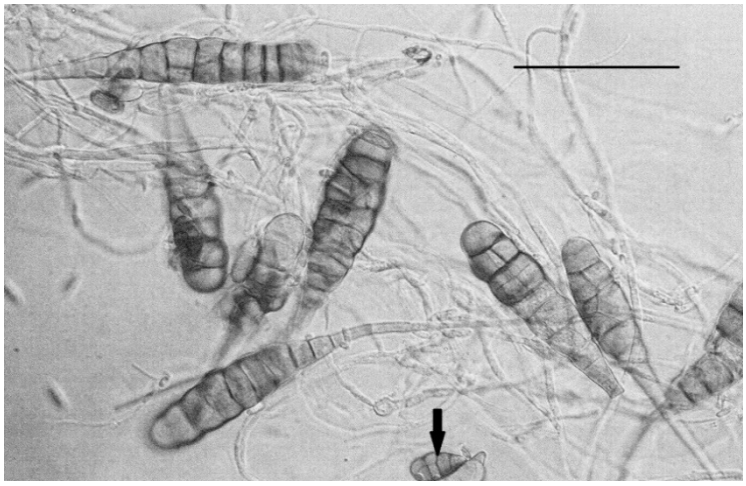

Figure 3 – Conidia of *Alternaria solani,* arrow shows conidium of *A. tenuissima*. Bar = 75 μm

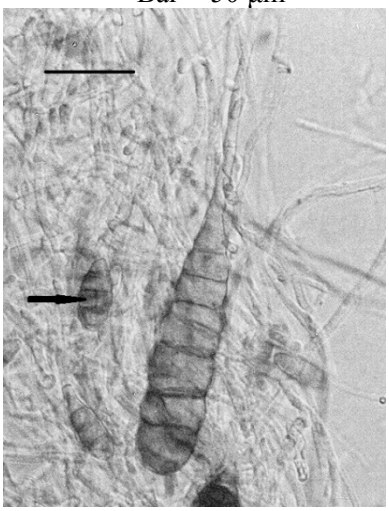

Figure 4 – Conidium of *Alternaria solani,* arrow shows conidium of *A. tenuissima*. Bar = 40 μм

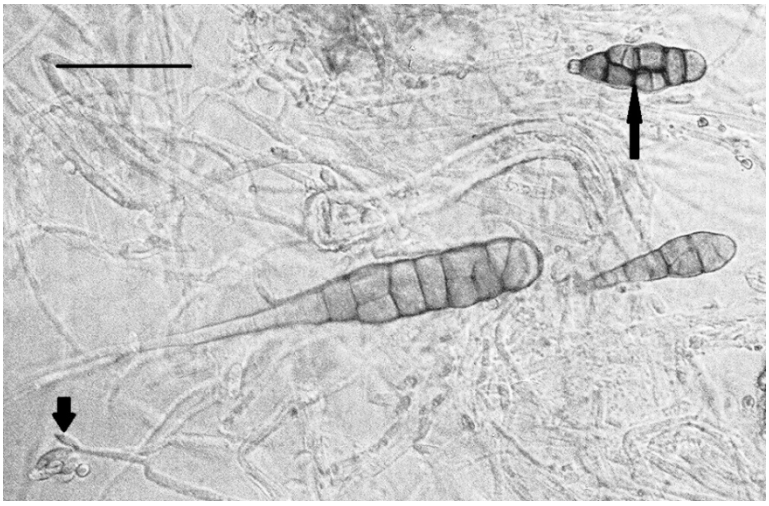

Figure 5 – Conidium of *Alternaria solani,* long arrow shows conidium of *A. tenuissima,* short – microconidial sporulation of *Fusarium oxysporum*. Bar = 40 μm

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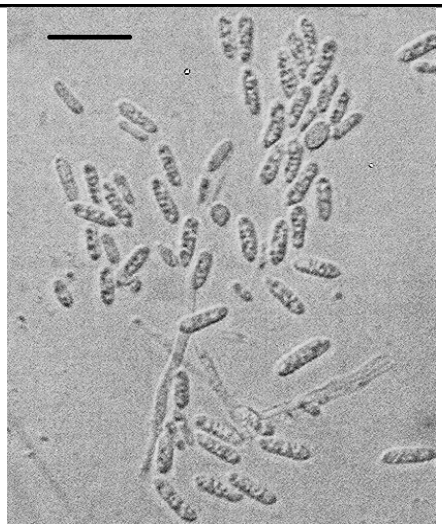

Figure 6 – Microconidia of *Fusarium oxysporum*. Bar = 15 μm

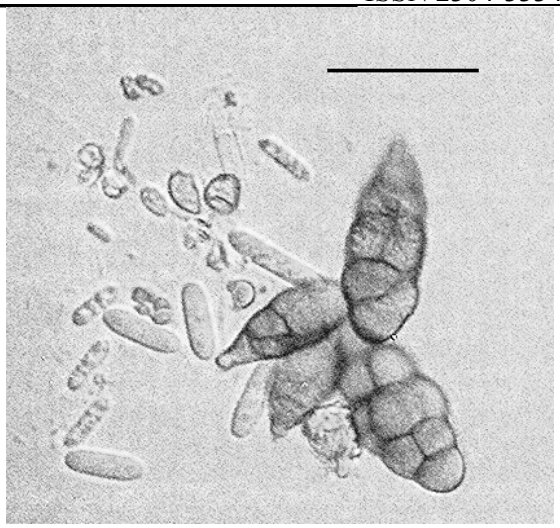

Figure 7 – Macro- and microconidia of *Fusarium oxysporum* and conidia of *A. tenuissima*. Bar = 40 μm

Comparing our results with the literature data, it should be noted that in the territory of the Leningrad region polyphagous species *A. tenuissima* was found more often than others pathogens on potato (this species is usually considered saprotroph, weak or secondary pathogen) while representatives of the species complex of *'A. infectoria*', *A. alternata* and *A. avenicola* were represented by single finds [1]. Species *A. solani* with large conidia and long acrogenous outgrowths was identified on potato leaves in the Khabarovsk and Primorsky regions [1].

It is believed that warm sunny weather coupled with high humidity and occasional rain [7] helps to intensive reproduction of A. solani on potato leaves, which was observed in Kazakhstan in the early summer of 2016.

Conclusion

Alternaria solani, *A. tenuissima* and *Fusarium oxysporum* are marked as agents of early blight of potato leaf or potato brown leaf spot (cultivar Berkut).

References

1. *Gannibal F.B.* Alternariosis of potato leaves – species composition, taxonomy and nomenclature of the disease agent // Laboratory of a mycology and phytopathology of A. A. Yachevsky VIZR. History and present. Ed. of A. P. Dmitriyev. – SPb.: VIZR, 2007. – P. 142-148. [In Russian]

2. *Orina A.S., Gannibal F.B., Levitin M.M.* A specific variety, biological features and geography of the fungi of the genus *Alternaria* associated with plants of *Solanaceae* family // Mycology and Phytopathology – 2010, 44 (2). – P. 150-159. [In Russian]

3. *Gannibal F.B.* Monitoring of alternariosis of crops and identification of fungi of the genus *Alternaria* (A methodical grant) – SPb: VIZR, 2011. – 70 p. [In Russian]

4. *Suleymenova S.E., Krasavin V.F., Moshnyakov A.N., Koybagarov E.S.* For identification a pathogen causing early blight disease of potatoes on the southeast of Kazakhstan // Proceedings of the international scientific-practical conference of young scientists "The intellectual potential of the XXI century: the contribution of the young scientists to the development of agricultural science". – Almaty, 2015. – Vol. 3. – P. 21-25. [In Russian]

5. *Rao V.G.* The fungus genus *Alternaria* Nees in Bombay-Maharashtra-I. // Sydowia Annales Mycologici. – 1964, 18. – P. 44–64.

6. *Rao V.G.* The genus *Alternaria* from India. // Nova Hedwigia. – 1969, 17. – P. 219–258.

7. *Ivanyuk V.G., Banadysev S.A., Zhuromsky G.K.* Protection of potatoes against diseases, pests and weeds. – Mn.: RUE "Belarusian research institute of potato", 2003. – 550 p. [In Russian].

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ВИДОВОЙ СОСТАВ ВОЗБУДИТЕЛЕЙ БУРОЙ ЛИСТОВОЙ ПЯТНИСТОСТИ КАРТОФЕЛЯ (СОРТ БЕРКУТ) НА ЮГО-ВОСТОКЕ КАЗАХСТАНА

Аннотация

Бурая или ранняя пятнистость листьев картофеля (*Solanum tuberosum* L.) широко известна во всем мире. Идентификация возбудителя часто проводится на основе видовой принадлежности растения-хозяина или симптомов заболевания. Целью настоящих исследований было установление видового состава возбудителей бурой пятнистости листьев картофеля (сорт Беркут) на юго-востоке Казахстана. При изучении гербарного материала обнаружено, что на листьях картофеля сорта Беркут наблюдается смешанная инфекция. В большинстве пятен поражения отмечен мелкоспоровый вид из комплекса видов *'Alternaria alternata' – Alternaria tenuissima* (Kunze) Wiltshire. Значительно реже на этом сорте отмечен вид *Alternaria solani* Sorauer, характеризующийся крупными спорами и длинным акрогенным выростом с боковыми ответвлениями. В тех же пятнах поражения обнаружен *Fusarium oxysporum* Schltdl.

Ключевые слова: бурая листовая пятнистость картофеля, болезнь, картофель, комплекс видов, *Alternaria solani, A. tenuissima, Fusarium oxysporum.*

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ОҢТҮСТІК-ШЫҒЫС ҚАЗАҚСТАНДАҒЫ КАРТОП ЖАПЫРАҒЫНДАҒЫ ҚОҢЫР ДАҚ ҚОЗДЫРҒЫШЫНЫҢ ТҮРЛІК ҚҰРАМЫ (СОРТ БҮРКІТ)

Аңдатпа

Картоп жапырағының (*Solanum tuberosum* L.) қоңыр немесе ерте дақ бүкіл әлем бойынша танымал болып есептеледі. Өсімдік-иесі немесе ауру белілерінің түрлік құрамын анықтауда қоздырғыштарды арнайы идентификациялау негізінде жүзеге асырылады. Ғылыми жұмыстың негізгі мақсаты Оңтүстік-шығыс Қазақстандағы картоп жапырағының (сорт Бүркіт) қоңыр дақ қоздырғышының түрлік құрамын анықтау болып табылады. Гербарлық материалдарды зерттеу барысында Беркут сортының жапырағында аралас инфекция анықталды. Бүркүт сортының жапырағы көп мөлшерде ұсақспоралы комплексті түрге жататын *'Alternaria alternata' – Alternaria tenuissima* (Kunze) Wiltshire саңырауқұлағымен зақымдалған. Сондай-ақ, осы сортта салыстырмалы түрде сирек кездескен, ірі споралы және бүйір бөлімі бұтақшалы ұзын агрогенді өсіндісімен сипатталатын *Alternaria solani* Sorauer саңырауқұлағының түрі анықталды. Сонымен қатар дәл сол дақта *Fusarium oxysporum* Schltdl саңырауқұлағы кездесті.

Кілт сөздер: картоп жапырағының қоңыр дағы, қоздырғыш, картоп, комплексті түрлер, *Alternaria solani, A. tenuissima, Fusarium oxysporum.*