

**EFFECT OF TRAINING SYSTEM ON SEED YIELD AND QUALITY OF BITTER GOURD CV. 'KALYANPUR BARAMASI' UNDER HERBICIDE MANAGED CROP**

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Received: February, 2014; Revised accepted: May, 2014

**ABSTRACT**

*The experiment was carried out at IIVR, Varanasi to know the feasibility of different training systems (Bower and kniffin) along with crop spread on ground as control and their effects on seed yield and quality of bitter gourd cv 'Kalyanpur Baramasi' under herbicide managed crop during rainy season (2008 and 2009). The weeds were managed with the application of popular herbicide 'Pendimethalin' @ 1 litre a.i. per hectare as pre-emergence. In bower system bamboo poles (2 m in height) were pitched on both the end of furrows at a distance of 5 m. and poles were connected with plastic wire. The wire along the furrow is further connected with cross wire fastened at 30 cm. distance, so as to form a network of wire. In Kniffin system wires were fastened only along the furrow at 30 cm distance in four rows, vertically. Maximum fruit yield 169.4 q ha<sup>-1</sup> was recorded under bower system and next best yield i.e. 141.3 q ha<sup>-1</sup> under Kniffin system. Maximum seed recovery (0.6%) was found under kniffin trailing system followed by on ground spread crop (0.45%). Ground spread crop gave minimum fruit yield 21.8q/ha which was 87.13% less than bower system. Significantly maximum seed yield was found 76.6 kg ha<sup>-1</sup> under bower system followed by Kniffin training system (63.2 kg ha<sup>-1</sup>). Bower system produced 75.85 percent more seed yield compared to ground spread crop pooled year. Seed germination was maximum 74.5 percent in seed obtained under bower system followed by Kniffin system owing to maximum test weight and healthy seed.*

**Key words:** Herbicide, Bower, kniffin, seed recovery, seed yield

**INTRODUCTION**

Bitter gourd (*Momordica charantia* L.) is an important crop of family Cucurbitaceae and grown in almost all parts of India. During rainy season a prominent variety 'Kalyanpur Baramasi' is being grown largely for fresh fruits in eastern Uttar Pradesh, Uttarakhand and Bihar. It bears fleshy, shiny green and long fruits (20-25 cm), which continue fruiting for longer duration (100 days) than small fruited varieties (65 days). The production of quality seeds is problematic during rainy season due to several factors like poor pollination, fruits rots, rudimentary seed development etc. when crop is left on the ground. In general, this cultivar bears less number of seed per fruits (10-14). By nature the crop, is a weak climber and needs proper support for its growth, development, pollination and fruiting. The plants trained on the support not only give more yields by helping in continuous fruiting but also it is less affected by weeds and use of herbicide only without any hand weeding safe guard the crop in comparison to ground spread crop. Trained vines are also less susceptible to fruit fly, downy mildew etc. It is presumed that training increases total yield and quality of seed but it is not sure that in what percentage seed yield increases and quality is improved. Therefore, the main objective of this experiment was to know the feasibility of different training systems and their

effects on seed yield and quality of bitter gourd under herbicide managed crop.

**MATERIALS AND METHODS**

Field experiment was conducted during 2008 and 2009 during rainy season at research farm of Indian Institute of Vegetable Research, Varanasi (U.P.) with two trailing systems viz. Bower and Kniffin and as control the ground spread, using 'Kalyanpur Baramasi' a popular rainy season cultivar. The experiment was laid out in randomized block design with six replications. For raising good crop, the recommended doses of N<sub>2</sub> (120 kg), P<sub>2</sub>O<sub>5</sub> (60 kg) and K<sub>2</sub>O (60 kg) were applied. The full dose of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O and half of nitrogen were applied before seeding as basal dose. The remaining quantity of nitrogen was applied at 30 days after sowing at the time of earthing up. The seeds of bitter gourd cv. Kalyanpur Baramasi were sown in the first week of July in 3.0 x 5.0 m plot size at a distance of 1.5 m x 0.50 m from row to row and plant to plant, respectively. The crop was managed with the application popular herbicide 'Pendimethelin' @ 1.0 litre a.i. per hectare as pre-emergence. In bower system, bamboo poles (2.0 m in height) are pitched on both the end of furrows at a distance of 5.0 m. These poles were connected with plastic wire. The wire along the furrow is further connected with cross wire fastened at 30.0 cm distance, so as to form a

network of wire. Two seeds in each mound were dibbled at the distance of 0.5 m along the furrow and covered lightly with soil. In Kniffin system the wires were fastened only along the furrow at 30.0 cm distance in four rows, vertically. In this system vines were allowed to grow on wire on both the sides of furrow with the help of plastic rope. On ground system vines were allowed to spread on ground. The observations on plant height (m), branch number plant<sup>-1</sup>, branch length (m), number of fruits plant<sup>-1</sup>, number of seeds per fruit, seed recovery (%), test weight (g), mature fruit yield (ha<sup>-1</sup>), seed yield (kg ha<sup>-1</sup>), fresh weight (g), and seed germination (%) were recorded at seed maturity stage, except for green fruit yield. The plant height and branch length measured by meter scale, branch number, number of fruits plant<sup>-1</sup> and number of seed per fruit counted at the time of seed extraction. To assess the seed recovery, 10 randomly mature fruits were selected and seed extracted and washed thoroughly in running water and recovery percent was calculated. Seed yield was taken at each harvesting per plot and converted into ha<sup>-1</sup>. The 100 seeds were counted with the help of seed counter (Tripette and Renaud, France) and the test weight (g) was taken with the help of electronic balance (Mettler- Toledo, Switzerland). For germination test 100 seeds were taken and placed on wet towel paper and after wrapping laid in tray having 2.0-3.0 cm water by seed germinator (Calton,

India). The germination was counted after 8 days. The data recorded in the study were analyzed statistically as per Gomez and Gomez (1984).

## RESULTS AND DISCUSSION

Growth characters like plant height, number of branches plant<sup>-1</sup> and branch length were found significantly maximum. Pooled year analysis showed maximum plant height (3.1 m) number of branches (7.2) and branch length (1.6 m) under bower trailing system followed by Kniffin system which had plant height (1.9 m), number of branches (5.2) and branch length (1.31 m) whereas under on ground spread (control) the plant height (1.10 m), number of branches (0.6) and branch length (0.3 m) were recorded. In on ground spread, the plant height, branch numbers per plant and branch length reduced 71.80%, 28.20%, and 37.5%, respectively than bower system. It was clear that weed population and diseases and pests reduced growth character when spread on the ground. Similar results were also reported by Harbi *et al.* (1996). Maximum fruit yield 169.4 q ha<sup>-1</sup> was recorded under bower system and next best treatment yield i.e. 141.3 q ha<sup>-1</sup> a under Kniffin system. Ground spread crop gave minimum fruit yield 21.8q ha<sup>-1</sup> which was 87.13% less than bower system. It was due to proper support which promoted the growth substantially leading to enhance number of branches and ultimately fruiting coupled with less infestation of disease and pest.

Table 1: Effect of training system on fruit and seed yield of bitter gourd cv. Kalyanpur Baramasi (pooled data of 2009 and 2010)

Treatments	Growth and Yield Parameters										
	Plant height (m)	Branches plant <sup>-1</sup> (No.)	Branch length (m)	Fruits plant <sup>-1</sup> (No.)	Seeds fruit <sup>-1</sup> (No.)	Seed recovery (%)	Test weight (g)	Fruit yield (q ha <sup>-1</sup> )	Seed yield (kg ha <sup>-1</sup> )	Fresh weight (g)	Seed germination (%)
Bower system	3.9	7.2	1.6	13.4	13.5	0.4	28.4	169.4	76.6	692.9	74.5
Kniffin system	1.9	5.2	0.98	9.3	11.6	0.6	29.3	141.3	63.2	483.8	71.8
Ground	1.1	4.5	1.2	2.8	5.8	0.45	17.8	21.8	18.5	357.5	64.6
CD at 5%	0.17	0.6	0.3	1.3	2.3	0.24	0.9	38.2	3.9	32.8	2.6

Seed yield was influenced by number of fruits plant<sup>-1</sup>, and number of seeds fruit<sup>-1</sup>. Recovery percent and test weight were found maximum under bower system followed by Kniffin system. Pooled year data showed maximum number of fruits plant<sup>-1</sup> 13.4 and number of seed fruit<sup>-1</sup> 13.5 in bower system followed by Kniffin system which produced number of fruits plant<sup>-1</sup> 9.3 and number of seed fruit<sup>-1</sup> 11.6. Pooled data showed that under on ground spread crop number of fruits per plant and number of seeds per fruit reduced 79.10 and 57.04 percent, respectively than bower system. Similar results were recorded by

Stan *et al.* (1980) and Joshi *et al.* (1994). Pooled data of seed recovery percentage showed insignificant effect between both the trailing systems and ground spread control crop. Test weight of seed was noted maximum (29.3 g) in kniffin system followed by bower system. Ground spread crop reduced 39.24 percent test weight than kniffin system. Significantly maximum seed yield was found 76.6 kg ha<sup>-1</sup> under bower trailing system followed by Kniffin training system. Bower training system produced 75.85 percent more seed yield compared to ground spread crop. Bhokare and Ranpise (2004) reported that

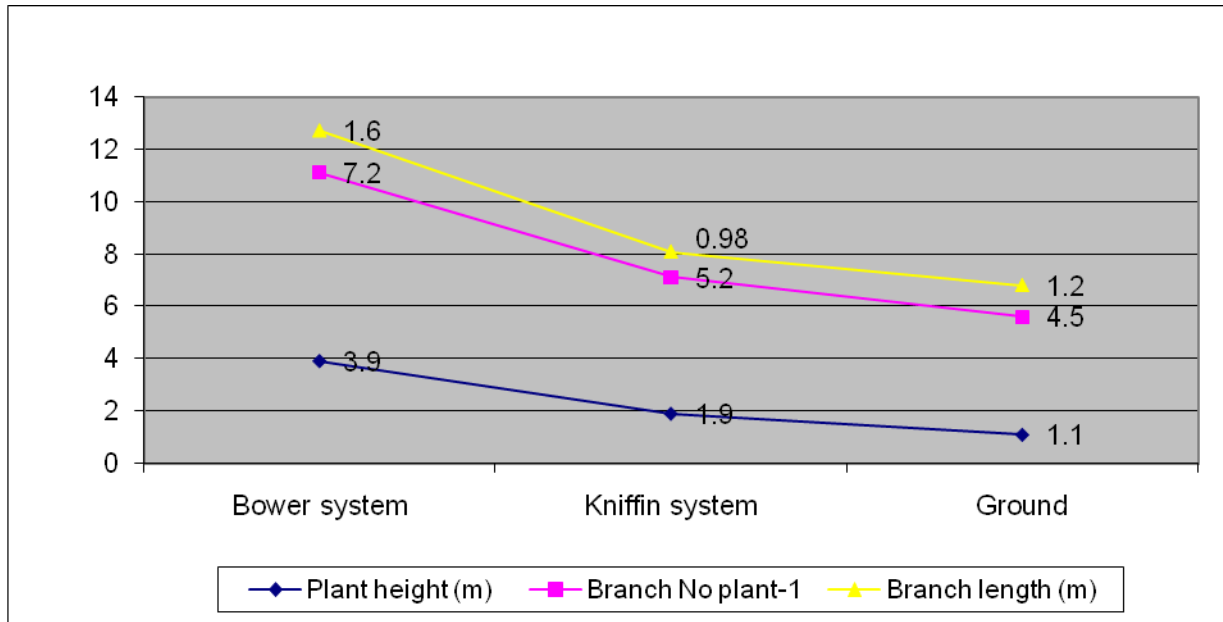


Fig. 1 Growth parameter under different training systems

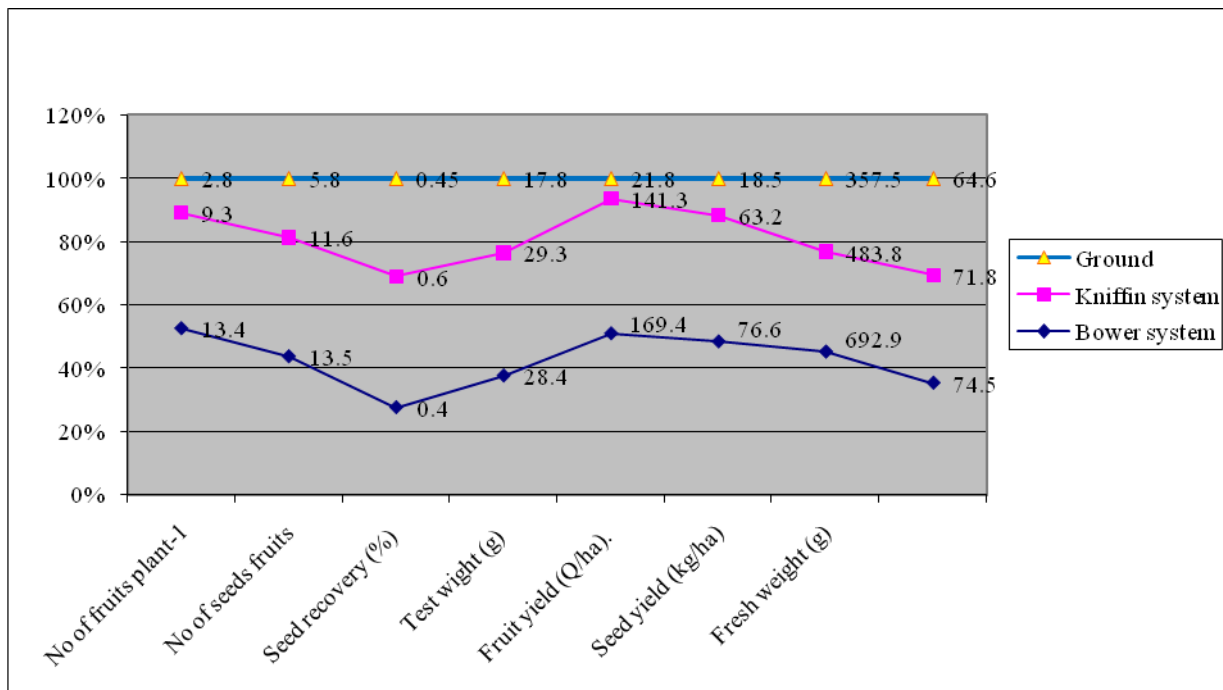


Fig. 2 Effect of seed yield attributing traits under different training systems

increase in yield over ground system was 71.83, 200.65 and 243.80% in the bush, kniffin and bower system, respectively. Fresh weight of plant was found maximum 692.9 g under bower trailing system followed by Kniffin trailing system, which was attributed to more growth and less pest and disease infestation. Similar result was found by Harbi *et al.* (1996). Seed germination was maximum 74.5 percent

under bower system followed by Kniffin system owing to maximum test weight and healthy seed. Similar results have been reported by Joshi *et al.* (1995). From the above results and discussion, it can be concluded that for higher yield of quality seed in bitter gourd during rainy season, it is better if the crop is raised using one of the traing system preferably kniffin system.

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