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THE INFLUENCE OF TEMPERATURE ON THE VIABILITY OF THE AGENT OF COTTON PLANT BACTERIAL BLIGHT – *XANTHOMONAS CAMPESTRIS* VAR. *MALVACEARUM* IN PURE CULTURE

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ABSTRACT
This article outlines the data on the influence of various temperatures on pure culture of Xanthomonas campestris var. malvacearum. In the result of conducted research it was defined that the agent of bacterial blight of cotton plant keeps the temperature +55 °C degree within 10 minutes, but in -10 °C degree the survivability makes 60-90 %. In a natural condition bacteria endure in low temperature to – 10 °C, but in continuous strong cold it loses viability since the temperature fluctuation causes to defrostation and freezing of environment resulting in the death of bacteria.
KEY WORDS: *Xanthomonas campestris var. malvacearum, temperature, viability, bacterial blight of cotton plant, pathogen, culture, growth.*

INTRODUCTION
At present time in more than 80 countries of the world cotton is produced as a raw material and more than 20 mln tons of cotton fiber is obtained from 30 mln hectare area every year. In some year when spring is too rainy with high humidity, cotton plant soil is infected with various pathogens which lead to low yield of cotton by 10 – 25 %.

One of the reasons of yield decrease is cotton plant infection by the agent of bacterial blight of cotton plant *Xanthomonas campestris* var. *malvacearum*. Damage level caused by *X.campestris* var. *malvacearum* depends on climatic condition of the year [1, 2, 3, 5, 6, 8].

The references from literatures about the influence of temperature on viability of the agent of bacterial blight of cotton plant in pure culture show that at temperature 50 °C the bacteria die after 25 minutes, while at 56 °C after 15 minutes. When they stay inside the seeds in inactive condition, they can endure in this dry condition heated to 90 °C with exposition of not less than an hour [1, 2, 10].

According to the data of Smith (1920) the bacteria are too resistant to frost that can survive in low temperature up to -27,8 °C and even lower [9], but in continuous strong cold they lose survivability partially, and in further fluctuation of temperature causing to defrostation and freezing of environment the bacteria die in pure culture condition of agar at high humidity [1, 4].

MATERIALS AND METHODS
The object of the research is *Xanthomonas campestris* var. *malvacearum* strain 3, allotted from infected bacterial blight of cotton plant of C-6524 variety which is grown in different districts of Tashkent region.

To identify the influence of high temperature on the viability of *X.campestris* var. *malvacearum* three-day culture was placed in thermostat where the temperature can grow up to 45 °C; 50 °C; 55 °C; 60 °C degree with exposition of time 10, 15, 20, 25 and 30 minutes. Besides, the influence of temperature was studied by heating on water bath. After the incubation in

thermostat and in water bath the culture of *X.campestris* var. *malvacearum* was reinoculated in a pure media. According to emergence of *X.malvacearum* growth the viability of causative agent is defined.

For the study of low temperature of pure culture *X.campestris* var. *malvacearum* endures in refrigerator in a low temperature from 2 °C to -10 °C and survive during the day, then in four days, ten days, twenty and thirty days. Then the bacteria of the culture were sown in test-tube with fresh media. As per *X.campestris* var. *malvacearum* the survivability of bacteria was determined.

For testing the activity in low natural temperature on *X.campestris* var. *malvacearum*, three-day test-tubes of the culture of agent of bacterial blight of cotton plant was placed in open air. The observation was conducted from November to April months.

RESULTS AND DISCUSSION

For determination of effect of various temperatures on viability of the agent of bacterial blight of cotton plant in pure culture the research was conducted on the influence of high and low temperature upon *X. campestris* var. *malvacearum*.

The study of high temperature on survivability of agent of bacterial blight of cotton plant showed *that X.malvacearum* could endure at temperature 50 °C degree only in 20 minutes when heated, while at 55 °C degree endured only in 10 minutes and died in continued 15 minutes. At temperature 60 °C degree *X.campestris* var. *malvacearum* died since the growth wasn't observed in any variant (table 1).

Table-1.

The influence of high temperature on pure culture of *Xanthomonas campestris* var. *malvacearum*

№	Continuous keeping in minutes	Temperature			
		45 °C	50 °C	55 °C	60 °C
1	5	+	+	+	-
2	10	+	+	+	-
3	15	+	+	-	-
4	20	+	+	-	-
5	25	-	-	-	-
6	30	-	-	-	-

Comments: + growth presence; - growth absence; In a sown test-tube.

According to Babayan (1963) the culture of *X.campestris* var. *malvacearum* is very endurable to the frost, their survivability maintained at temperature -8,5 °C degree within 30 days .

Table -2 presents the data on the influence of low temperature on survivability of *X.campestris* var. *malvacearum*. Pure culture of *X.campestris* var. *malvacearum* endures at – 10 °C degree, viability maintains within 30 days and constitutes 70 %, while at temperature – 5 °C degree viability maintains within 30 days and makes 90 %.

With the view of the study of the influence of low natural temperature on survivability of pure culture of *X.campestris* var. *malvacearum*, test-tubes of three-day culture of agent of bacterial blight of cotton plant were placed in an open air.

From the table-3 it is obvious that *X.campestris* var. *malvacearum* endures at low temperature up to -10 °C degree in December and January months and survivability makes 80-70 %, while in February viability of *X.campestris* var. *malvacearum* is partially lost and makes 50 %. In March and April months viability of agent of bacterial blight of cotton plant completely loses, since the temperature fluctuation causes to defrostation and freezing of environment in which the bacteria die in pure culture of agar in high humidity. These data match with the information of Babayan who considers the agent of cotton bacterial blight to be able to endure at -27 °C degree, but in temperature fluctuation bacteria may die.

Table-2.

The effect of low temperature in pure culture of *Xanthomonas campestris* var. *malvacearum*

Analy-sis time	Temperature																	
	-2 °C			-5 °C			-10 °C			-15 °C			-20 °C			-30 °C		
	The number of test-tubes in experiment	The number of test-tubes with growth	Also, %	The number of test-tubes in experiment	Number of test-tubes with growth	Also, %	The number of test-tubes in experiment	Number of test-tubes with growth	Also, %	The number of test-tubes in experiment	Number of test-tubes with growth	Also, %	The number of test-tubes in experiment	Number of test-tubes with growth	Also, %	The number of test-tubes in experiment	Number of test-tubes with growth	Also, %
day	10	10	100	10	10	100	10	9	90	10	7	70	10	7	70	10	6	60
5 days	10	10	100	10	10	100	10	9	90	10	7	70	10	6	60	10	5	50
10 days	10	10	100	10	10	100	10	8	80	10	6	60	10	4	40	10	2	20
20 days	10	10	100	10	9	90	10	8	80	10	3	30	10	-	-	-	-	-
30 days	10	10	100	10	9	90	10	7	70	10	3	30	10	-	-	-	-	-

Table-3.

The influence of natural low temperature on *Xanthomonas campestris* var. *malvacearum*

Analysis time	Number of test-tubes in experiment	Number of test-tubes with growth	Also %	Temperature condition of air (average)						
				12	8	5	0	-1	-7	-10
November	10	10	100	+	+	+	-	-	-	-
December	10	8	80	-	-	-	-	+	+	+
January	10	7	70	-	-	-	-	+	+	+
February	10	5	50	+	+	+	+	-	-	-
March	10	-	-	-	-	-	-	-	-	-
April	10	-	-	-	-	-	-	-	-	-

CONCLUSIONS

1. Consequently, on the base of obtained results it can be concluded that the pure culture of *X.campestris* var. *malvacearum* can endure at +55 °C degree within 10 minutes, while at -10 °C degree survivability makes 60-90 %. It was determined that at temperature 50 °C degree the culture of *X.campestris* var. *malvacearum* dies after 25 minutes, while at 55 °C degree after 10 minutes.

2. The data on the influence of low temperature upon the retention of viability of pure culture of *X.campestris* var. *malvacearum* in natural condition showed that bacteria is sensitive to cold and endures in low temperature up to -10 °C degree, but in continuous strong cold its viability is lost, since temperature fluctuation causes to defrostation and freezing of environment and leads to the death of bacteria.

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REFERENCES

1. *Babayan, A.A. (1963). Bacterial Blight of cotton plant. Erevan: Armgosizdat, 269 p.*
2. *Babayan, A.A. (1939). Overwintering of pathogen agent of bacterial blight in infected stubble of cotton plant in the main cotton regions of the USSR. Erevan: Хорурдайн Айастан. 57 p.*
3. *Beltukova, K.I. (1968). Bacterial diseases of plants. Kiev: Naukova Dumka. 359 p.*
4. *Gorlenko, M.V., Voronkevich, I.V. (1950). Plant diseases and environment. Moscow: Publishing House of the Moscow Society of Nature Testers, 120 p.*
5. *Karimov, M.A. (1976). Diseases of cotton plant. Tashkent: Uqituvchi. pp. 24-37*
6. *Lagazidze. G.I. (1964). Bacterial diseases of cotton plant. Baku: Azerbgosizdat. 74 p.*
7. *Lebedeva O.G. (1935). Bacterial blight of cotton plant. Edit. ZAK RChI. Tiflis. 64 p.*
8. *Sattarova, R.K.. (1973). Cyto-physiological peculiarities of bacterial blight of cotton plant - Xanthomonas malvacearum. Abstract dis. for the degree of candidate of biological sciences. Tashkent. 26 p.*
9. *Smith, E.F. (1920). An introduction to bacterial dieseases of plant. London an Philadelphia: W.B.Saunders Company. 685 p. https://archive.org/details/anintroductiont00smitgoog/page/n9*
10. *Stougton, R. (1930). Angular leaf-spot disease of cotton. Nature, 125. pp. 350-351.*