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Asian Cotton Research & Development Network

Development of cotton mutant lines tolerant to *Verticillium dahliae* Kleb and soil drought

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TCD/IAEA/Vienna/Austria

PARTICIPATING INSTITUTIONS

- **Research Institute of Cotton breeding, seed production and agro-technologies**
- **International Atomic Energy Agency**
- **Institute of Nuclear Physics, Academy of Sciences of Uzbekistan**

Object of the study

- **Dry cotton seeds of the below listed varieties induced:**

Djarkurgan,
Bukhara-102
Turon
C- 9082

In 2007, seeds have been exposed at the Gamma facility of Institute of Nuclear Physics of Academy of Sciences

Three doses used; 50, 100 and 150 greys.

Research methods

Mutagenesis
Individual selection of plants
Infection of cotton seeds
Introduction of infected oats by fungus culture to the soil
Creation of artificial drought condition
Analysis of agronomic traits
Fiber quality testing on HVI
Evaluation material on wilting and drought
Mathematical and statistical analysis

Researches conducted in the different ecological conditions of Uzbekistan

Development of cotton mutant lines tolerant to diseases, Tashkent province

Development of cotton mutant lines tolerant to local stresses, Namangan province

Development of cotton mutant lines tolerant to drought resistance, Kashkadarya province

Research scheme

2007
Radiobiological nursery M1 with irradiation of seeds on the naturally infested field.
2008
Radiobiological nursery M2. Forms study under the optimal and artificially drought irrigation regimes. Selection of mutant forms and study on the naturally infested field.
2009
Radiobiological nursery M3 on the naturally infested field. Sowing families under the optimal and artificially drought irrigation regimes.
2010
Breeding nursery of the 1-year (M4). Families study under the optimal and artificially drought irrigation regimes. Selection the best families with a best traits.
2011
Breeding nursery of the 2-year (M5). Verification of constancy on the studied characteristics of mutants. Selection the best lines.
2012
Breeding nursery of the 3-year. Checking mutant lines under the greenhouse and naturally infected field conditions.
2013
Control nursery. The station small test (Institute)
2014
Control nursery. Competitive test. Seed multiplication of the best lines.

Variability of some agronomical traits

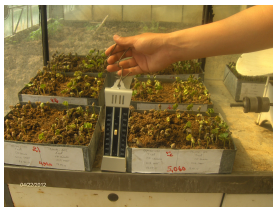
50% of emergence, day
50% Flowering,day
50% Maturity, day
Boll weight, g
Plant productivity, g
Fiber outturn, %
1000 seeds weight , g
Fiber staple lengths, mm,

Stamms

Stamm preparation and using

- Stamm #50 used for infestation
- The medium was prepared according to the general procedure on PDA
- Stamm multiplied in PDA media and add to sterilized oat seeds.
- In greenhouse condition; 2 g mass used per 4 kg sterile sandy soil.
- There tested 200 plants per each accessions.
- Seeds mixed with wilt pathogens planted 4 g/m2
- Phytotron conditions in 4 replicates, and in the field conditions on small plots in triplicate.
- To medium culture was added streptomycin rate of 300 mg per 1 l of the medium.

Pictures from the greenhouse researches

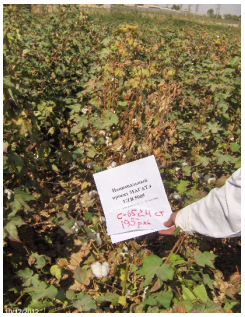


Research plots

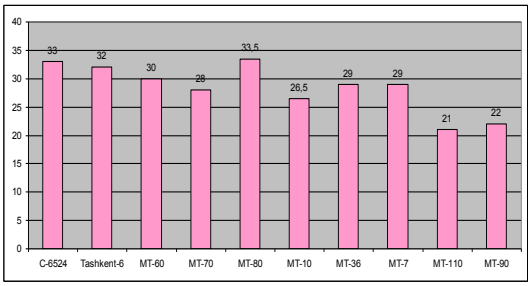
- **The experiment was conducted under typical serozem soil conditions Kashkadarya province**
- The climate in this district is relatively hotter in comparitive to Tashkent province.
- In farmers' fields of Kashkadarya province acute shortage of irrigation water and more than half of the cotton fields in the more or less saline.
- Daytime temperatures in the shade exceeds 45 Celsius.
- Warm winds often blows.
- Artificial relatively soil drought created depending on the Less water holding capacity of soil.
- The optimal regime is a 70-70-60% and drought is 65-65-60% of LWHC. (2009 to 2010).
- **The same regimes was studied in Tashkent province**

Pictures from the field researches





Cotton variety and mutant lines susceptibility to *Verticillium dahliae* under the Greenhouse condition



Yield capacity, c/ha 2012.

№ п/п	Variety, line	1	2	3	Average	Difference from the St
1	C-6524 (St)	33,33	33,33	31,94	32,87	-
2	Omad	33,33	33,33	34,72	33,80	+ 0,93
3	MT-60	34,72	33,33	36,11	34,72	+ 1,85
4	MT-70	36,11	36,11	34,72	35,65	+ 2,78
5	MT-80	36,11	36,11	36,11	36,11	+ 3,24
6	MT-10	37,50	37,50	34,72	36,57	+ 3,70
7	MT-36	37,50	34,72	37,50	36,57	+ 3,70
8	MT-70	37,50	37,50	34,72	36,57	+ 3,70
9	MT-118	37,50	36,11	37,50	37,04	+ 4,17
10	MT-90	38,89	37,50	37,50	37,96	+ 5,09
11	C-9085	37,50	36,11	37,50	37,04	+ 4,17

Initial cotton breeding material development

- **Thus, such as a medium staple mutant lines; MT-10, MT-7, MT-90 could be recommended as an initial wilt tolerant material.**
- **MT-70, MT-118 and MT-90 could be recommended as a drought tolerant accessions**

Stationary testing

- In 2013, two mutant lines were submitted (MT-70 and MT-71) to the small stationary testing plot of CBSPARI. Both lines were superior by the complex traits concerning to the standards (C-6524 and Namangan-77)

RELEASED VARIETY

At present, MT-70 (C-2530) is cultivated at 8 hectares in "Surkhan" farm,

Surkhandarya province

THANKS