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Водный режим почвы, оказывает существенное влияние на развитие корневой системы и в конечном счете на урожайность хлопчатника. Обильный режим орошения (вариант-6) увеличивает вегетативную массу растений, затягивает раскрытия коробочек, их созревания и снижает урожай хлопка-сырца. Общая сухая масса корней в слое 0-70 см составила в среднем за 2007-2008 года 23 г, а урожай 29,5 ц/га. Наибольший урожай (31,1-31,5 ц/га) хлопка-сырца был получен в 5-м варианте с режимом орошения (0-1-1), где в слое 0-70 см сухая масса корней в среднем составила 23,5 г. На остальных вариантах общая сухая масса корней и урожай ниже по сравнении с 5-м вариантом.

The water mode of soil makes essential impact on development of root system and finally on productivity of cotton plant. The plentiful mode of an irrigation (variant 6) increases a vegetative weight of plants, tightens disclosing of hullies their warming and the crop of crap of a raw, the general dry weight of roots in a layer 0-70compaunded 23g. Averaged for 2007-2008 and the crop (31,1-31,5 c/hectares) raw clap has been received in 5th variant with a mode of an irrigation (0-1-1) where in a layer 0-70 cm dry weight of roots has on has made an average 23,5. On other variants the general dry weight of roots and a crop more low in comparison with 5-th variant.

OCCURRENCE OF TOMATO FUSARIUM WILT DISEASE IN KAZAKHSTAN

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ABSTRACT: Nine Fusarium isolates identified as A, B, C, D, E, F, G, H, and I were isolated from tomato wilted plants grown under glasshouse conditions at different locations of Almaty, Kazakhstan. All isolates formed colonies, conidia and mycelia with morphological characteristics typical of *F. oxysporum*. These isolates were used for inoculation seedlings of the Carolina Gold cultivar grown in plastic pots under glasshouse conditions. Wilt symptoms particularly brown vascular discoloration in stem were observed after two months from inoculation. This was the first record about presence of tomato wilt caused by *Fusarium oxysporum* f. sp. *lycopersici* in Kazakhstan.

INTRODUCTION

Fusarium oxysporum has received considerable attention because of its ability to cause vascular wilt or root rot diseases on a wide range of plants. *F. oxysporum* f. sp. *lycopersici* (FOL) causes Fusarium wilt disease only of plants belonging to the genus *Lycopersicon* **(Rowe, 1980)**. Since then, it has become a major limiting factor in the production of greenhouse tomato in many countries **(Rowe *et al.*, 1977; Nuter *et al.*, 1978)**. At the first, the causal fungus was identified as a new race (J3) of *F. oxysporum* Schlecht. f. sp. *lycopersici* Snyd. & Hans. which causes Fusarium wilt of tomato **(Sato and Araki, 1974)**. The sever FOL symptoms appears at soil temperatures of about 27°C. **(Rowe, 1980; Menzies *et al.*, 1990** and **Hibar *et al.*, 2007)**. This study aimed to confirm the pathogenic potentialities of the collected *F. oxysporum* f. sp. *lycopersici* isolates on inciting the wilt symptoms of tomato (cv. Carolina Gold) plants.

MATERIALS AND METHODS

Isolation, identification, preparation of inocula and pathogenicity test of the wilt pathogen:

Tomato (*Solanum lycopersicum*) plants showing typical symptoms of the Fusarium wilt disease were collected from different tomato glasshouses in Almaty province of Kazakhstan during May 2008 season. Cuttings

(3 cm length) revealed different degrees of vascular discoloration were used for isolation of the wilt fungus (**Katan *et al.*, 1991 and Amini, 2009**). The growing fungi were purified using the hyphal tip followed by single spore techniques. In addition to the vascular discoloration, identification of the *Fusarium oxysporium* f. sp. *lycopersici* isolates was made according to **Nelson *et al.*, 1983** and **Leslie** and **Sumerell, 2006.** Spore suspensions of the obtained isolates were prepared and adjusted to be containing about "10^{6}" spores/ml (**Beshir, 1991 and Amini, 2009**). Spore suspension of each known Fusarium isolate was used to inoculate seedlings of tomato cultivar Carolina Gold which is resistant to *Fusarium oxysporum* f. sp. *lycopersici* race 1 and 2 (**Bost, 2005**).

Tomato 4-weeks-old seedlings were transplanted into plastic pots (30 cm. in diameter) each containing 11 Kg of natural soil mixture consisted of clay and sand at rate of 2:1 (by weight) at rate of 3 seedlings per pot then spore suspension was poured over stem base at rate of 20 ml/seedling. In control (non-inoculated), plain water was used instead spore suspension. Pots were irrigated and maintained in a glasshouse at 25-30°C and 70% relative humidity. The inoculated tomato plants were kept under observation of wilt symptoms at 2 months after inoculation.

Disease assessment:

Two months after inoculation, the wilt disease incidence was carried out using a visual 0 - 4 scale according to **Vakalounakis** and **Fragkiadakis, 1999** and the disease incidence was determined according to **Song *et al.*, 2004.**

Statistical analysis:

Three pots (replicates) were used for each particular treatment. The inoculation treatments were arranged in a completely randomized block design in the glasshouse. The data were subjected to analysis of variance according to **Snedecor and Cochran (1982)**. The least significant difference at 0.05 was calculated.

RESULTS AND DISCUSSION

Tomato plants (cv. Carolina Gold) inoculated with isolates of *Fusarium oxysporum* showed different degrees of wilt disease symptoms after 2 months from inoculation. The vascular bundles of infected tomato plant showed dark lines in both sides compared with stems of the healthy plants **(Fig.1)**. This browning of the vascular tissue is characteristic of the disease and can be used for its tentative identification. *F. oxysporum* f. sp. *lycopersici* (FOL) causes severe wilt disease. The browning of the vascular system is characteristic of the disease and generally can be used for identification of the fungal isolates as *Fusarium oxy* f. sp. *lycopersici* (**Armstrong and Armstrong 1968; Jones, 1991** and **Reis, *et al.*, 2005**).

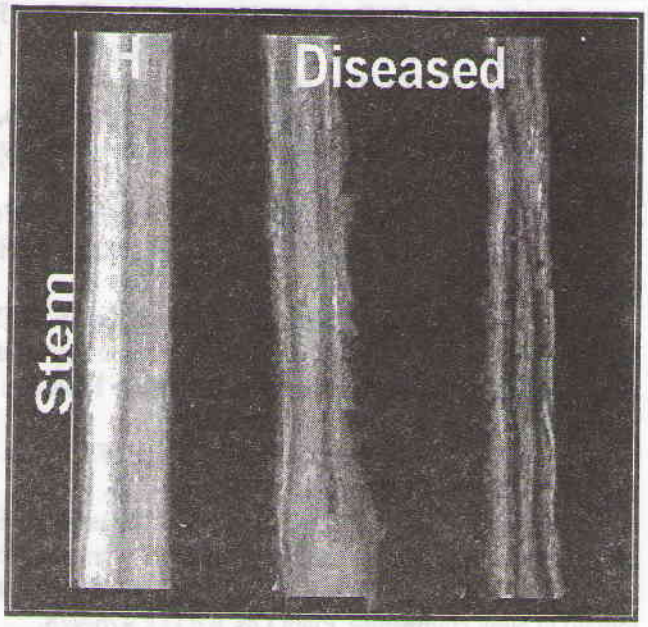

Fig. (1): Healthy (H) and vascular discoloration on stem of diseased tomato plants (cv. Carolina Gold) infested with *Fusarium oxysporum* f. sp. *lycopercici* isolate A.

Data in **Table (1)** reveal that, the (FOL) isolates A and G caused the highest percentage of diseased and dead tomato plants (77.78%) and disease incidence (52.78%). However, isolates H and I seemed to be non-significant when compared with the non-inoculated control which remained disease free. As Carolina Gold tomato cultivar was described as resistant to Fusarium wilt races 1 & 2 **(Bost, 2005)**, the tested Fusarium isolates particularly isolates A and G might considered as new isolates of race 1 or 2 or might be race 3. Such findings agree with **Jones et al. (1982)** observed mature plants with Fusarium wilt symptoms in tomato cultivars possessed resistance to races 1 and 2. Also, **Volin and Jones (1982)** isolated a new race of *Fusarium oxysporum* f. sp. *lycopersici* from commercially produced plants in western Florida. The principal varieties currently produced commercially are reported to have the I2 gene for race

Table (1): Percentage diseased and dead plants and disease incidence after inoculation with isolates of *Fusarium oxysporum* f.sp. *lycopersici*

Fusarium isolate FOL	Diseased plants %	Disease incidence %
A	77.78	52.78
B	55.56	33.33
C	33.33	22.22
D	44.44	25.00
E	33.33	22.22
F	66.67	41.67
G	77.78	52.78
H	11.11	11.11
I	11.11	8.33
Control	**0.00**	**0.00**
L.S.D. at 0.05	21.063	9.173

2 resistance. **Cai, *et al.*, (2003)** stated that the collective evidence suggests that race 3 in California originated from the local race 2 population.

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Бұл жұмыста Алматы қаласының (Қазақстан) әр жерінде орналасқан жылыжай жағдайындағы өсіп, ауруға шалдыққан томат өзектерінен және тамырларынан тоғыз *Fusarium oxysporum* бөлінулер A, B, C, D, E, F, G, H, және I анықталып, әр қайсысының түс өзгерісі байқалғаны туралы зерттелген. Барлық бөлінулердің *F. Oxysporum* тән морфологиялық

ерекшеліктері анықталатын, конидия және мицелий колонияларынан құралған. Осы тәжірибеде жылыжай жағдайындағы өсірілген «Каролина Алтыны» атты томат сұрыпы алынып, сынақта жоғарыда айтылған инфекциялық ауруларды тудыратын қабілеттілігі бар бөлінулер микроорганизмдері анықталды. Солу себепті егу енгізілгеннен кейін екі айдан соң, томат өзектерінде және тамырларының түтікшелері түссізденіп және қоңырқай түсті болып боялуы анық көріне бастады. Берілген томат сұрыпынан анықталған бөлінулер бойынша өзгерістер пайда болды. Қазақстандағы *Fusarium oxysporum* f. sp. *lycopersici* (FOL) себебінен ауруға шалдыққан томаттардың анықталуының алғашқы тәжірибесі сәтті болып аяқталды.

В данной работе девять *Fusarium oxysporum* изолятов идентифицированные как A, B, C, D, E, F, G, H, и I были выделены со стеблей и корней увядших томатных растений, выращенных в тепличных условиях в различных местоположениях города Алматы (Казахстан) и показывающих различную степень нарушения окрашивания сосудов. Все изоляты сформированы колониями конидия и мицелий с морфологическими особенностями, типичными для *F. oxysporum.* Тест патогенности данных изолятов был определен в эксперименте, в котором использовался культурный сорт «Золото Каролины», выращенное в горшке в условиях теплицы. Симптомы увядания отчетливо наблюдались в стеблях и корнях в виде обесцвечивания или коричневого цвета сосудов растения, через два месяца после прививки. Были значительные различия по полученным данным при определении эффективности проверенных изолятов на данного сорта томата. Данное исследование является первым успешным открытием увядания томатов, вызванными *Fusarium oxysporum* f. sp. *lycopersici* (FOL) в Казахстане.

УДК 712 (574.25)

ТИПЫ УСЛОВИЙ МЕСТОПРОИЗРАСТАНИЯ И ИХ ФИТОРАСТИТЕЛЬНЫЙ ПОТЕНЦИАЛ В ИЛЕ-АЛАТАУСКОМ ГОСУДАРСТВЕННОМ НАЦИОНАЛЬНОМ ПРИРОДНОМ ПАРКЕ

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Иле-Алатауский государственный национальный природный парк является уникальным местом организации и проведения научно-познавательного туризма в условиях охраны, сохранения лесных ландшафтов и близкого расположения крупного мегаполиса как г.Алматы.

Целью исследований является лесоводственная оценка типов насаждений и их групп с эстетической точки зрения, выделив из них лучшие в этом отношении для организации научно-познавательного туризма.

Природные ландшафты Заилийского Алатау наиболее полно характеризуются геоморфологической структурой поверхности и растительностью, следовательно, парковый ландшафт здесь должен устанавливаться по основному признаку – составу и структуре растительности « ... как наиболее чутким индикаторам на изменения комплекса внешних условий» [1] при непременном учете геоморфологии.

Классификация же парковых ландшафтов для горных местообитаний может основываться только на лесотипологической основе по группам типов насаждений, т.к. ведущие значения здесь приобретают не теплорегулирующие [2], а эстетические свойства горных лесных участков.

Архитектурно-художественные качества лесных участков северного макросклона Заилийского Алатау [3, 4] зависят в первую очередь от условий местопроизрастания и характера растительности, что наиболее полно выражено в сочетании определенных типов насаждений (лесных ассоциаций). Они отчетливо выражают эстетические свойства лесных ландшафтов, поэтому могут быть применены в парковом хозяйстве, также как и в лесном.

Под условиями произрастания понимается их потенциальное плодородие, определяемое количественным сочетанием основных факторов жизни растений: света, тепла, влаги и элементов минерального питания.