

A high level of curly top virus resistance in sugarbeet varieties is necessary in order to grow an economical crop in Idaho and eastern Oregon. In 1991, the Amalgamated Sugar Company growing area experienced the worst infection from curly top virus in about 20 years, with an

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Beet yellows virus, transmitted by aphids, is a serious limitation to sugar beet (*Beta vulgaris*) production in the Lower Sacramento Valley/Upper San Joaquin Valley in California. Yield losses as high as 75% can result from severe disease incidence with infection early in the plant growth cycle. The green peach aphid (*Myzus persicae*) has been implicated as the primary vector of beet yellows virus. However, within the last ten years, populations of black bean aphid (*Aphis fabae*) have increased in central California concomitant with the increase in disease severity. Information is lacking regarding the relative effects of black bean aphid aphid injury versus stress from yellows virus on sugar beet yield. This study was designed to investigate this relationship and to provide some fundamental information on sugar beet plant response to these stresses. Treatments were established in plots (1 row x 12 feet) 2 weeks after plant emergence as follows, 1.) nonviruliferous black bean aphids for full season, 2.) nonviruliferous black bean aphids for partial season, 3.) viruliferous black bean aphids (yellows virus + aphid injury), and 4.) untreated check. Aphids were infested beneath floating row cover material to maintain the integrity of the treatments. Black bean aphid levels peaked at ~ 1200 per 2 leaves in the infested treatments and the virus incidence was 100% in the BYV treatment. Photosynthetic rates averaged 19.8, 12.2, and 22.1  $\mu\text{mol}/\text{m}^2/\text{s}$  on 29 May, 9 June, and 5 July, respectively. There were no significant differences among the treatments on these dates. On 21 July, the photosynthetic rate was reduced in the full season aphid treatment by 33.5% and in the aphid + virus treatment by 42.2%. Sugar beet yield was 18.3 tons/A in the uninfested treatment (without aphids and virus) and the yield was 89.6, 71.6, and 31.7% of that in the uninfested treatment in the aphid-partial season, aphid-full season, and aphid+beet yellows virus treatments, respectively. Percentage sugar was not affected by the treatments and averaged 13.1% for the four treatments.