STUDIES ON BEMISIA TABACI AND ITS MANAGEMENT

Kamlesh Malik and B.P. Singh

Central potato Research Institute Campus, Modipuram-250110, UP, India

ABSTRACT: Studies employing RAPD-PCR analysis and biological indicator zucchini cultivar Ambassador showed that Bemisia tabaci occurring in western Uttar Pradesh does not belong to B-biotype. Population of B. tabaci in early planted crop peaked by third week of October and started declining thereafter. Best control of B. tabaci and potato apical leaf curl disease was achieved when seed treatment with imidacloprid was followed by aerial spray at emergence and 15 days thereafter. Despite the presence of vector, potato apical leaf curl disease was absent in variety Kufri Bahar while it was serious in other varieties namely Kufri Anand, Kufri Badshah, Kufri Chipsona-I, Kufri Chipsona-2, Kufri Pukhraj and Kufri Sutlej in the unprotected early planted crop.

Bemisia tabaci is a damaging insect pest known in the world because of its direct feeding, contamination of plant products with honey dew and ability to vector many plant viruses (Perring, 2001). Biotype ‘B’, because of its global pest status, has been the focus of considerable research over the past many years.

Although B. tabaci was detected on potato crop about 20 years ago, its population started showing high build up on early planted potato crop in warmer parts of Haryana about a decade back. It started migrating to Punjab and western part of Uttar Pradesh subsequently. This build up of B. tabaci was followed by the appearance of potato apical leaf curl disease (APLCD) which attained serious proportions on early planted seed potato crop. Subsequently, causal agent of the disease was identified as Tomato leaf curl New Delhi virus (ToLCNDV) (Garg et al., 2001). It was tentatively believed that ToLCNDV was transmitted by biotype B of B. tabaci. The present study was aimed at identifying the biotype of B. tabaci, its control in early planted seed potato crop and response of different potato cultivars to APLCVD.

For identification of the biotype of B. tabaci, samples were collected from brinjal crop in the month of September’2003 and sent to Dr. Muniyappa, UAS, Bangalore for RAPD-PCR identification of the biotype. Thirteen samples were tested for biotype determination.

Whitefly management was attempted at Central Potato Research Institute Campus, Modipuram both in early and main crop of potato. The early crop was planted on 25.09.2003 with variety Kufri Bahar. Five treatments, viz., T0: control, T1: seed treatment with imidacloprid @0.004% a.i., 10 minutes dip, T2: T1 + spray of the crop with 0.002% a.i. imidacloprid at emergence + 2nd spray with same dose after 20 days of emergence, T3: T1+ maize as barrier crop, T4: T2 + maize as barrier crop were tested. Same treatments were repeated in main crop with increased dose of imidacloprid (0.006% a.i.) for seed treatment.

RAPD-PCR analysis of the whitefly samples revealed that the fingerprints of the samples did not match with the fingerprints of biotype ‘B’ (Fig. 1a) suggesting that whitefly population which exists in western UP does not belong to biotype B. Also the indicator plant zucchini var. Ambassador did not show any ‘Silver leaf’ symptoms (Fig.1b) when fed with the B. tabaci collected from Modipuram thereby further indicating the isolate of the B. tabaci to be non-B.

Fig.1.(a) RAPD-PCR of B. tabaci (b) Zuccini plant without silver leaf (c) PALC diseased plant
Data recorded in early crop on management studies showed that the population of whitefly varied from 15-101 adults/100 leaves in plots, which received seed treatment with imidacloprid @ 0.004% a.i.; 11-84 adults/100 leaves in seed treatment + first spray with 0.002% a.i. imidacloprid at the emergence of the crop and 2nd spray after 20 days; 13-147 adults/100 leaves in seed treatment + maize as barrier crop; 14-88 adults/100 leaves in seed treatment + 1st spray with 0.002% a.i. imidacloprid at emergence, and 2nd after 20 days of emergence and 19-179 adults/100 leaves in unsprayed control (Fig. 2). In the main crop, B. tabaci population from last week of October to third week of December was 4-12/100 leaves in seed treatment: 0-7/100 leaves in seed treatment + single spray at the time of emergence; 11-2/100 leaves in seed treatment + first spray at emergence + second spray after 15 days, and 33-98/100 leaves in control.

Fig. 2. Population of white fly in Kufri Bahar in early crop

No incidence of PALCD was recorded in early crop of Kufri Bahar, although curling of leaf (11%) was there but that was not due to the apical leaf curl virus. This was confirmed with rigorous testing initially with ELISA and later by PCR. Other varieties had serious PALCD incidence; it was 2.5, 32.3, 45.6, 47.4, 65.0, 80.2 and 85.3% in Kufri Surya, Kufri Chipsona-2, Kufri Badshah, Kufri Chipsona-1, Kufri Satluj, Kufri Anand and Kufri Pukhraj, respectively.

Build up of B. tabaci in the early planted crop was quicker and higher as compared with the main crop. Correspondingly, PALCD incidence in the early crop of susceptible varieties was markedly higher. Variety Kufri Bahar showed resistance to PALCD even in the early crop. Contrary to the common belief, B. tabaci occurring in the Western UP does not belong to biotype B. B. tabaci and the PALCD were effectively managed by a treatment comprising seed treatment followed by two foliar sprays with imidacloprid.

Literature cited: