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INHERITANCE OF WILT RESISTANCE OF HYBRIDS OF COTTON OF THE SPECIES GOSSYPIUM HIRSUTUM L. WITH INOCULATION OF PLANTS BY DIFFERENT GEOGRAPHIC POPULATIONS OF THE FUNGUS VERTICILLIUM DAHLIAE KLEB.

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Abstract

Kim Robert, Abboskhon Marupov, Michael Kim, 2005. Inheritance of wilt resistance of hybrids of cotton of the species Gossypium hirsutum l. With inoculation of plants by different geographic populations of the fungus Verticillium dahliae kleb

With the objectives for creation of wilt resistant varieties and lines of cotton to more virulent races, strains and isolates of the fungus Verticillium dahliae Kleb we had studied genotype resistance of the varieties and lines of cotton of the species G. hirsitum L. to more virulent isolates of the fungus V. dahliae extracted in various soil-climatic regions of the of Uzbekistan from zoned varieties, and also inheritance of wilt resistance with hybrids F_1 obtained with participation of maternal varieties Omad, C-8284, C-8288 and lines L-408, L-155 and L-1708 with fatherly forms C-5621, L-44 to the studied monosporous isolates of the fungus V.dahliae 28, 30, 32, 36, 40 and 44. The results witness about the fact, that parental forms have different genotype resistance to the isolates after inoculation of plant-hosts. Inheritance of wilt resistance with hybrids F_1 after inoculation of plants with isolates of the fungus V. dahliae is characterized depending upon the methods of assessments (according phenotype of sick plants and according cut of stalk) super dominance and dominance to the side of resistant or susceptible parent independently from the methods of sick with wilt plants record, and also interim inheritance.

Key words: *wilt resistance, inheritance, hybrids and varieties, isolate, dominance, verticillium*

MATERIAL AND METHODS

In the experiment we used parental forms of the varieties Omad, C-5621 and C-8284, and also the lines L-408, L-155, L-44 and L- 1708, and hybrids F_1. The experiment had been founded in 3 times repetition, 20 lunar plots in 4 rows in each hybrid combination.

The records on wilt resistance of hybrids F_1 we carried out according phenotypic appearance of wilt on the terms of June, 15, July, 15, August, 15 after inoculation of plant-host with monosporous isolates 28, 30, 32, 36, 40 and 44 of the fungus V. dahliae, and also the degree of affection of plant according the cut of main stalk in faint, medium and strong degree in the end of September.

RESULTS AND DISCUSSION

In hybrid combination Omad x C-6521 the plants inoculated with monosporous isolates 28, 30 and 76 have relatively faint susceptibility towards wilt. Phenotypic performance of wilt was equal to 20%, at the time with the inoculation of plants with isolates 32 and 44 the number of susceptible plants for June, 15 was 40%, and with the plants infected with isolate 40 there were no symptoms of wilt. Number of affected plants for June, 15 was equal to 60, 80, 40, 60 and 60% respectively. The highest virulence for hybrid combination Omad x C-5621 have monosporous isolates 28, 30, 32, 44, which were extracted from the varieties C-6524 and C-2609 in Andijan province and from the variety Akkurgan-2 in Fergana province.

The degree of inheritance of wilt resistance of the hybrids Omad x C-5621 towards studied monosporous isolates of the fungus V. dahliae is characterized by dominance and super dominance to the side of susceptible parent independently from the method of assessment for wilt resistance, except where on the phenotype of plants infected hybrid with isolate 36 there was dominance to the side of resistant parental formp C-5621.

The other picture was observed in hybrid combination C-8284 x C-5621 where coefficients of dominance according phenotypic performance of disease showed interim inheritance on resistance to monosporous isolate 30, dominance and super dominance on wilt resistance to isolates 28, 32, 36 and 40. Super dominance on susceptibility to isolate 44, where both parental forms have high wilt resistance to the present isolate, which was extracted from the variety Akkurgan-2 from the samples of plants obtained from Fergana province. This says about the fact, that monosporous isolate 44 of the fungus V. dahliae is more virulent for the present hybrid combination than other isolates.

Some other results had been obtained on inheritance of the sign on wilt resistance according cut of stalk, i.e. super dominance on resistance to monosporous isolates 30, 32 and 36. Dominance of hybrids to the side of more susceptible parent C-8284 with inoculation by isolate 28 (h=-1.0), and with hybrids infected with isolates 40 and 44 there is super dominance.

Inheritance of wilt resistance in hybrid combinations Omad x L-44 and C-8284 x L-44 is characterized by super dominance on susceptibility in phenotypic wilt performance with inoculation of hybrids by isolate 28. With infection of hybrids Omad x L-44 by isolates 30, 32, 36, 40 and 44 there is dominance to the side of wilt resistant parent L-44, and with inoculation of plants with isolate 32 there is dominance of more susceptible parent L-44, which shows less wilt resistance than the variety Omad to present monosporous isolate of the fungus V. dahliae.

The inheritance of wilt resistance with hybrids F_1 according phenotype of plant with inoculation of plants by monosporous isolates 36 and 40 is characterized by interim phenomena and dominance to the side of more susceptible variety Omad and super dominance on susceptibility to wilt with inoculation of hybrids with isolate-44 (h=60.0), i.e. monosporous isolate 44 extracted from the variety Akkurgan-2 in Fergana province is more virulent for present hybrid combination.

In hybrid combinations with fatherly forms C-5621 and Л-44, and maternal varieties Omad and C-8284 the degree of susceptibility of hybrids F_1 to isolate-36 is at the level of parental forms and interim inheritance to isolate-30. The analysis of the obtained results according the degree of susceptibility of hybrids with participation of maternal forms L-162, L-842, L-408, L-155 and L-1708 to the studied monosporous isolates of the fungus Verticillium, shows, that they have different genotypical reaction in phenotypic inheritance of the sign of wilt resistance. Coefficients of dominance in hybrid combination L-162 x C-5621 show, that inheritance of resistance to wilt is characterized by super dominance towards wilt resistance, except isolate-44, there is super dominance on susceptibility to wilt. Similar results had been obtained on cut of stalk, but with some differences accord-

ing the degree of dominance. Similar results on inheritance of the sign of wilt resistance to the studied isolates of pathogen were in hybrid combination with participation of fatherly form L-44, both as on plant phenotype as well as on cut of stalk.

With hybrids obtained while crossing L-408 x C-5621 and Л-408 x Л-44 with inoculation of plants with monosporous isolates 28,30, 32, 36, 40 and 44, there was super dominance in phenotypic wilt performance towards isolate-28, and according cut of stalk dominance to the side of wilt resistant parent. High degree of inheritance of wilt resistance have hybrid plants inoculated with isolate-44 independently from the method of assessment of sick plants. With that for present hybrid combination the highest virulence have monosporous isolates 36 and 40, which had been extracted from the varieties Akkurgan-2 and C-6524 in Namangan province. Similar results had been obtained while evaluating according cut of stalk.

Inheritance of wilt resistance in hybrid combination L-408 x L-44 is characterized by dominance of susceptibility in phenotypic wilt performance with inoculation of plants by isolate -28 towards the side of parental form L-408. Similar inheritance of the sign had been obtained also according cut of stalk. This witnesses about the fact, that present line possesses high wilt resistance and high degree of tolerance towards monosporous isolate-28. High degree of susceptibility to wilt had been obtained with hybrids F_1 by inoculation of plants with monosporous isolates 30, 32, 40 and 44 independently from the methods of assessment on wilt resistance. With that it is necessary to mark, that for that hybrid combination the most virulent isolates of the fungus V. dahliae are isolates 30, 32, and 40, which had been extracted from the samples of plants received from Andijan province from the varieties C-6524 and C-2609 (isolates 30 and 32), and also in Namangan province from the variety C-6524 (isolate-44). In hybrid combinations obtained while crossing L-408 with fatherly forms C-5621 and Л-44 there is very faint reaction in phenotypic wilt performance with inoculation of plants by monosporous isolates 28, 30, 32, 36, 40 and 44 for August, 15, and on June, 15 and on July, 15 are practically absent, except one case with hybrid combination L-408 x C-5621 towards isolate 32 on July, 15. Degree of wilt resistance in hybrid combinations with the participation of resistant to wilt maternal form L-155 witnesses about the fact, that the studied hybrids F, with infection of plant-host by isolates of the fungus Verticillium have high phenotypic resistance to wilt in all studied isolates. Number of infected plants in the combinations L-155 x C-5621 and L-155 x L-44 for August, 15 was varying from 0 to 60% depending upon virulence of the studied isolates. It should be marked, that there were no affected with wilt plants on June, 15 and July, 15, Except one case in hybrid combination L-155 x L-44 to isolate 44. It should be mark that hybrid combination L-155 x C-5621 is characterized by phenotypic dominance on susceptibility to isolate-28 at the level of parental forms, and according cut of stalk super dominance to the side of more resistant parent C-5621. Similar results had been obtained with inoculation of hybrids F, with isolates 30, 32, 36, and 44, which had shown dominance and super dominance according resistance to wilt. Also resembling results were obtained with the assessment according cut of stalk. Hybrids inoculated by isolate-40 have dominant character of inheritance of the present sign to the side of more susceptible parent L-155. It is necessary to mark, that for that hybrid combination the most virulent monosporous isolates of the fungus V. dahliae are isolates 30 and 36, and with that they show high degree of tolerance.

Wilt resistance of hybrid combination L-1708 x C-5621 to virulent isolates of the fungus V. dahliae is characterized by higher resistance in phenotypic wilt performance while inoculating of hybrids with isolates 32, 36, 40 and 44 for June, 15 and July, 15. The number of sick with wilt plants in hybrid combination L-1708 x L-44 on July, 15, except to isolate-32, was varying from 20 to 40%, and on August, 15 in both combinations number of affected with wilt plants was varying from 0 to 40% depending upon virulence of the studied isolates of the fungus V. dahliae. The highest virulence for hybrids L-1708 x C-5621 have isolates 28, 30 and 40 (on cut of stalk), and for hybrids L-1708 x L-44 isolates

28 and 30, i.e. monosporous isolates 28 and 30, i.e. monosporous isolates 28 and 30 are equally virulent for both hybrid combinations. The degree of tolerance performance is varying from 0 to 60,0 %, and only in one case has 100% to isolate–40. Wilt resistance of hybrids F_1 to the studied monosporous isolates of the fungus is inherited according the principle of super dominance and dominance to the side of resistant or more susceptible parent. Interim inheritance is observed in hybrid combination L-1708 x C-5621 and to isolates 30 (on cut of stalk), and also with hybrids L-1708 x L-44 to isolate-28, and in four cases at the level of parental forms, and in hybrid combinations L-1708 x C-5621 and L-1708 x Л-44 to isolates 28, 36, 30 and 40, respectively.

CONCLUSIONS

The obtained results on inheritance of wilt resistance of the hybrids of first generation to the studied virulent isolates 28, 30, 32, 36, 40 and 44 of the fungus V. dahliae show that:

- the highest wilt resistance has the variety Omad and lines L-44, L-842, L-408, L-155 and L-1708 to the studied monosporous isolates 28, 30, 32, 36, 40 and 44 of the fungus V. dahliae, which posses the reaction of super sensibility while introducing parasite into organism of plant-host, do not perform external symptoms of disease with wilt.;
- wilt resistance with hybrids of first generation with inoculation by the studied monosporous isolates of the fungus V. dahliae is inherited according the type of super dominance and dominance to the side of resistant or susceptible parent independently from the methods of records of sick with wilt plants, and also interim inheritance is observed. The degree of dominance of the sign depends upon combinational ability of parental forms and genotype reaction of hybrids F_1 on the introduction of parasite into organism of plant - host, and also upon the virulence of monospores isolates, which are extracted from different varieties of cotton and from different soil-climatic regions of the Republic of Uzbekistan;
- phenotypic degree of wilt performance with parental forms and hybrids F_1 depends upon genotype nature of their resistance to monosporous isolates of the fungus V. dahliae with inoculation by parasite of the plant-host and their reaction on performance of external phenotypic symptoms of the disease. The highest phenotypic wilt resistance posses the varieties Omad, C-5621 and lines L-44 and L-1708, and among hybrids the hybrid combinations L-155 x C-5621 and L-1708 x C-5621;
- hybrid combinations L-155 x C-5621 and L-155 x L-44 have the best combinational ability on wilt resistance to the studied isolates, than other hybrid combinations with the participation of maternal forms Omad, C-8284..

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