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BREEDING FOR RESISTANCE AGAINST LATE BLIGHT IN TOMATO UNDER EGYPTIAN CONDITIONS

By

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SUMMARY

In Egypt there are many commercial varieties, but they are not resistant to late blight disease, which is one of the most important and most serious fungal diseases that destroy the tomato crop in all its parts and which is caused by the egg disease Phytophthora infestans.

The wild genotype (L03684), in addition three cultivars of tomato were resistant to late blight, PH-2 (Solanum lycopersicum L.) Mecline, Caline and Fline. These cultivars had confirmed polygenic resistant genes to late blight, and were used as a source of pollens, were obtained from the Asian Development Center for vegetables.

And crossed between them and their varieties widely cultivated under Egyptian conditions such as (Castle Rock - Edkawi - Super Marmand) with a (partial dialle mating design) to obtain all possible crosses during the 2015-2016 agricultural season in the Bramoun-Dakahlia research farm.

when plants arrived 60 day-old were sprayed using Phytophthora infestans zoospore suspension to runoff with a hand sprayer, and covered plants with a plastic tunnel to increase humidity and kept at 18-20°C with a 16 hr photoperiod for 7-15 days. Within a year 2017, some of less susceptible crosses were selected such as: (L03684 x Edkawy), (Fline x Castle Rock), (Mecline x Castle Rock), (Mecline x Edkawy), (Caline x Super Marmand).

During the 2017-2018 growing season the seeds of the following genotypes were obtained (the seven parents, five first generation, five second generation, five BC1 hybrids for the first parents, and five BC2 for the second parents) for each hybrid separately.

At the end of the 2018 season, the degree of severity to these genotypes was evaluated under laboratory conditions at the, Plant and Seed Diseases Laboratory of the Faculty of Agriculture, Mansoura University. Then a genetic analysis (six parameter) was carried out to study the effect of additive and non-additive gene effects, heterosis, heritability in both narrow and broad sense and minimum number of effective gene were estimated. The main results obtained were as follows:

- This study presented the Estimates of the means for the severity of late blight caused by Phytophthora infestans that, the hybrid (L03684 x Edkawy) was less susceptible

with value (30), while the hybrid (Mecline x Castle Rock) was the most sensitive with value (52.87).

- ❖ This study showed some of genetic parameters of the final severity for seven parental varieties (Additive variance) ranged from (31.46:76.67) for crosses (Mecline x Castle Rock) and (L03684 x Edkawy) respectively. And (variance of dominance) with value (89.08:122.28) for (L03684 x Edkawy) and (Caline x Super Marmand) respectively.
- ❖ The estimates of heritability showed that broad sense heritability and narrow sense heritability were ranged from (81.8) to (67.92) while in the narrow sense range from (37.87) to (7.75) for severity revealed the magnitude of the environmental factors on the total variation.
- ❖ And showed heterosis over the mid parent (M.P.) with value (24.11%) for cross (Caline x Super Marmand). Positive sine indicated the dominance was toward susceptible. But for cross (L03684 x Edkawy) evaluated with (-33.77%). The negative value indicated that this cross was less sensitive than its mid- parents
- ❖ Minimum number of genes controlling resistance were ranging from (4.93): (28.01) with respect to the degree of sensitivity to the severity of the late blight.
- ❖ The results of Scaling tests (A,B and C) for all populations were significant except the population included on cross (Mecline x Edkawy) insignificantly differed from zero, the additive - dominance model is adequate to interpret gene effects.
- ❖ Estimates of additive gene effects were of low, magnitude. Epistatic gene effects were considered to be more important than additive gene actions in the inheritance of resistance to Phytophthora infestans in the crosses were studied.
- ❖ The additive x additive, additive x dominance and dominance x dominance gene actions were highly significant, for most crosses so the different breeding programs depending on hybridization such as the reciprocal recurrent selection breeding program is the best method to improve the resistance to Phytophthora infestans.