SUMMARY

The present work was carried out at Laboratory, Greenhouse, and Farm of Faculty of Agriculture, Moshtohor, Zagazig University, during 1996/97 – 1997/98 seasons, to isolate and identified some pepper-associated potyviruses, which caused serious reduction in the pepper crops during the last seasons. This work also aims to establish an effective means to produce virus-free peppers by using natural antiviral substances, and survey occurrence and incidence of the isolated virus(es).

A new potyvirus, suggesting called pepper severe mosaic potyvirus (PSMV), was isolated from pepper crops (*Capsicum annuum* L. Balady) in Qalubia, Menofyia and Sharkia governorates. The distinguishing symptoms of this virus isolate were severe mosaic on top leaves; necrotic spots on the stems, fruits and leaves; followed by premature foliar abscission. Infected plants, generally, showed severe stunting.

Isolated virus was identified using sympomatology, host range, mode transmission, physical properties, and serological tests.

The host range of pepper severe mosaic virus (PSMV) were 18 species or cultivars (belonging 3 families, *i.e.*, *Amaranthaceae, Chenopodiaceae,* and *Solanaceae*), during pot-trial under greenhouse conditions.

Only necrotic local lesions followed by no systemic infection were appeared on *Amaranthus ascendens* Lois. Meanwhile, chlorotic ones appeared on mechanically inoculated leaves of *Chenopodium amaranticolor* Coste & Ryn., and *C. quinoa* Willd.

Necrotic local lesions followed by systemic infection produced on *Nicotiana debneyi* Domin. While, chlorotic ones followed by systemic infection appeared on *N. rustica* L., and *N. tabaccum* "White Burley".

Systemic symptoms only and differentiated according to host plant species or cultivars was appeared on *Capsicum annuum* L. cvs. "Balady Hot, Balady Sweet, California Wonder", *C. frutescens* "Tabasco" *Datura metel* L., *N. glutinosa* L., *N. clevelandii* Gray, *N. tabacum* "Samsun and Xanthi-nc" *Petunia hybrida* Vilm., *Physalis floridana* Rydi. and *Solanum nigrum* L.

Physical properties of the isolated virus recorded as follows:

Thermal inactivation point (TIP), was 80°C but not at 85°C after 10 min., dilution end point (DIP), was between 10^{-6} and 10^{-7}, and longevity *in vitro* (LIV), was between 28-35 days.

Tested transmission means demonstrated that, the isolated virus was easily transmitted by mechanical inoculation and by green peach aphid, *Myzus persicae* Sulz. as non-persistent manner. But non-transmissible though pepper seeds.

Particles of the isolated virus, negatively stained with uranyl acetate (2%), were filamentous fexuous and had a 760 nm length and 15 nm width when examined with electron microscope.

Serological studies using tube precipitin, double diffusion test and directs system (double-antibody sandwich) of enzyme-linked immunosorbent assay (DAS-ELISA) tests were performed. Results demonstrated that there is a clearly positive reaction between antiserum against isolated virus (PSMV) and antisera against some other potyviruses such as PSMV, PVY and TEV, but not with PVMV, which imported kindly from Argentina, Germany, Finland and Nigeria, respectively.

This result clearly showed that, serologically, the isolated virus is a member of Potyvirus group.

Aqueous extracts of 12 plant species showing potent antiviral activity belong to 10 families and containing different active integrated compounds used in the pot-trial.

Extracts of *Chenopodium amaranticolor* Coste & Reyn.(leaves), *Hibiscus rosa sinensis* L.(flowers), *Vinca rosea* L.(leaves), and *Pelargonium zonale* L'Hérit (leaves), showing marked inhibitory effect, especially if sprayed 24h before inoculation with the tested virus.

Leaves extracts of *Lantana camara* L., *Euphorbia pulcherrima* Willd., *Datura metel* L., *Salvia officinalis* L., and fruit extract of *Azadirachta indica* A. Juss came in the next in this trend.

Slight inhibitory effect induced using leaves extracts of both *Adhatoda vasica* Ness and *Euphorbia peplus* L. While, no effect showed using leaves extract of *Acalypha fruticosa* Forsk.

There were no significant differences between sprayed the tested extracts pre-, mixed or post-inoculation with the virus isolate.

Response of some pepper cultivars, species and hybrids (most frequently cultivated in the greenhouse) against virus infection were studied using pot experiment.

Serrano (hot pepper), and Gedeon (sweet pepper) gave the superior resistant against infection by isolated virus. Came in the next Cayenne Large, Anheium and Pical (hot pepper); Marconi, California Wonder and Yellow Banana, respectively.

Generally, hot pepper showing more resistance to virus infection than sweet peppers.

Screening for existence pepper severe mosaic virus (PSMV) including some Northern Egyptian Governorates (e.g., El-Behera, Dakahlia, Domiat, Gharbia, Giza, Ismailia, Kafr El-Sheikh, Menofyia, Qalubia, and Sharkia) was carried out during summer season (July-September), 1997.

Young leaves and fruits of pepper plants (commercial *Capsicum* sweet and hot lines, species or varieties) naturally-infected with typical potyvirus symptoms from different fields were collected and investigated for the virus isolate. Crude sap from infected leaves subjected to detection tests using double antibody sandwich Enzyme-Linked Immunosorbent Assay (DAS-ELISA) technique in indirect system at Agricultural Genetic Engineering, Research Institute (AGERI), Giza, Egypt. Meanwhile, fruit samples were subjected to vitamin C and capsaicinoids determination.

Seven of ten screened Egyptian governorates (El-Behera, Ismailia, Menofyia, Sharkia, Giza, Gharbia and Qalubia, arranged descendingly according to severity infection) showed incidence of the isolated virus with different severity. Results clearly established when compared with the productivity of these governorates from pepper (recorded in the yearbook of Agriculture Ministry), where found consecutive correlation between severity infection and reduction in the productivity. Isolated virus not detected in the other three screening Egyptian governorates (Dakahlia, Domiat and Kafr El-Sheikh).

Fruit samples collected from infected and healthy pepper plants during the screening were subjected to chemical analyses for their content of both vitamin C (ascorbic acid) and capsaicin. Correlation between virus infection and fruit pepper content of vitamin C and capsaicin were estimated.

Results showed marked reduction in the content of both vitamin C and capsaicin in the virus infected pepper plants. Positive correlation between pepper content of pungency 'capsaicin' and resistance to virus infection was naturally found during the survey.

Occurrence of the isolated virus during this study, suggested called pepper severe mosaic potyvirus (PSMV), was the first record in Egypt.