

PRILOG POZNAVANJU VIRUSNIH BOLESTI KULTIVIRANIH I SAMONIKLIH ŠTITARKI

Većina biljaka familije štitarki (Apiaceae) u nas se uzgajaju kao povrtne kulture, a svakodnevno se upotrebljavaju kao povrće i mirodije. Pregledom najčešće uzgajanih povrtnih kultura štitarki gotovo se uvijek mogu naći i biljke sa simptomima virusne zaraze. Viroze se ispoljavaju u vidu suženja lišća, prosjetljavanja i žućenja žila žutog mozaika i općeg kržljanja cijele biljke (Sl. 1). Lišće oboljelog peršuna i celera sa suženom, a često i nitas-tom plojkom ima smanjenu tržišnu vrijednost, a prirod korijena oboljelih biljaka je znatno manji.

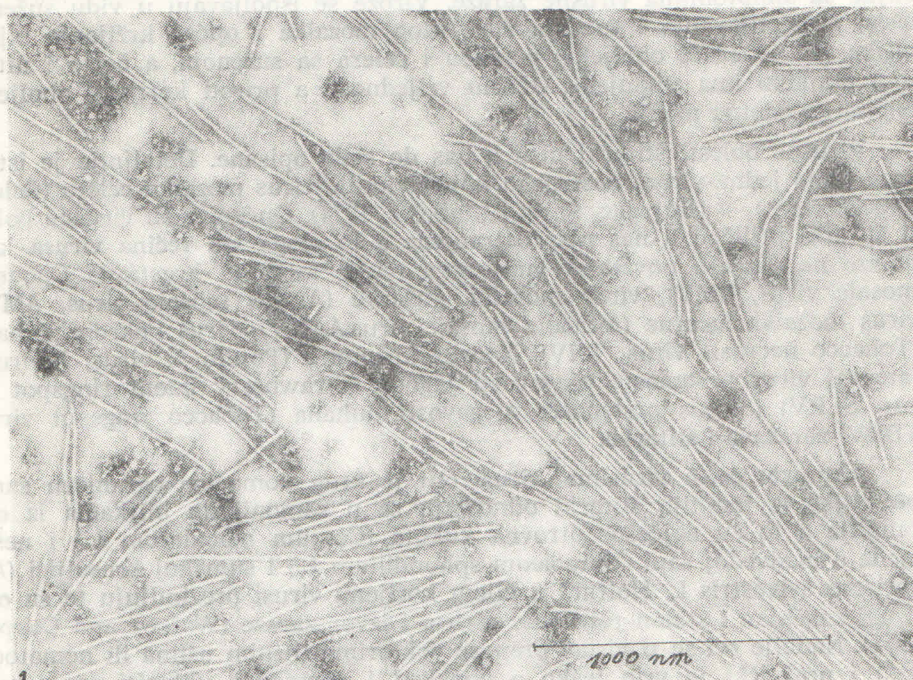
Virusne bolesti štitarki nisu u nas do sada opisane. Detaljnije je istra-žena samo jedna viroza pastrnaka koju uvjetuje virus mozaika celera (Celery mosaic virus) — (Buturac, Šarić i Ljubešić, 1974). Općenito su virusne boles-ti štitarki prilično u nas rasprostranjene a to stoga što većina virusa koji dolaze na ostalim povrtnim kulturama (virus mozaika krastavca Cucumis mosaic virus, CMV), virus mozaika gušarke (Arabis mosaic virus, AMV), virus mozaika lucerne (Alfa-alfa mosaic virus, AAMV), virus nekroze duhana (Tobacco necrosis virus, TNV), X-virus krumpira (Potato X virus, X-virus), latentni virus prstenaste pjegavosti jagode (Strawberry latent ringspot vi-rus, SLRV) i virus prstenaste pjegavosti duhana (Tobacco ringspot virus, TBRV) zaražava i štitarke.

Nasuprot ovim virusima, virusi čiji je krug domaćina ograničen samo na biljke iz familije štitarki održavaju se u samoniklim biljkama iz ove familije a to su najčešće otrovna kukuta (*Conium maculatum* L.) i nešto rjeđe u medveđoj šapi (*Heracleum sphondilium* L.) i šumskoj krasuljici (*An-thriscus sylvestris* L. Hoffm.) u čijem korijenu virusi prezimljuju te su one drugi značajan i stalan rezervoar virusa i izvor zaraze (Walkey and Cooper, 1971). Nadalje svi se ti virusi prenose vektorima (lisnim ušima ili nematoda-ma) i praktički je vrlo teško a ponekad i nemoguće ukloniti spomenute izvore zaraze. U manjim vrtovima je opasnost od zaraze s virusima kudikamo veća jer se u njima često održava velik broj ekonomski štetnih virusa u jednogodišnjim i perenim ukrasnim biljkama i u brojnim povrtnim kultu-rama.

Danas viroze štitarki dobivaju novo značenje, jer se neke kulture (mr-kva, celer pastrnak) ne uzgajaju samo u vrtovima već zahvaljujući prim-jeni herbicida i mehanizacije i na većim površinama za potrebe industrij-ske prerade. Stoga je u ovom prilogu u cilju boljeg poznavanja virusnih bolesti štitarki i njihovog preventivnog sprečavanja dat kratki pregled vi-roza štitarki kao i ostalih virusa koji su najčešće iz takvih virotičnih bi-ljaka izolirani.

Virusi i viroze pastrnaka (*Pastinaca sativa* L.)

Iz virotičnih biljaka pastrnaka izolirano je do sada svega nekoliko virusa od kojih su u literaturi opisani kao virusi pastrnaka: virus mozaika pastrnaka (Parsnip mosaic virus, PMV), virus išaranosti pastrnaka (Parsnip mottle virus, PMotV) i virus žute pjegavosti pastrnaka (Parsnip yellow fleck virus, PYFV) — (Murant et al. 1970). Oboljele biljke pastrnaka su obično inficirane jednim od spomenutih virusa ali često i više njih. Pored navedenih virusa na pastrnaku se spominju i drugi virusi kao što su CeMV (Buturac, Šarić, Ljubešić, 1974; Walkey and Cooper 1971), X-virus krumpira i virus mozaika krastavca (Murant and Gold 1968).



Sl. 1. Fragmentirane virusne čestice iz preparata djelomično purificiranog pomoću precipitacije polietilenglikolom i s dva ciklusa diferencijalne centrifugacije

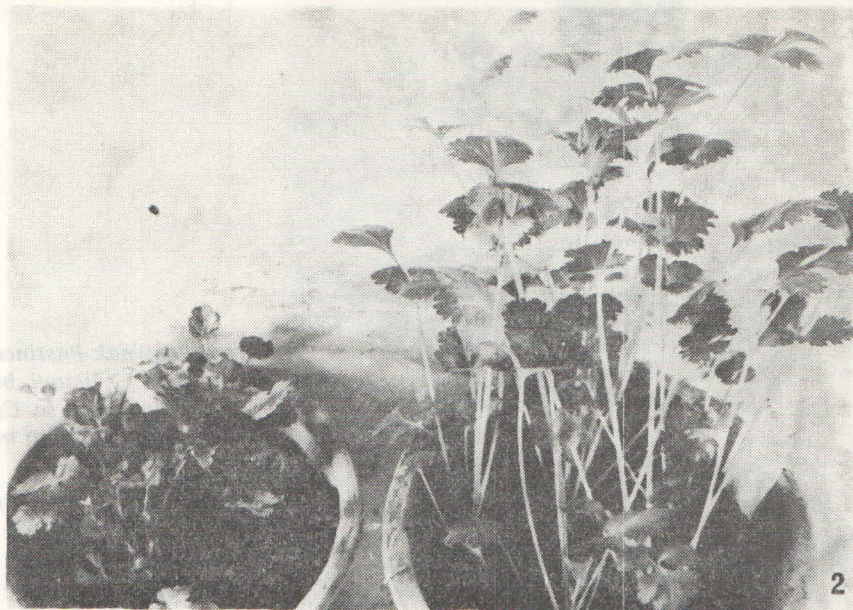
Fig. 1. Fragmented virus particles from partially purified preparation obtained by polyethyleneglycol precipitation and two cycles of differential centrifugation. 50 000:1

Virusi i viroze celera (*Apium graveolens* var. *dulce*)

Viroze celera najčešće izaziva virus mozaika celera (CeMV) i virus mozaika krastavca (CMV). Viroze celera u nas također izaziva CeMV, a vjerojatno i CMV (Buturac, Šarić, Ljubešić 1974).

Prvu virozu celera opisali su i nazvali južni mozaik celera (Southern celery mosaic virus), kasnije je utvrđeno da je to soj CMV, (Price 1935 i Wellman 1934. i 1935). Opisano je također niz drugih virusa celera kao što

su virus kovrčavosti lista celera — soj virusa mozaika celera (Celery and Severin 1945), virus žute pjegavosti celera (Celery yellow spot virus) — (Freitag and Severin 1945. i Hollings 1964), viroza žučenja žila celera (Celery



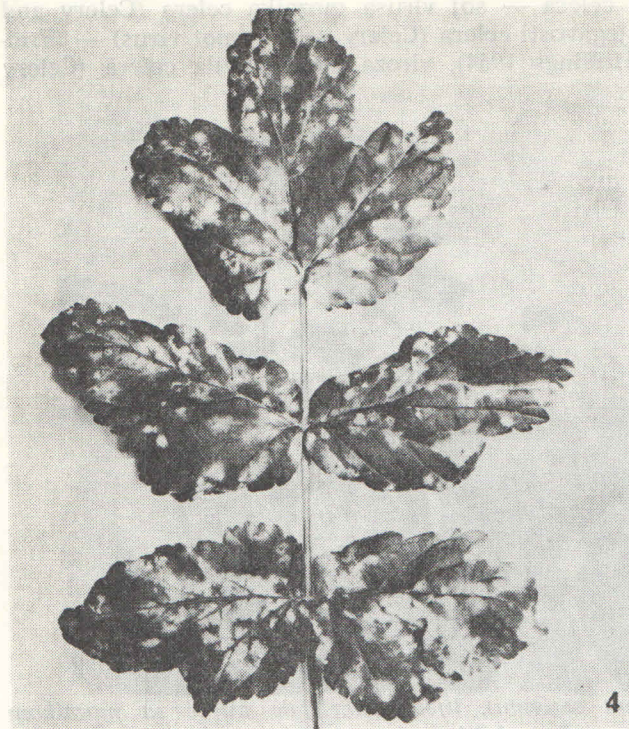
Sl. 2. Korijandar (*Coriandrum sativum*), lijevo zakržljale biljke sa mozaikom inficirane sa CeMV, desno zdrave biljke

Fig. 2 Coriander (*Coriandrum sativum*), left severely stunted plants with mosaic inoculated with CeMV, right healthy plants



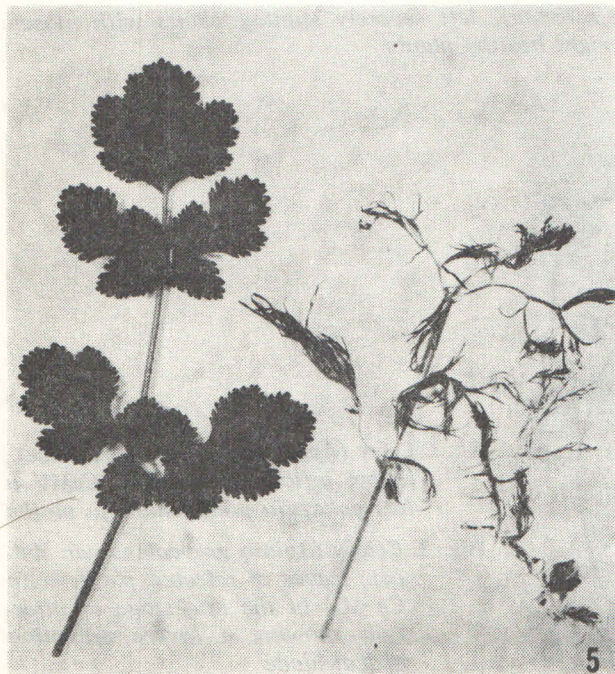
Sl. 3. Celer (*Apium graveolens* var. *dulce*), listovi inficirane biljke sa CeMV u fazi pokazuju jaku redukciju plojke

Fig. 3. Celery (*Apium graveolens* var. *dulce*), leaves of infected plants with Ce MV in the late stage of infection showing a severe reduction of leaf blade



Sl. 4. Pastrnak (*Pastinaca sativa*), listovi biljke inficirane sa CeMV sa simptomom mozaika

Fig. 4. Parsnip (*Pastinaca sativa*), leaves of plants infected with CeMV showing mosaic



Sl. 5. Korijandar (*Coriandrum sativum*), inficiran sa CeMV, lijevo zdravi list, desno inficirani list sa žestoko suženom plojkom

Fig. 5. Coriander (*Coriandrum sativum*), infected with CeMV left healthy leaf, right infected leaf with severe reduction of leaf blade

yellow vien) koju uzrokuje virus crne pjegavosti rajčice (Tomato black ring virus) — Hollings 1964. i 1965), virus prstenaste pjegavosti celera (Celery ringspot virus) — (Hollings 1964), latentni virus celera (Celery latent virus) — (Brandes and Luisoni 1966).

Od ostalih virusa koji također nanose znatne štete kulturama celera najčešće su izolirani: virus mozaika krastavca (CMV) — Hollings 1964, Götte 1957, Walkey and Mitchell 1969, Zitter 1970. i Tomlison et. al. 1970), virus mozaik gušarke (Hollings 1964, Walkey and Mitchell 1969), latentni virus prstenaste pjegavosti jagode (Walkey and Mitchell 1969), virus mozaika lucerne (Snyder and Rich 1942. i Hollings 1964), virus nekroze duhana, virus prstenaste pjegavosti duhana i virus bezsjemenosti rajčice (Tomato aspermi) — (Hollings 1964).

Virusi i viroze mrkve (*Daucus carota* var. *sativa*)

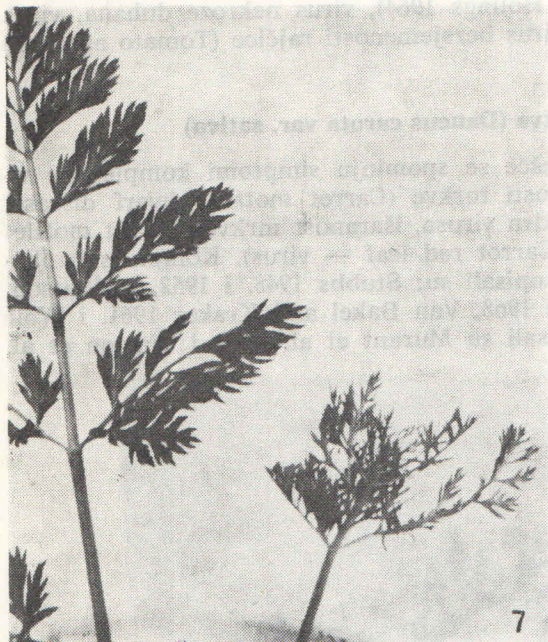
Među virozama mrkve najčešće se spominju simptomi kompleksne virusne bolesti — kržljave išaranosti mrkve (Carrot mottley dwarf disease, CMotDV) koju izgleda uzrokuju dva virusa, išaranost mrkve (Carrot mottle) i virus crvenjenja lišća mrkve (Carrot red leaf — virus). Kompleksno oboljenje kržljave išaranosti mrkve opisali su: Stubbs 1948. i 1952, te Watson, Serieant and Lennon 1964, Heize 1968, Van Bakel and Kraker 1961. i Wolf 1968. Virus išaranosti mrkve opisali su Murrant et al. 1969. i Watson et al.



Sl. 6. Šumska krasuljica (*Anthriscus sylvestris*), lijevo zdrava biljka, desno inficirana s neidentificiranim virusom koji se lako prenosi sokom sa samoniklog pastrnaka koji pokazuje simptome žućenja žila
 Fig. 6. Chervil (*Anthriscus sylvestris*), left healthy plants, right one with an unidentified virus easily transmissible by sap from wild parsnip showed vein yellowing

1964. Drugi virus kompleksne viroze mrkve, virus crvenjenja lišća mrkve opisali su Watson et al. 1964. i Wolf 1968. Kao virus mrkve spominje se i virus mozaika mrkve (Carrot mosaic virus) — (Chod 1965. i Camargo et al. 1971).

Pored ovih tipičnih virusa mrkve iz virotičnih biljaka mrkve izolirani su također virus mozaika lucerne (uobičajeni tip) — (Campbell and Melugin 1971), virus mozaika krastavca (Iwaki and Komuro 1970), virus prstenaste pjegavosti dragoljuba (Nasturtium ringspot virus, NaRV) — (Schmelzer and Wolf 1959).



Sl. 7. Mrkva (*Daucus carota*), inficirana sa CeMV, lijevo zdravi list, desno inficiran i zakržljao

Fig. 7. Carrot (*Daucus carota*), infected with CeMV, left healthy leaf, right infected one and stunted

Virusi i viroze peršuna (*Petroselinum crispum* Nym.)

Oboljele biljke peršuna su obično zakržljale sa žutim listovima, skraćanim peteljka i reduciranim liskama. Iz takvih biljaka su Frowd i Tomlison (1972) izolirali virus mozaika celera (CeMV), virus mozaika krastavca (CWV), virus prstenaste pjegavosti dragoljuba (NaRV), koji je kasnije indetificiran kao virus venuća boba (Broad bean wilt, BBWV), virus iša- ranosti mrkve te jedan neidentificirani filamentozni virus dužine 500 nm. Jako žućenje lišća peršuna (calico tip) izaziva virus mozaika lucerne (Campbell and Megulin 1971). U Floridi je iz peršuna izoliran virus mozaika krastavca (CMV) koga je Welman 1935. nazvao i opisao pod imenom južni mozaik celera Frowd and Tomlison 1972). Virus mozaika krastavca (CMV) također su izolirali iz peršuna u Engleskoj Frowd i Tomlison 1970, i u Njemačkoj, gdje je pored CMV izoliran i virus prstenaste pjegavosti dragoljuba (Wolf 1970).

VIRUSES DISEASES CULTIVATED AND WILD PLANTS
OF FAMILY APIACEAE

Mr. Ivan Buturac

Facultu of Agriculture Zagreb

S U M M A R Y

In our country cultivated and also wilde species of Apiaceae can be very often found with symptoms of virus diseases. There are more precisely investigated and described virus disease of parsnip which is couosed by celery mosaic virus (Buturac, Šarić i Ljubešić, 1974) In our region wild plants of Apiaceae are also infected with viruses. This was proved by inoculation test on test plants, but detail determination of this viruses wasn't performed. Researchs clearly show that is some viruses belong only to the family Apiaceae (whit a narrow host range) but very often exist such viruses wich are not specifically only for the Apiaceae (withn tle wide host range) wich infected also plants from other families.

LITERATURA

- Ruturac, I., Šarić, A. i Ljubešić, N. 1974:** Nalaz virusa mozaika celera u Jugoslaviji. Acta Bot Croat. 33 (1974) 37-44.
- Brandes, J. und E. Luisoni, 1966:** Untersuchungen über enige Bigenschalten von zwei gestreckten Sellerieviren. Phytopathol. Z. 57, 277-288.
- Camargo, I. J. B., E. W. Kitajima, A. S. Costa, 1971:** Microscopia electronica de inclusiones citoplasmaticas e alteracees celulares ossocides ao virus do mosaico de Cenoura. (Electron microscopy of cytoplasmic inclusions and cellular changes associated with mosaic virus). Bragantia 30, 31-37, RAM 1972, 3661.
- Campbell, R. N., and A. S. Melugin, 1971:** Alfallda mosaic virus strains from carrot and parsley. Plant Disease Reprtr. 55, 322-325.
- Chod, J., 1965:** Studies in same ways in which carrot mosaic virus can be transmitted. Biol. Plant. 7, 463-468 (Praha).
- Freitag, J. H., and Severin, 1945:** Insect transmission, host range, and properties of the crinkle-leaf strain of westerncelery-mosaic virus. Hilagardia 16, 361-370.
- Frowd, J. A., and Tomlison, 1970:** Nasturatum ringspot virus in parsley crops in Britain. Plant Disease Reprtr. 54, 734-735.
- Frowd, J. A., and J. A. Tomlison, 1972:** Relationships between a parsley virus, nastirtium ringspot virus and broad Bean wilt virus. Ann. Appl. Biol. 72, 189-165.
- Götte, W., 1957:** Über das Auftreten von Selleremosaik in Deutschland. Nachrbl. Dt. Pflanzenschutzdienst, Braunschweig 9, 99-101.
- Heinze, K. 1968:** Die Scheckige Verzwegung der Möhre (Carrot motley dwarf) auch in Deutschland. (Carrot motley dwarf also in Germany) Z. Pflkrankh. Pfl. Path. Pfl. Schutz, 75, 513-517. RAM 1969, 1420.
- Hollings, M. 1964:** Same properties of five viruses of celery in Britain. The Journal of horticultural science 39.

- Iwaki, M., and Komuro Y., 1970:** Viruses isolated from carrot, celery mosaic virus and cucumber mosaic virus
Ann. Phytopat. Soc. Japan 36, RAM 1970, 3065.
- Murant, A. F., and R. A. Goold, 1968:** Purification, properties and transmission of parsnip yellow fleck, a semipersistent, aphid-borne virus.
Ann. Appl. Biol. 62, 123-137.
- Murant, A. F., R. A. Goold, I. M. Roberts, and J. Cathro, 1969:** Carrot motte — a persistent Aphid borne virus with unusual properties and particules.
- Murat, A. F., Munthe, and R. A. Goold, 1970:** Parsnip mosaic virus, a new member of the potato virus Y group.
Ann. Appl. Biol. 65, 127-135.
- Price, W. C., 1935:** Classification of southern celery mosaic virus. Phytopathology 25, 947-954.
- Schmelzer, K., und P. Wolf, 1969:** Nachweis des Ringmosaik Virus der Kapuziner — kresse (Nasturtium ring-spot virus) in Trompetenbaum (Catalpa bignonioides Walt. (und Möhre) Daucus carota L.). Zentbl. Bakt. Parasitkde Abt. 2, 123, 577-579. RAM, 1971, 67.
- Severin, H.H.P., and J.H. Freitag, 1935:** California Celery mosaic diseases. Phytopathology, XXV, 891, Abs.
- Snyder, W.C., and S. Rich, 1942:** Mosaic of celery caused by the virus of alfalfa mosaic. Phytopathology 32, 537-539.
- Sutabutra, T., and P.N. Campbell, 1971:** Strains of celery mosaic virus from parsley and poison hemlock in California. Plant Disease Repr. 55, 328-332.
- Tomlinson, J.A., Carter, Annel., Dale, W.T. Simpson, Carol J., 1970:** Weed plant as sources of cucumber mosaic virus. Ann. Appl. Biol., 66, 11-16. RAM, 1971, 1021.
- Walkey, D.G.A., and J. Mitchell, 1969:** Studies on a »strap leaf« disease of celery caused by strawberry latent ringspot virus. Pl. Path. 18, 167-172.
- Walkey, D.G.A., J.A. Tomlinson. J.A. Frowd, 1970:** Occurrence of western celery mosaic virus in Umbelliferous crops in Britain. Plant Disease Repr. 54, 370-371.
- Walkey, D.G.A., and V.C. Cooper, 1971:** Effect of western celery mosaic on celery crops in Britain and occurrence of the virus in umbelliferous weeds. Plant Disease Repr. 55, 268-271.
- Watson, M., E.P. Serjeant, and E.A. Lennon, 1964:** Carrot motley and parsnip mottle viruses. Ann. Appl. Biol. 54, 155-166.
- Welman, F.L., 1934:** Identification of celery virus, the cause of southern celery mosaic. Phytopathology 24, 695-725.
- Welman, F.L., 1935:** The host range of southern celery mosaic virus. Phytopathology 25, 377-404.
- Wolf, P., 1968:** Viruskrankheiten an Knollensellerie und Möhre in Europa. Sonderdruck aus »Der Deutsche Gartenbau« 5, S. 106—108, S. 131-134.
- Zitter, T.A. 1970:** Cucumber mosaic i WCeMV two aphid-transmitted virus diseases of Florida celery. Proc. Fla. St. hort. Soc. 83, 188-191, RAM, 1970, 2996.