

Research Paper :

Design and testing of suitable boom for power tiller operated sprayer for bower type pattern of grape vineyard

S.B. GITE AND A.A. DEOGIRIKAR

Accepted : September, 2010

ABSTRACT

Grape (*Vitis Vinifera* L.) is a world wide popular fruit due to its taste and juicy nature. Grape crop is more susceptible to pests and diseases as such normally need 25 to 38 applications of pesticides or insecticides in a year. Conventional methods of spraying in grape vineyards are labor intensive and time consuming. Average farmer cannot afford larger tractor for spraying. Planting of grape and training to the grown vineyards are the very much important aspects. For proper growth and for maintaining proper shape to facilitate the interculturing, spraying, harvesting activities, proper training to the grape vineyard is to be given. Bower or pedal system is the best training system, which is commercially followed in Maharashtra. Two wheel tractor is most suitable for spraying in country like India. So it was decided to design and test suitable boom for hydraulic sprayer operated with power tiller for bower type pattern of grape vineyard. Considering the shape of the grape vineyard layout pattern, the boom for bower type vineyard system was fabricated in the workshop. Two booms of inverted L shape were designed and tested in the laboratory. There were eight nozzles, four on each boom. HTP pump was driven by the flywheel of the power tiller. Booms were fitted on a frame. The frame was fixed on the backside of the trailed type unit. The control panel was used to control the discharge to the boom to regulate the pressure. Discharge required through each nozzle was calculated to design the booms. The laboratory test results indicated that spray cone angle of the nozzle increased with increasing system pressure. Maximum droplet density (31 droplets/cm²) during the field trials was found for the travel speed 1.0 kmph and system pressure 9.0 kg/cm², which was most suitable for spraying in grape fields. The value of uniformity coefficient was found to be 1.96 for the treatment combination of N₁P₃, which showed more uniform size of droplets.

See end of the article for authors' affiliations

Correspondence to:
A.A. DEOGIRIKAR
Department of Agricultural
Engineering, College of
Agriculture, Dr. Balasaheb
Sawant Konkan Krishi
Vidyapeeth, Dapoli,
RATNAGIRI (M.S.) INDIA

Key words : Swath width, Boom, Bower, Uniformity coefficient, Droplet density

Fruits have been grown in India for thousands of years and occupy today a position of considerable importance. Fruits are the chief source of vitamins, without which the human body can not maintain proper health and resistance to diseases. Grape is one the most delicious, refreshing and nourishing fruits rich in minerals, sugar and vitamins. Share of Maharashtra state in total production of grape of India is almost one third. Spraying is one of the most important operations in crop protection from the point of view of pests and diseases control. Grape is highly susceptible crops to pest and diseases. Hamid (1973) suggested that two-wheel tractor was most suitable in India for promoting economic development, employment and better income distribution. Verma *et al.* (1988) found that power tiller with its matching equipment for different operations was an appropriate and economic source of power. Considering difficulties of conventional spraying methods and incapability of Indian farmers to have costly tractors for mounting and operating plant protection equipments, it was decided to design and test

a suitable boom for bower type pattern of grape vineyard mounted on trailed type unit with power tiller as a power source.

Kelkar *et al.* (1994) revealed that bower or pergola system is the best training system, which is commercially followed in Maharashtra. Normally 25 to 38 applications of pesticides or insecticides are required to control the pest and diseases of grape crop in a year (Vevai *et al.*, 1964). Chemical control is the only effective method of controlling most insects, pests, weeds and diseases (Smith, 1970). In India, two wheel tractor is most suitable which unlike large tractors would replace animal labor but not human labor and would be consistent with countries objective of promoting economic development, employment and better income distribution (Hamid, 1973). The present study was, therefore, undertaken to design and test suitable boom for bower type pattern of grape vineyard and accordingly develop a suitable sprayer for bower type grape vineyards.