



# INHIBITION OF TOMATO YELLOW LEAF CURL VIRUS (TYLCV) BY EXTRACT OF ALGAE *CLADOPHORA CRISPATE*

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## Abstract

Tomato yellow leaf curl virus (TYLCV) causes enormous economic losses in tomato production in Iraq, so it is important to search for an alternative method to control TYLCV as compared with using of insecticides against whitefly (*Bemisia tabaci*). The present study aims to evaluate the effect of the alcoholic extract of algae (*Cladophora crispate*) with the different concentrations 0.5, 1.0, 1.5% against TYLCV disease on tomato. Results show that the spraying with concentration of 0.5% was significantly superior from other treatments in increase of plant length 130.00 cm and leaf area 28.00 cm as well as decrease of disease incidence and disease severity which reached 20% and 0.23% respectively, then followed by the concentration 1.0% in increase of plant length 99.00 cm and leaf area 23.66 cm and decrease of disease incidence and disease severity 40% and 0.56% respectively and finally the concentration 1.5% in increase of plant length 72.00 cm and leaf area 11.66 cm, also decrease of disease incidence and disease severity 40% and 0.43% respectively as compared with control treatment that sprayed with only distilled water, which recorded in traits previous 72.00 cm, 11.66 cm, 100% and 2.03% respectively.

**Key words:** TYLCV, *Cladophora crispate*, *Bemisia tabaci*

## Introduction

Tomato (*Lycopersicon esculentum* Mill.) is one of the most significant vegetables in the world, ranking second in importance after potato in many countries (Salim and Jasim, 2016). Major constraints to production of tomatoes are diseases caused by fungi, bacteria and viruses (Salim *et al.*, 2017; Jones *et al.*, 2016; McGovern, 2015). Apart from a number of bacterial and fungal pathogens which cause severe infections on tomato, it is infected by a number of viruses. Among the viral pathogens, Tomato yellow leaf curl virus (TYLCV) is the most destructive disease of tomato that cause severe disease in economically important crops, including tomato, with yield losses of up to 100%, Tomato yellow leaf curl, genus Begomovirus is belong to Geminiviridae family, the genome of the virus contains a single-stranded circular DNA and the length of the DNA is in all cases about 2800 nucleotides (Glick *et al.*, 2009). TYLCV is transmitted by whitefly *Bemisia tabaci* in a persistent manner (EPPO/CABI, 1996). Acquisition and inoculation

feeding periods range from 20 to 60 min and from 10 to 30 min depending on the isolates (Mansour & Al-Musa, 1992; Ioannou, 1985; Cohen & Nitzany, 1966). Symptoms of TYLCV are appearing on the tomato after 2-3 weeks, the new growth of plants with TYLCV has reduced inter nodes, giving the plant a stunted appearance. The new leaves are also greatly reduced in size and wrinkled, are yellowed between the veins, and have margins that curl upward, giving them a cup-like appearance. Flowers may appear, but usually will drop before fruit is set (Melzer *et al.*, 2009). It is difficult to control of TYLCV, but the common method is based on using of extensive insecticide to manage vector insects (Palumbo *et al.*, 2001). But sole dependence on insecticides leads to environmental pollution and it is not effective, therefore other alternative methods need to be investigated. Induced systemic resistance (ISR) can be stimulated in many plants by biotic or abiotic elicitors that increase the capacity of the plant to resist pathogens (Murphy *et al.*, 1999; Beckers and Conrath, 2007). There are several strategies for control of plant viral diseases, but not effective in reducing or avoiding of viral infections as compared with chemical

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