

DISEASE OF FABA BEAN (*VICIA FABA* L.) CAUSED BY *ALTERNARIA TENUISSIMA* (NEES.)

Yu. N. Kurkina

Belgorod State University

e-mail: kurkina@bsu.edu.ru

Fields were surveyed for a leaf spot disease on broad bean in different parts of Belgorod and Orel regions. The initial lesion was brown, then the lesion enlarged and became concentric. Mature leaves had coalescing necrosis surrounded by yellowing. Older leaves of the plant were particularly affected. In a later stage of the disease, the leaves became blighted from the margin to the center and most of the diseased plants defoliated. In a comparison of symptoms of the disease and morphological characteristics of the isolated fungus with other broad bean diseases, this disease was described as alternarios, because it caused by *Alternaria tenuissima*.

Key words: *Alternaria tenuissima*, *Vicia faba*, disease, leaf spot, lesions.

Faba bean (*Vicia faba* L.) is cultivated for use as a green or dried, fresh vegetable or for green manure in many parts of the world. It is also widely grown as a minor garden crop. In Russia, faba bean is grown during April to September. Last year disease of bean was observed in fields and home gardens in Belgorod and Orel regions. Infected plants with numerous concentric brown spots on both younger and older leaves were quite common in all locations surveyed.

This paper describes the symptoms of the disease in the field and the morphology of the causal fungus, *Alternaria tenuissima* (Nees), on faba bean cultivars.

MATERIALS AND METHODS

Diseased samples were obtained from different farmers fields our regions. Fungal isolates were collected mainly from leaves in the samples. Pieces of leaf tissue, including both a lesion and healthy tissue, were surface-sterilized with 70% ethanol for 2-3 sec and then washed thoroughly with sterilized, distilled water. Then leaf pieces were transferred to an agar medium plate and incubated at temperature 23°C for 3 to 5 days. Hyphal tips from a fungal colony were transferred to a new medium plate, and a single-spore isolation was made from the resultant colony. Single-spore isolates were maintained on slants medium of Chapeka.

The conidial morphology of each single-spore culture was studied as soon as possible after isolation. Dimensions of conidia produced on naturally infected plant parts were also measured. Infected leaves were kept in a moist chamber at room temperature to induce sporulation. Conidia produced on the plant parts were measured after 4 days.

Plants of faba bean were used for pathogenicity tests in this study in laboratory. The plants were grown in a glasshouse throughout the experiment. A spore suspension of the isolates, obtained by flooding with sterile water and rubbing 7- to 10-day-old cultures grown on agar medium, was used as inoculum. Drop inoculations were carried out with a pipette on the upper leaf surface. Inoculated plants were kept in moist chamber and incubated at 25°C under dark for 24 hr incubation.

RESULTS AND DISCUSSION

The leaf spot disease was observed in all fields from the end of May until the middle of July. Thus, the disease occurred irrespective of the plant's growth stage. The number of lesions per plant and per leaf ranged from 3 to 100 and 0,2 to 9,8, respectively, and the percentage of infected plants ranged from 30 to 60. In the fields, lesions appeared on both younger and older leaves. Initially, lesions were distinct, brown, water soaked, and circular or slightly irregular. Then the lesion enlarged and became concentric, and lesions on mature leaves had extensive necrosis surrounded by yellowing. In a later stage, plants defoliated as

leaves blighted from margin to the center. Less severely affected fields had scattered patches with a few infected plants. In severely infected fields, lesions with circular to irregular shapes also appeared on stems and pods, and plants were almost completely defoliated.

An *Alternaria* species was the most frequent of fungal isolates growing from the lesions on broad bean leaves. On medium plates, the *Alternaria* fungus developed aerial hyphae on grayish white colonies.

In pathogenicity tests, symptoms appeared after both spray inoculation of attached leaves and drop inoculation of detached leaves. Five isolates were obtained from five locations in Belgorod and Orel regions. These isolates were used for morphological studies and tested for their pathogenicity on plants. All five isolates were pathogenic to faba bean.

Based on morphological characteristics, we identified the fungus as *Alternaria tenuissima* (Nees) [1,2]. Repeated isolations of *A. tenuissima* from a naturally infected leaf spot, production of the same disease symptom after inoculation of plants completion of Koch's postulates and complete agreement with the natural disease in all surveyed fields provided sufficient evidence that the leaf spot disease of broad bean is caused by *A. tenuissima*.

The fungus has been isolated as a weak pathogen from numerous host plants and had wide morphological variation, similar to that shown for *A. tenuissima*.

The variability of dimensions in the same species may result from a number of factors, most common being influence of the substrate (table).

Mean characteristics of *Alternaria tenuissima* from faba bean

Mean characteristics of fungal isolate	Leaf	Agar medium
Conidia in chain of branched chain	2,5	0
Conidia in chain of unbranched chain	7,5	3,5
Percentages of branched chain	4	0
Percentages of unbranched chain	96	100
Length of conidia, μm	39,8	28,6
Width of conidia, μm	11,1	14,6
Number of transverse septa	5,9	3,1
Number of longitudinal septa	1	1
Lesion development on inoculated sites after 24 hr	less than 50% inoculated sites	-----
Lesion development on inoculated sites after 48 hr	more than 75% inoculated sites	-----

The fungus has been isolated throughout the world from many diseased crops such as cotton, *Helianthus annuus*, *Simmondsia chinensis* [4-7]. This study, however, appears to be the first description of disease symptoms, morphology, and pathogenicity of *A. tenuissima*, as a pathogen of faba bean causing a destructive leaf spot disease.

All the isolates used in our study were pathogenic, though the pathogenicity of the isolates varied with respect to cultivars as well as incubation period. Moreover, pathogenicity also varied among experiments. On the other hand, lesions or other symptoms were not observed on faba bean leaflets inoculated with water even after the longest incubation period. Extended necrosis surrounded by yellowing was usually observed on diseased leaves and was presumed to be due to the pathogen's toxin(s). Nutsugah *et al.* [8] showed that toxin(s) are released during spore germination of this organism and possibly play a role as a disease determinant of *A. tenuissima*.

Severe disease on leaves at a later growth stage, suggesting that repeated infection cycles may be necessary for the disease to reach a level with an economic impact. It is not known whether the disease is seed borne or not, although reports have indicated that *A. tenuissima* is associated with soybean and cauliflower seeds in nature.

LITERATURE CITED

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ЗАБОЛЕВАНИЕ БОБОВ (*VICIA FABA* L.), ВЫЗВАННОЕ *ALTERNARIA TENUISSIMA* (NEES)

Ю.Н. КУРКИНА

Белгородский государственный
университет

e-mail: kurkina@bsu.edu.ru

В разных районах Белгородской и Орловской областей на посевах бобов было выявлено заболевание с характерной пятнистостью. Первоначально повреждения на листьях были в виде мелких коричневых пятен, которые позже увеличивались и становились явно округлыми. Вокруг пятен листовая пластинка желтела. Старые листья были сильно повреждены. В поздних стадиях болезни листья отмирали и осыпались. По совокупности симптомов болезни и морфологии патогена был поставлен диагноз – альтернариоз вызываемый грибом *Alternaria tenuissima*.

Ключевые слова: бобы, болезни растений, повреждения, пятнистость листьев, *Alternaria tenuissima*, *Vicia faba*.
