International Journal of Agriculture, Environment and Biotechnology
Citation: IJAEB: 8(1): 69-73 March 2015
DOI Number: 10.5958/2230-732X.2015.00009.1

HORTICULTURE

Effect of intensity of pruning on yield and fruit quality of ber (*Ziziphus mauritiana* L) cv. UMRAN

Navjot Gupta and MS Gill

Department of Horticulture, Punjab Agricultural University, Regional Station, Bathinda, Ludhiana, India.

Corresponding author: navjot_bti@yahoo.co.in

Paper No. 293 Received: 28 August 2014 Accepted: 2 February 2015 Published: 25 April 2015

ABSTRACT

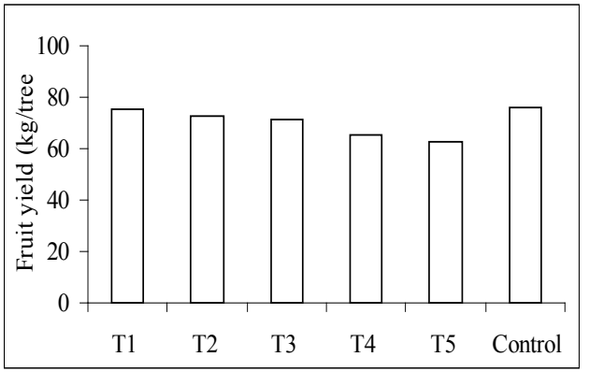
A study was conducted at Regional Research Station, Bathinda to determine the effect of different pruning intensities on yield and fruit quality of ber cv. Umran. The secondary branches of ber trees were pruned at 4, 6, 8, 10, 12 bud levels and control i.e., no pruning. The fruit yield decreased with the increase in intensity of pruning. The maximum fruit weight and fruit size in terms of fruit length and fruit breadth was obtained in trees pruned at 8th bud level followed by the trees pruned at 10th level and minimum in the trees kept under control. The pulp percentage and pulp stone ratio was maximum in the fruit of the trees pruned at 8th bud level. TSS content was maximum in the fruits pruned at 8th bud levels followed by 10th and 12th bud levels and minimum under control. The acid content of the fruits was also not influenced by pruning intensities.

Highlights

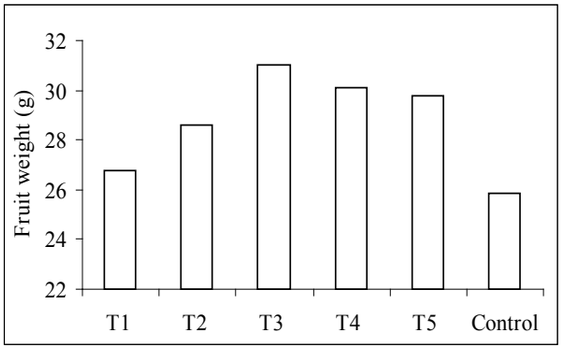
- Fruit yield decreased with increase in intensity of pruning.
- The fruit size, fruit weight, pulp percentage, pulp stone ratio and TSS content was obtained maximum in trees pruned at 8th bud level followed by the trees pruned at 10th bud level.

Keywords: Ber, Pruning Intensities, Quality, Yield

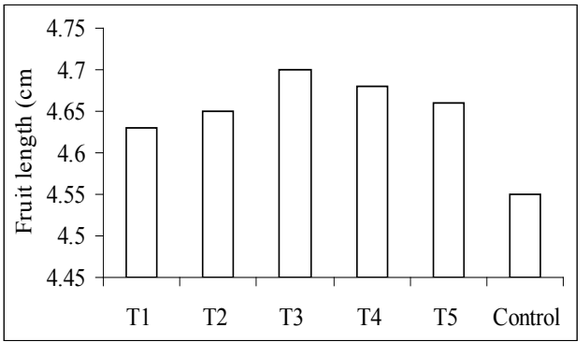
Indian jujube known as ber (*Ziziphus mauritiana* Lamk.) is an extremely drought hardy and native fruit of India. The cultivation of ber is gaining popularity in arid and semi-arid region in India because of its low maintenance cost, wide adaptability, low water requirement, high yield, good returns, scope for value addition and suitability even under wastelands (Martinuzzo 2006). Among the different factors responsible for sustainable production of quality ber fruits, practice of pruning is the most vital. Pruning is essential to maintain vigour in the trees and to maintain fruit productivity, quality and size (Singh *et al.*, 2004). Pruning is determined by fruiting behaviour of a crop. In ber, the fruits are borne in the axils of the leaves on the young shoots of the current season. Therefore, pruning is required every year to induce maximum number of new healthy shoots which bear good quality fruits and removal of unproductive, over-crowded and portion of old branches for production of new fruit bearing shoots. The intensity of pruning in ber is depend on several factors like genotype (Nanthakumar and Shanmugavelu 1990), spacing (Bisla *et al.*, 1991) and the agroclimatic condition where the crop is being grown (Pandey *et al.*, 1998). So, there is a need to standardize the extent of pruning under different agro-climatic conditions. Keeping the above objectives in view the present study examined the effect of different intensities of pruning on yield and fruit quality of ber.



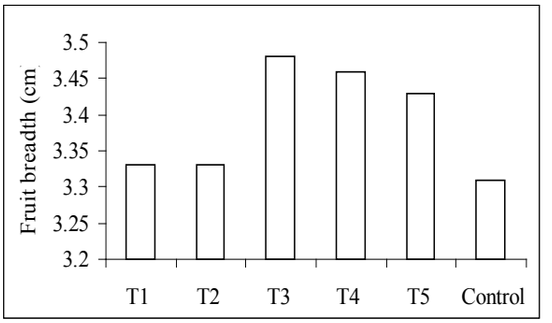
A. CD: T=1.33



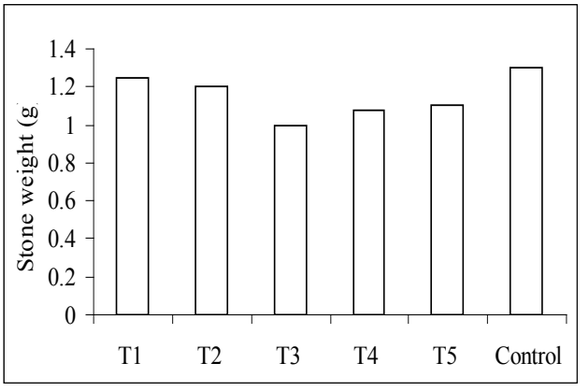
B. CD: T=0.52



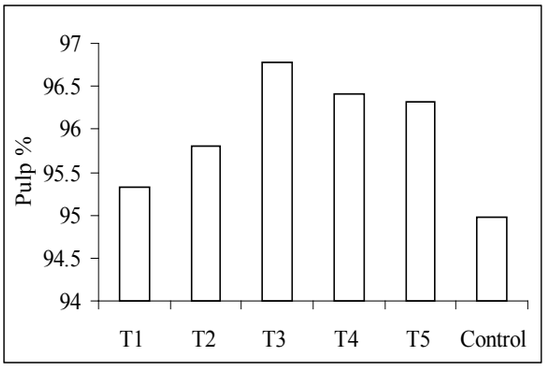
C. CD: T=0.04



D. CD: T=0.03

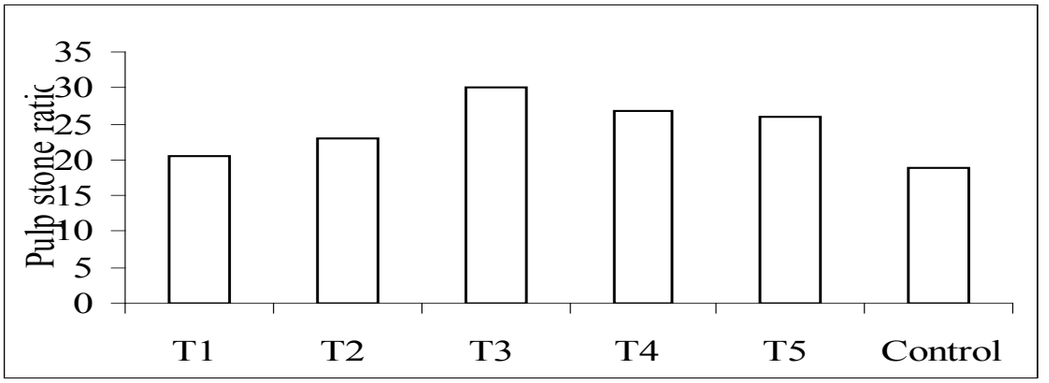


E. CD: T=0.03

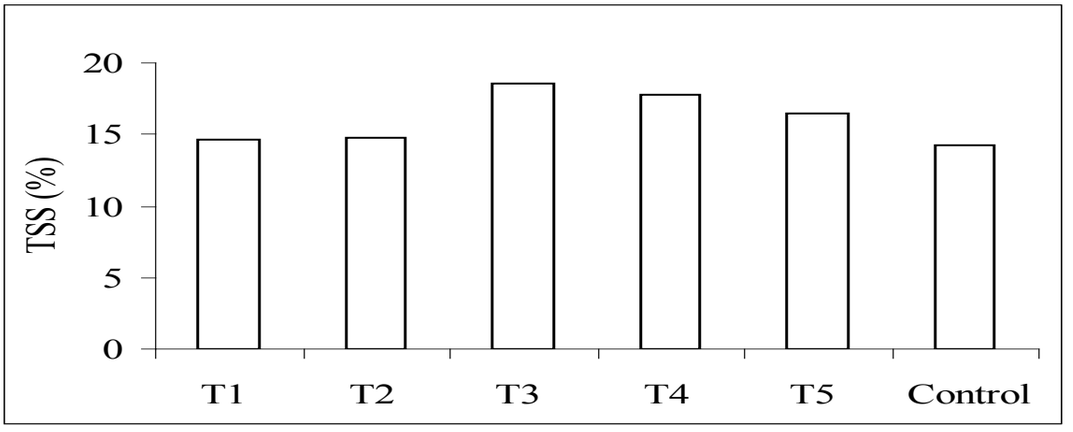


F. CD: T=1.04

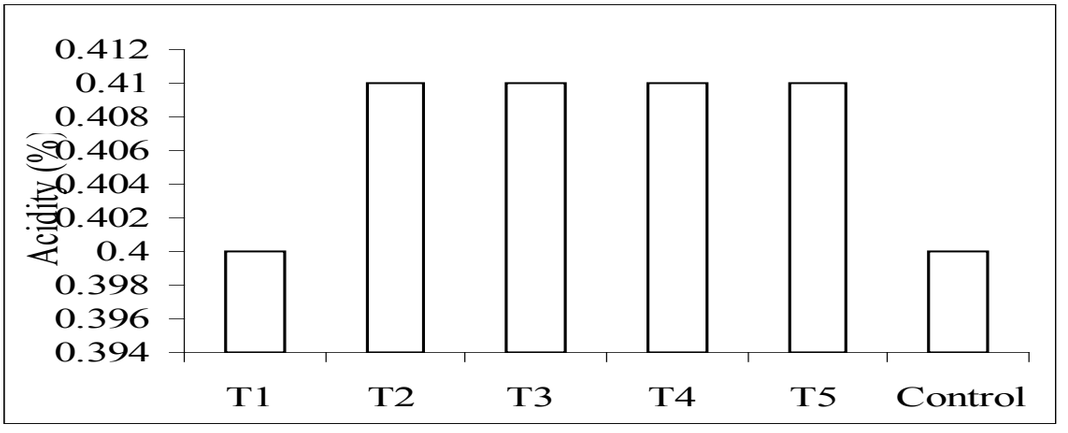
Figure 1. Effect of intensity of pruning on (A) Fruit yield; (B) Fruit weight; (C) Fruit length; (D) Fruit breadth; (E) Stone weight; (F) Pulp percentage ; T=intensities of pruning; CD= Significant at $p \leq 0.05$.



G. CD: T=1.35



H. CD: T=0.61



I. CD: T= NS

Figure 2. Effect of intensity of pruning on (G) Pulp stone ratio; (H) TSS; (I) Acidity; T=intensities of pruning; CD= Significant at $p \leq 0.05$.

Materials and Methods

The experiment was carried out in the orchard of PAU, Regional Research Station, Bathinda, Punjab during two successive seasons, 2010-11 and 2011-12. The soil of the experimental site was sandy loam and characterized with pH (8.31), organic carbon (0.32%), electrical conductivity (0.23dS/m), available N (212 kg/ha), available P (21.5 kg/ha) and available K (357.0 kg/ha). The trees were about 18 years old and were planted in randomized block design with four replications at the spacing of 7.5 m X 7.5 m and one tree per treatment per replication. Recommended package of practices were followed for cultivation of fruit plants. The secondary branches of ber trees were pruned on 15th of May during both the years. Pruning treatments consists of six treatments viz., T_1 at 4^{rth} bud level, T_2 at 6th bud level, T_3 at 8th bud level, T_4 at 10th bud level, T_5 at 12th bud level and T_6 control i.e., no pruning. Data were recorded on fruit yield per plant (kg), fruit weight (g), fruit length (cm), fruit breadth (cm), stone weight (g), pulp percentage, pulp: stone ratio, total soluble solids (TSS) and acidity (%). The fruits at each harvesting were weighed and per tree yield was recorded. Twenty representative mature fruits were picked randomly from each treatment and these fruits were then analyzed for physico-chemical characteristics. TSS were determined with the help of hand refractrometer while acidity were estimated by titration as per methods followed by AOAC (2000).

Results and Discussion

The fruit yield decreased gradually with the increase in intensity of pruning (Figure 1). The fruit yield was obtained maximum (76.25kg/tree) in the trees under control followed by the trees pruned with lower intensities i.e. at T_1 (4th bud level) and T_2 (6th bud level). The trees pruned at 12th (T_5) and 10th (T_6) bud levels produced significantly lower fruit yield of 62.50 kg/tree and 65.50 kg/tree respectively than the other pruning intensities. Kumar *et al.*, (2014) also found that the increase in yield was inversely proportional to increase in level of pruning. This may be attributed to the reduction in number of bearing shoots with severity of pruning and use of assimilates in vegetative growth which lead to the less number of fruits per tree. Gill and Bal (2008) also reported the significant reduction in fruit yields as the intensity of pruning increased.

The fruit size in terms of fruit length and fruit breadth increased with the increase in intensity of pruning. Fruit length was observed maximum (4.70 cm) in the trees pruned at 8th bud level (T_3) while the minimum fruit length observed in trees kept under control (4.55 cm) followed by T_1 (4.63cm). Similar trend was also observed in case of fruit breadth. The fruit breadth was observed maximum (3.48 cm) in the trees pruned at 8th bud level. The fruit breadth was recorded minimum in trees kept under control (3.31 cm) which was at par with the T_1 and T_2. This may be due to more number of fruits in case of unpruned trees resulting in lesser availability of nutrients which lead to smaller sized fruits while more availability of metabolites under the trees pruned at 8th bud level lead to increase in fruit size. Similar results with respect to fruit size were also reported by Kumar *et al.*, (2002).

All the pruning treatments were effective in increasing the average weight of the fruit as compared with the control. The significantly higher fruit weight (31.0 g) was obtained under the treatment T_3 (8th bud level) followed by T_4 (30.1 g) and T5 (29.8g). The minimum (25.9 g) fruit weight was obtained in the trees kept under control. Higher fruit size under this treatment might have resulted in higher fruit weight. Singh *et al.*, (2010) also observed similar results with respect to fruit weight.

The stone weight was observed significantly lower in T_3 followed by the trees pruned under treatments T_4 and T_5 while the stone weight was maximum in the trees kept under control (Figure 1). The pulp percentage was maximum in the fruit under the treatment T_3 followed T_4 and T_5. The minimum pulp percentage was obtained in the trees kept under control. This may be due to the maximum fruit size and fruit weight and minimum stone weight under the treatment T_3 (8th bud level). Similarly pulp stone ratio was significantly higher in the fruit of the trees

pruned under treatment T_3 followed by the trees pruned under treatment T_4 and T_5. The minimum pulp stone ratio was obtained in the trees kept under control (Figure 2). This might be due to maximum pulp percentage and minimum stone weight under T_3 treatment and vice versa in case of unpruned trees.

The different intensities of pruning has significant effect on the TSS content of the ber fruit (Figure 2). The TSS was significantly higher in pruned trees than the unpruned and less pruned trees. The maximum (18.50%) TSS content was observed in T_3 followed by T_4 and T_5 bud levels and minimum under control. The higher TSS in T_3 may be due to more open tree canopy and thus allowing more light and less competition for the growth of individual fruit per tree canopy while use of metabolites for vegetative growth in severely pruned trees might have resulted in lower TSS. Ahmed *et al.*, (2006) also recorded maximum TSS in pruned plants as compared to control. The pruning treatment has not any significant effect on the acid content of the fruits.

Conclusion

The yield of the ber fruit tress decreased with the increase in the intensity of the pruning. The fruit size, fruit weight, pulp percentage, pulp stone ratio and TSS content was obtained maximum in trees pruned at 8th bud level (T_3) followed by the trees pruned at 10th bud level and minimum in the trees kept under control. The acid content of the fruits was not influenced by the pruning intensities.

References

Ahmed S, Chata ZA, Nasir MA, Aziz A, Virk NA and Khan AR (2006) Effect of pruning on the yield and quality of kinnow fruit. *J Agric Soc Sci* **2**(1) : 26-30.

AOAC (2000) Official Methods of Analysis. 15th Edition, Washington, DC, USA.

Bisla SS, Dhiman BK and Charia AS (1991) Effect of pruning severity and spacing on flowering and fruiting behaviour of ber (Zizyphus mauritiana Lamk.) cv. Umran. *Haryana Journal of Horticulture Science* **20**(1-2):26-30.

Gill KS and Bal JS (2006) Influence of pruning severity and time on yield and fruit quality of ber (Zizyphus mauritiana Lamk.). *Indian Journal of Horticultural Science* **63**(2): 162-165.

Kumar H, Katiyar PN, Singh AK and Rajkumar BV (2014) Effect of different pruning severity on growth and yield of ber (Zizyphus mauritiana L.) cv. Banarsi Karaka. *International Journal of Current Microbiological Applied Science* **3**(5) :935-940.

Kumar S, Ram SN and Baig MJ (2002) Effect of pruning levels on yield and quality of ber (Zizyphus mauritiana L.) cultivars. *Range Manag Agroforest* **23**(1): 59-62.

Martinuzzo R (2006) JUJUBE Ziziphus jujuba Mill Rhamnaceae. A Tuscan farm house "the Jujube" Casa Vacanza "I1 Giuggiolo".

Nanthakumar S and Shanmugavelu KG (1990) Studies on the effect of pruning on fruit-set and yield of certain ber cultivars Zizyphus mauritiana Lamk. and Zizyphus rotundifolia Lamk. *Punjab Horticulture Journal* **30**(1-4): 111-116.

Pandey RC, Pathak RA and Singh IS (1998) Effect of pruning intensity on vegetative and reproductive growth in ber (Zizyphus mauritiana Lamk.). *Indian Jounal of Horticulture* **55**(4): 306-313

Singh H, Bal JS and Singh G (2004) Effect of time of pruning on growth, flowering, fruit set and maturity in 'Umran' jujube. *Indian Journal of Agricultural Science* **54**(8): 688-689.

Singh H, Srivastava VS and Singh P (2004) Training/pruning. In: Singh, S (ed.) Adv Citri Pp. 206-19. Kalyani Publisher, Karnataka, India.

Singh S, Singh B and Singh, M (2010) Influence of time and severity of pruning on vegetative growth, fruit quality and yield of ber cv. Umran. In: National Seminar on recent trends and development, CCS. HAU. Hissar : 57-58.