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Review paper

Stemphylium vesicarium (wallr.) E.G. Simmons: an onion plant pathogen and options for suppression

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SUMMARY

Onion (*Allium cepa* L.) is one of the most important vegetable species grown worldwide, including the Republic of Serbia. Leaf blight, caused by the fungus *Stemphylium vesicarium*, is a serious and destructive disease of onion leaves around the world, which limits the quality and quantity of bulbs and seeds. Yield decrease occurs due to a reduced photosynthetic area, which leads to the formation of smaller bulbs of poorer quality. The recommended strategy for control and reduction of SLB inoculum includes crop rotation with other vegetable species or cereals that are not hosts of these fungi, the use of resistant onion genotypes, weed removal, adequate use of nitrogen fertilizers, control of thrips (*Thrips* spp.), as well as seed treatment, considering that seeds play a significant role in the spread of pathogens. Timely and correct application of foliar fungicides is certainly the key strategy. The timing of application of fungicides with different modes of action is crucial for controlling *Stemphylium vesicarium* in onion.

Keywords: plant pathogenic fungi, plant disease suppression, onion, leaf blight, fungicides

INTRODUCTION

Onion belongs to the monocotyledon family Amaryllidaceae, genus *Allium* (Yusupov et al., 2021). This genus includes about 1250 perennial bulbous plant species that are used as food and spice, but also as honey-bearing, ornamental, medicinal and industrial plants. It is characterized by a distinct nutritional value and is present in our diet throughout the year (Gvozdanović-Varga, 2011). Cultivation and use of onion has been known for the past 4000 years (Kazanova, 1978; Brewster & Rabinowitch, 1990).

Onion production in the Republic of Serbia is widespread and the main production regions are Northern Banat and Bačka, Podrinje, the environs of Prizren, Pirot and Belgrade (Miladinović et al., 1997). In the Republic of Serbia in 2022, areas under onion crops amounted to 4114 hectares with an average yield of 8.5 t/ha, while 1364 hectares were sown/planted with onion in the Serbian Province of Vojvodina, with an average yield of 12.2 t/ha (Statistical Office of the Republic of Serbia, 2022).

Causal agents of onion disease

Diseases are one of the most important limiting factors in onion production. Onion diseases are caused by dozens of pseudofungi, fungi, bacteria and viruses (Koike et al., 2007). Literature shows that onions are susceptible to at least 66 diseases caused by different pathogens: 36 types of fungi, about 10 different types of bacteria, a large number of viruses and one phytoplasma (Bulajić, 2015). Among them, pseudomycosis and mycosis, which occur during the growing season, but also during storage, stand out for their importance. The presence of pathogens depends on climatic conditions during the growing season, genotype and region of cultivation. In the Republic of Serbia, the most important causal agents of onion diseases are phytopathogenic fungi listed in Table 1, and the drying of onion leaves caused by a fungal pathogen in the genus *Stemphyllium* has become frequent in recent years.

STEMPHYLIUM VESICARIUM (WALLR.) E.G. SIMMONS – THE CAUSAL AGENT OF LEAF BLIGHT

Importance

Stemphylium leaf blight and stalk rot of onion are caused by the hemibiotrophic fungal pathogen *Stemphylium vesicarium* (Wallr.) E.G. Simmons (teleomorf: *Pleospora herbarum* [Pers.] Rabenh., sin *P. allii*) of the genus *Stemphylium*. Depending on agro-ecological conditions and geographic growing region, it is described as a very significant disease of onion (*Allium cepa* L.) and garlic (*A. sativum* L.) (Gupta et al., 1994; Miller & Schwartz, 2008; Mishra & Singh, 2017).

S. vesicarium (SLB) leads to premature leaf blight (leaves droop after necrosis), thus making it more susceptible to post-harvest diseases (Paibomesai et al., 2012). In onion production, SLB can be easily confused with purple blotch symptoms, caused by *Alternaria porri* (Suheri & Price, 2001). Uddin et al. (2006) reported that *S. vesicarium* is first to initiate infection, which is then followed by infection with *A. porri,* and hence the disease is designated as the purple blotch complex (PBC). The mentioned fungi are very well described in international literature as significant pathogens of onion (Mathur & Sharma, 2006) having economic impact on onion production worldwide (Gupta et al. 1994).

The presence of this pathogen under Serbian agro-ecological conditions has been recorded on annual basis in recent years, and it causes significant economic damage in some onion producing regions of Vojvodina Province. So far, there has not been enough recorded data about the ecology and distribution of SLB in the territory of the Republic of Serbia.

The presence of *S. vesicarium* in onion was first described in the United States (Miller et al., 1978), then

Table 1. Onion diseases caused by phytopathogenic fungi (Mijatović et al., 2007)

Disease name	Pathogen or causal agent
ROOT NECROSIS	
Root rot	*Pythium* spp.
Onion Stunting	*Rhizoctonia solani* (Kühn)
White rot	*Sclerotium cepivorum* (Berk)
Botrytis leaf fleck	*Botrytis cinerea* (Pers. ex Fr)
Smut	*Urocystis cepulae* (Rabenh. ex Fuckel)
Onion smudge	*Colletotrichum circinans* (Berk.) Voglino
Pink root of onion	*Pyrenochaeta terrestris* (J.C. Walker & Larson)
BASAL ROT	
Fusarium basal rot	*Fusarium oxysporum* f. sp. *cepae* (Snyder & Hansen)
LOCAL NECROSIS OF ABOVE-GROUND PARTS OF PLANTS	
Downy mildew	*Peronospora destructor* (Berk). Caspary
Purple blotch	*Alternaria porri* (Ellis) Cifferi
Rust	*Puccinia porri, P. allii* (DC) Rudolph
Onion smut	*Urocystis cepulae* (Hansen)
Botrytis leaf blight	*Botrytis squamosa* (Walker)*, B. alli* (Munn)

Portugal (Tomaz & Lima, 1988), India (Gupta et al., 1994), Korea (Cho & Yu, 1998), Venezuela (Cedeño et al., 2003), Egypt (Hassan et al., 2007), Canada (Paibomesai et al., 2012), Japan (Misawa & Yasuoka, 2012) and New Zealand (Wright et al., 2018).

Yield and quality losses of up to 90% have been reported in Texas and New York State (Miller et al., 1978; Lorbeer, 1993), while losses of 80-85% have been reported in seed crops in Portugal (Tomaz & Lima, 1988). Extensive damage has also been reported in Egypt (Hassan et al., 2007), India (Rao & Pavgi, 1975), Japan (Misawa & Yasuoka, 2012), New Zealand (Suheri & Price, 2001), South Africa (Aveling et al, 1993) and Spain (Basallote-Ureba et al, 1999). Premature plant mortality under conditions of high disease pressure was correlated to yield losses of 28-38% and up to 74% (Hoepting, 2018a; 2018b).

Host range

Stemphylium vesicarium can infect a range of plant species from many families (Table 2). Its host plants include several crop species of the *Allium* genus, fruit trees, legumes, and ornamentals (Stricker, 2021). *S. vesicarium* has been detected in a wide range of crops as both a pathogen and saprophyte (Hassan et al, 2020). Additionally, the pathogen can cause asymptomatic infections and develop as an endophyte in living tissues of various other plants (Köhl et al., 2009; Misawa &Yasuoka 2012).

Symptoms

The pathogen is common in seed and commercial crop production. Initial symptoms on leaves include the appearance of small yellow to orange spots, 2-3 mm

Table 2. Host plants of *Stemphylium vesicarium,* Stricker (2021)

Common name	Latin name	Source
Leek	*Allium ampeloprasum* L.	(Suheri & Price, 2001)
Common onion	*Allium cepa* L.	(Raghavendra Rao & Pavgi, 1975)
Welsh onion	*Allium fistulosum* L.	(Misawa &Yasuoka, 2012)
Garlic	*Allium sativum* L.	(Aveling &Naude, 1992)
Oats	*Avena* sp. L.	(Brahmanage et al., 2019)
Asparagus	*Asparagus officinalis* L.	(Falloon et al., 1987)
Beet	*Beta vulgaris* L.	(Hanse et al., 2015)
Carrot	*Daucus carota* L.	(Mulenko et al., 2008)
Canola	*Brassica napus* L.	(Mulenko et al., 2008)
Chinese cabbage	*Brassica rapa* L. ssp. *pekinensis*	(Woudenberg et al., 2017)
Chili pepper	*Capsicum chinense* Jacq.	(Vitale et al., 2017)
Citrus	*Citrus* sp. L.	(Woudenberg et al., 2017)
Soybean.	*Glycine max* L	(Pande & Rao, 1998)
Sunflower	*Helianthus annuus* L.	(Arzanlou et al., 2012)
Lettuce	*Lactuca sativa* L.	(Liu et al., 2019)
Sweet pea	*Lathyrus odoratus* L.	(Köhl et al., 2009)
Lentil	*Lens culinaris* Medikus	(Sinha & Singh, 1993)
Lupin	*Lupine* sp. L.	(Ahmad, 2014)
Apple	*Malus* sp. Mill	(Woudenberg et al., 2017)
Mango	*Mangifera indica* L.	(Ahmad, 2014)
Alfalfa	*Medicago sativa* L.	(Díaz-Valderrama et al., 2021)
Parsley	*Petroselinum crispum* [Mill.] Fuss	(Koike et al., 2013)
Green bean	*Phaseolus vulgaris* L.	(Câmara et al., 2002)
Pea	*Pisum sativum* L.	(Woudenberg et al., 2017
Pear	*Pyrus* sp. L.	(Rossi et al., 2008)
Radish	*Raphanus raphanistrum* subsp. *sativus* (L.)	(Belisario et al., 2008)
Tomato	*Solanum lycopersicum* L.	(Woudenberg et al., 2017)
Spinach	*Spinacia oleracea* L.	(Misawa et al., 2017)
Grape	*Vitis vinifera* L.	(Kranz, 1965)
Corn	*Zea mays* L.	(Unamuno, 1941)

in diameter, which become elongated, oval and sunken over time, developing a dirty white to gray color, and reaching a size of over 4-5 cm in length and 1-1.5 cm in width, with profuse sporulation at the centre of lesion (Rao & Pavgi, 1975; Sharma & Sharma, 1999). Another characteristic symptom includes brown, oval lesions up to 7 cm in diameter towards the tip and center of outer leaves, and yellow lesions of 0.5-4 cm in diameter on inner leaves (Figure 1).

Figure 1. *Stemphylium vesicarium*: symptoms on onion leaves (photo A. Takač)

Stemphylium blight is restricted to onion leaves and inflorescence stalks (Rao & Pavgi, 1975; Aveling et al, 1993), and the most prominent symptoms appear on older leaves (Shishkoff & Lorbeer, 1989). Althought SLB becomes visible when an onion crop is at the 3- to 4-leaf stage, the disease most commonly occurs at plant maturity or at the beginning of leaf senescence (Tayviah, 2017).

A characteristic symptom is the progressive leaf necrosis, which starts from the tip (often termed as „tip burn" in international literature) (Figure 2), associated with host-specific toxins (SV-toxin I and SV-toxin II) produced after infection (Singh et al., 2000; Wolpert et al., 2002).

Toxins play a very important role in the pathogenicity and aggressiveness of isolates. Disease progress and premature aging of leaves lead to reduced growth and size of bulbs, which significantly affects the yield (Figure 3).

Figure 2. *Stemphylium vesicarium*: blight of onion leaf tips (photo A. Takač)

Figure 3. *Stemphylium vesicarium*: merging of spots and formation of large necrotic surfaces (photo A. Takač)

Epidemiology

S. vesicarium belongs to the genus *Ascomycota*, family *Pleosporaceae* and order *Moniliales*. The life cycle is characterized by the succession of sexual and asexual stages. In the sexual stage, it forms ascospores that are located in pseudothecia, while the asexual stage includes the formation of conidia on conidiophores (Prados-Ligero et al., 1998; Basallote-Ureba et al., 1999).

S. vesicarium is dormant during wintertime, surviving as pseudothecia or mycelia in diseased or asymptomatic leaves (Simmons, 1969). Mycelia also overwinter on infected asymptomatic leaves of winter onion and other host plants (Rossi et al., 2008; Misawa & Yasuoka, 2012; Llorente et al, 2012). Optimal temperature for pseudothecia maturation during the winter period in moderate climates ranges from 5-15 °C, and high relative humidity follows as a factor (Prados-Ligero et al., 2003; Llorente & Montesinos, 2004). Under the same conditions, ascospore maturation lasts from 1-6 months (Simmons, 1969; Prados-Ligero et al., 1998). Ascospores can infect onion plants under laboratory conditions (Prados-Ligero et al., 1998) but their role in field epidemiology is fully unknown.

In *Allium* species, conidia carry primary infection in the field (Prados-Ligero et al., 2003; Misawa & Yasuoka, 2012). Conidia appear throughout the production year from May to September, and the maximum air concentration of conidia is recorded between mid-June and mid-August (Gossen et al., 2021). Conidia of *S. vesicarium* germinate at temperatures as low as 4 °C and infect leaf tissue at 10 °C (Prados-Ligero et al., 2003).

The release of air-borne ascospores and conidia shows a diurnal pattern in response to temperature, leaf wetness duration, and relative humidity (Suheri & Price, 2000). When the weather is warm (18-25 °C) and humid, initial symptoms are first observed on weakened plants (Johnson & Lunden, 1986). Symptoms may occur during periods of leaf wetness >16 h (Suheri & Price, 2000; Prados-Ligero et al., 2003).

Onion seed, transplants and volunteer onion play significant roles in disease epidemiology. *S. vesicarium* can be carried on or in onion seeds, and the pathogen is easily transmitted from infected seeds to seedlings (Aveling et al., 1993; Stricker, 2021). Lorbeer (1993) noted a distinct influence and importance of seeds in its epidemiology in New York State. According to Hay et al. (2021), the presence of the pathogen was not confirmed in a healthy seed collection. Considering that seeds are treated (coated) with fungicides in conventional production, the risk of seed-to-seedling transmission of pathogens is reduced.

According to Hay et al (2021), volunteer onions in fields or in cull-piles may also represent an important source of inoculum, especially in the absence of onion crop rotation. During monitoring activities in two onion crops in New York in late May 2020, *S. vesicarium* was recovered from 80 to 88% of volunteer onion plants, even though the incidence in surrounding crops was only 2-8%. It indicates that *S. vesicarium* had overwintered in volunteers or that the more rapidly developing volunteer plants acted as a green bridge for pathogen establishment in the crop.

S. vesicarium can be maintained in plant debris and in infected perennial weed species. Such common weeds include: redroot pigweed (*Amaranthus retroflexus)*, marsh yellow cress (*Rorippa palustris)*, yellow nutsedge (*Cyperus esculentus)*, perennial sowthistle (*Sonchus arvensis)*, bull thistle (*Cirsium vulgare)*, purslane (*Portulaca oleracea)*, as well as plants in the families: *Amaranthaceae*, *Brassicaceae*, *Cyperaceae*, *Asteraceae* and *Portulacaceaea* (Rao & Pavgi, 1975), where it releases ascospores in the spring. Stricker (2021) lists common sowthistle (*Sonchus oleraceus)*, field horsetail (*Equisetum arvense)*, field pennycress (*Thlapsi arvense)*, and jimsonweed (*Datura stramonium*) as hosts.

The relative importance of weeds as a source of inoculum is not yet known, and the removal of such inoculum reservoirs may not be effective for controlling SLB in onion crops because airborne spores have the potential to travel great distance (Hay et al, 2021).

Suppression of *Stemphylium vesicarium*

Prerequisites for effective protection include the reduction of inoculum level and prevention of disease development (Wright et al., 2018). Taking into account that the pathogen can persist in soil or plant material for several years, crop rotation with other vegetable or plant species belonging to the group of small grains that are not hosts of this fungus leads to decreasing occurrence of this pathogen, and consequently reduced disease incidence (Chand & Kumar, 2016). Crop rotation lasting 3-4 years is recommended.

Another very important measure is keeping the plants in good condition, and protecting crops from other leaf pathogens and thrips (Leach et al., 2020), considering that the pathogen penetrates the plant at the site of damaged leaves.

Seed treatment with hot water at 50 °C for 20 min reduces the inoculum level but also reduces germination. An excessive use of nitrogen and unbalanced nutrition increase the sensitivity of plants (Acharya & Shrestha, 2018).

Irrigation at 7 days interval and the recommended dose of nitrogen of 235 kg/ha have been found to give significantly better results in reducing the intensity of *S. vesicarium* and *Peronospora destructor* infections, and at the same time they lead to an increase in yield (Acharya & Shresthra, 2018). It is recommended to avoid overhead irrigation during the day because it prolongs the wetting of leaves and creates conditions for severe infection and dieback of leaves. Irrigation should either take place at night or a drip irrigation system should be installed as an even better solution.

Under the growing conditions in the Province of Vojvodina, Serbia, a significant difference in the intensity of infection has been observed in onions grown in a drip system and overhead irrigation system in which leaves become moist or wet (unpublished data).

Production should be based on good structural soils, and spatial isolation from winter onion is recommended as preferable.

Regular application of preventive (contact) and curative (systemic) fungicides is an important tool for managing diseases caused by fungal pathogens, especially where genetic resistance is not available (Llorente et al., 2012).

In order to reduce the risk of developing resistance, the application of fungicides with different mechanisms of action is recommended (Jasnić, 2006; Brent & Hollomon, 2007). Forecast models used worldwide to predict the occurrence of disease-causing agents provide very important information for proper timing of fungicide applications. Several forecasting models have been used for the management of *S. vesicarium* in a range of crops: FAST, TOMcast, BOTcast, BSPcast and STREP, all based on the temperature, leaf wet period and relative humidity (Stricker et al., 2020).

One of the most effective measures in controlling this disease complex is the use of tolerant genotypes, as well as good agricultural practices, but in case of their unavailability, chemical control measures are the only solution.

Application of fungicides

Fungicides that are currently registered worldwide to control *S. vesicarium* belong to the following FRAC groups: phthalimides (M4), chloronitriles (M5), demethylation inhibiting fungicides (DMI; FRAC group 3), succinate dehydrogenase inhibitors (SDHI; FRAC group 7), anilino pyrimidine fungicides (AP; FRAC group 9), quinone outside inhibitors, (QoI; FRAC group 11), but only a few have been registered to control *S. vesicarium* (Stricker, 2021).

Fungicides belonging to the triazole group: tebuconazole, difenoconazole and hexaconazole, and the contact fungicides propineb, mancozeb and chlorothalonil, have shown satisfactory effectiveness in controlling *S. botryosum* under *in vitro* and *in vivo* conditions (Mohan et al. 2003).

Mishra and Gupta (2012) studied the effects of eight different fungicides on fungal mycelial growth. Significant inhibition was recorded with contact fungicides: mancozeb, propineb, and the systemic fungicides azoxystrobin and propiconazole.

The 2022 List of Approved Substances in the Republic of Serbia did not include the active substance mancozeb, while propineb had been previously withdrawn from use (Ministry of Agriculture, Forestry and Water Management, 2022).

The results of an experiment carried out by Tesfaendrias et al. (2012) indicate a very high effectiveness of the fungicides azoxystrobin + difenoconazole, fluopyram + pyrimethanil, and difenoconazole in controlling this pathogen, which confirms the results of other authors that the combination of strobilurin and triazole (azoxystrobin + flutriafol) enables better control of *S. vesicarium*. Fungicides in the strobilurin group (Quinone outside Inhibitors, QoI fungicides) are very effective in inhibiting the germination of fungal spores. Their effect on the mycelial growth was also recorded, but their ability to inhibit spore germination is more significant.

On the other hand, fungicides of the triazole group (DeMethylation Inhibitors, DMI fungicides) inhibit ergosterol biosynthesis. Considering that fungal spores contain ergosterol, those fungicides have not shown high efficiency in preventing spore germination. Their effectiveness is based on the inhibition of mycelial growth (Bradley, 2011, loc.cit. Mishra & Singh, 2017), which could be the reason for different *in vitro* and *in vivo* efficacy results.

Laboratory analyses conducted by Mishra & Singh (2017) proved that fluopyram + tebuconazole, applied at a concentration of 50 ppm, completely inhibited the growth of *S. vesicarium* mycelium. Under *in vivo* conditions, azoxystrobin + flutriafol showed the highest efficacy, compared to the control. Based on all tested fungicides, the combinations of azoxystrobin 25% + flutriafol 25% and fluopyram 20% + tebuconazole 20% were recommended for controlling *S. vesicarium* *in vivo*. The lowest infection intensity was recorded when four foliar treatments were applied using the fungicides: propiconazole 0.1%, mancozeb 0.25% and copper oxychloride 0.3%, (Gupta & Gupta, 2013).

Hoepting (2016) highlighted the effectiveness of fungicides in the FRAC 3 group (difenoconazole) and FRAC 7 (fluopyram, fluxapiroxad). Hoepting (2020) noted that fungicides in the FRAC 3 group (difenoconazole, propiconazole, tebuconazole), FRAC 7 (fluopyram), FRAC 9 (cyprodinil, pyrimethanil) and FRAC 2 (iprodione) w the most effective in controlling *S. vesicarium*. Treatment with fluopyram 200 g/l + tebuconazole 200 g/l showed an efficiency of 52.5%, while fluopyram 250 g/l + trifloxystrobin 250 g/l and fluazinam showed an efficiency of 80-88.8 % in trials (Hausbeck et al, 2018).

Seed treatment with the a.i. penflufen (Succinate dehydrogenase inhibitor, SDHI) (FRAC 7), in combination with regular foliar fungicide application, gave satisfactory results in controlling *S. vesicarium* (Stricker et al., 2020).

Paneru et al. (2020) recommend the use of hexaconazole at a concentration of 0.1% and a combination of mancozeb + cymoxanil as effective fungicides for controlling the disease complex of onion.

Various bioagents such as *Bacillus subtilis*, *Pseudomonas fluorescens*, *Trichoderma harzianum*, *Gliocladium* spp. and *Saccharomyces cerevisiae* significantly inhibit mycelial growth under *in vitro* conditions (Hussein et al., 2007). Plant extracts of *Azadirachta indica* and *Datura stramonium* have shown effectiveness in reducing the growth of the fungi *A. porri* and *S. vesicarium* in a protected area (Abdel-Hafez et al., 2014, loc. cit Meena & Verma, 2017).

Leaf defoliation caused by *S. vesicarium* does not always have a direct effect on the yield, especially if the pathogen appears at the end of the growing season, but on the other hand, it leads to decrease in the effectiveness of maleic hydrazide, which is used in production as a sprout inhibitor (Isenberg et al., 1974). It is recommended to apply sprout inhibitor to green leaves immediately before laying of onions (Ilić et al., 2011). In this way, both the yield and quality of onions are preserved. If maleic hydrazide is not applied, onions will have a shorter shelf life. In Serbia, products based on a.i. maleic hydrazide potassium 245 g/l and maleic hydrazide potassium 270 g/l have been registered for this purpose (Aleksić et al., 2022).

Table 3: Active substances registered worldwide and in the Republic of Serbia for the control of *S. vesicarium* on onion (Anonymous 2021; Aleksić et al., 2022)

MOA	Target site and code	Group name	Chemical Group	Common name	FRAC code
C	C2	SDHI	pyrazole-4-carboxamides	flyxapyroxad	7
C	C2	SDHI	pyrazole-4-carboxamides	benzovindiflupyr	7
C	C2	SDHI	N-methoxy-(phenyl-ethyl) -pyrazole-carboxamides	pydiflumetofen	7
G	G1	DMI	triazoles	difenoconazole*	3
C	C2	SDHI	pyridinyl-ethyl-benzamides	fluopyram*	7
D	D1	AP	aniilino-pyrimidines	pyrimethanil	9
C	C3	QoI	methoxy-acrylates	azoxystrobin*	11
M	multi -site contact activity	Inorganic (elektrophiles)	inorganic	copper oxychloride*	M 01
G	G1	DMI	triazolinthiones	prothioconazole*	3

AP – fungicides (Anilino-Pyrimidines)
C2 – complex II: succinate-dehydrogenase
C3 – complex III: cytochrome bc1 (ubiquinol oxidase) at Qo site (*cyt b gene*)
C – respiration
D – amino acids and protein synthesis
D1 – methionine biosynthesis
DMI – fungicides (DeMethylation Inhibitors)
FRAC Code- fungal control agents sorted by cross-resistance pattern and mode of action
G1 – C14- demethylase in sterol biosynthesis(*erg11/cyp51*)
G – sterol byosyntesis in membranes
M – Chemicals with multi-site activity
MOA – mode of action
QoI – fungicides (Quinone outside Inhibitors)
SDHI – Succinate-dehydrogenase inhibitors
* registered in the Republic of Serbia for suppression of *S. vesicarium*

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Stemphylium vesicarium (wallr.) E.G. Simmons: patogen crnog luka i mogućnost suzbijanja

REZIME

Crni luk (*Allium cepa*) je jedna od najznačajnijih povrtarskih vrsta koja se uzgaja u svetu i kod nas. Sušenje lista, uzrokovano gljivom *Stemphylium vesicarium*, je ozbiljna i destruktivna bolest lista crnog luka u svetu, koja ograničava kvalitet i kvantitet lukovice i semena. Smanjenje prinosa nastaje usled smanjene fotosintetske površine, što dovodi do obrazovanja manjih lukovica lošijeg kvaliteta. Preporučena strategija za suzbijanje i smanjenje inokuluma SLB uključuje plodored sa drugim povrtarskim vrstama ili žitaricama koje nisu domaćini ove gljive, korišćenje otpornih genotipova crnog luka, uklanjanje korova, pravilna upotreba azotnih đubriva, suzbijanje tripsa (*Thrips* spp.), kao i tretman semena, obzirom da seme ima značajnu ulogu u širenju patogena. Ključna strategija je svakako pravovremena i pravilna primena folijarnih fungicida. Vreme primene fungicida, različitih mehanizama delovanja je ključno za suzbijanje *Stemphylium vesicarium* na crnom luku.

Ključne reči: patogene gljive, suzbijanje bolesti, luk, sušenje lista, fungicidi