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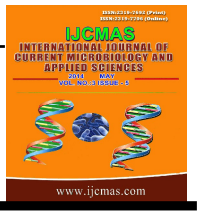

Original Research Article

Effect of different Pruning severity on Growth and Yield of Ber (*Zizyphus mauritiana* Lamk), cv. Banarsi Karaka

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A B S T R A C T

Pruning in ber is prerequisite for better growth and yield of fruits because it bear on current season growth. Therefore, it is very essential as certain extent of pruning in particular cultivars. The present investigation was carried out at Main experiment station (Horticulture Garden) of Chandar Shekar Azad University of Agriculture and Technology, Kanpur (U.P.) during the year (2011-12) to evaluate the response of pruning intensity on growth and yield of ber cv. Banarasi Karaka. The experiment comprised of seven treatments, T_1 (no-pruning), T_2 (10% pruning on previous season growth, T_3 (20% pruning on previous season growth), T_4 (30% pruning on previous season growth), T_5 (40% pruning on previous season growth), T_6 (50% pruning on previous season growth) and T_7 (60% pruning on previous season growth) with four replication and Randomized Block Design was applied. The growth and yield parameters *viz.*, days taken for sprouting, number of shoots emerged, number of retained shoots, shoot length, girth of shoots and fruit yield have been markedly promoted by the 30% pruning intensity than rest of the treatments. From over all experimental results, it is concluded that moderate severity of pruning (30% pruning on previous season growth) has been adjudged as optimum level of pruning in improving yield of ber fruits cv. Banarsi Karaka yield. Highest severity of pruning (60%) has been found to increase the vegetative growth but yield has been found inversely proportional supra-optimal level of pruning to above findings.

K e y w o r d s

Ber, pruning, pruning severity, growth, shoot length, yield

Introduction

Ber (*Zizyphus mauritiana* Lamk), Originated in central asia, which includes north west India, Afganistan, Tajakistan, Uzbekistan U.S.S.R and China it belongs to the family Rhamnaceae. Among the sub tropical fruits, it is one of the most common and ancient fruits of India. In fact, it was one of the prominent fruit on which the Sage Vedvyas, Made his adobe among the ber tree and for that reason he was named Badrayan (a person living on the forest of ber trees). Besides providing the nutritive fruits, various parts of the ber trees are also known to have medicinal

value. Ripe fruits are eaten fresh and utilized in the preparation of Jam, jelly, preserve and candy. Ripe fruits can be dried to prepare a product, similar to 'Chhuhara'. Ber juice can be prepared from the fresh fruit and can be used for making squash. The ber fruit is borne in the axil of leaves on the young growing shoots of the current year. Hence, a regular annual pruning is necessary to induce a good healthy growth which will provide maximum fruit bearing area on the tree. Pruning is an essential operation to maintain vigour of trees, fruit productivity and yield of ber (Singh *et al*., 2004). Moreover, annual pruning required to replace old and unproductive wood by new one, in unpruned trees, the old wood goes on accumulating every year and leads to barren centre, reduced productivity and poor fruit yield owing to shading and related problems. Therefore, in ber tree, it is essential practice to maintain their vigour and productivity as well as to improve the fruit size and fruit yield. The objective of pruning is to produce more no. of fruits with high quality marketable fruits at a low cost. Apart from these, pruning also lead to rejuvenation, better ventilation, and higher penetration of sun light and also become feasible in application of plant protection chemicals (Bakhshi *et al.,* 1997). Pruning in ber is pre-requisite for the better growth and yield of fruits because it bears on current season's growth. Therefore, it is very much essential to ascertain the extent of pruning in particular cultivars. Hence, keeping in the view the above, the present investigation was undertaken.

Materials and Methods

Field experiment was carried out in the garden of the department of horticulture, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur (U.P.) during the year (2011-12). The trees received uniform cultural operations throughout the experiment. The experiment site situated in the Gangetic alluvial belt of central U.P. Lies between 25.26^0 to 26.38^0 North latitude and 79.31^0 to 80.34^0 East longitudes at an elevation of 125.90 m, above mean sea level. Climate of the experimental site is characterized as subtropical with hot dry summer and cold winter, the annual rainfall is about 700 to 1000 mm, most of which is received from July to September with Scattered showers in winter from the North-East monsoon. The maximum temperature ranges from 20^0C to 45^0C and minimum from 6.6 ^{0}C to 22.6 ^{0}C with relative humidity from 40-80% in different months of the year.

The soil of experimental field is sandy loam of average fertility, with pH 7.9, Water holding capacity 40.30%, humus 2.54%. The soil had 0.56% of Organic carbon, 0.056% of Total nitrogen, 0.027 of Total Phosphorus, 0.67% of Total potash with Total zinc of 16.20 (ppm) and Total boron of 30.50 (ppm). Well established and uniform uneconomic bearing trees of Ber cultivar Banarsi Karaka were selected for the present experimentation. The experimental trees are about 35 years old were headed back during the previous year (2010).

The trees received uniform cultural operations throughout the experimental period and the whole of the orchard was kept clean. The trees were pruned with a view to improve the growth and production of fruits. The amount of fertilizer and manures were applied uniformly under all treatments. The treatment consists of seven treatments viz., T_1 Control (No pruning), T_2 10% removal

of previous season growth, T_3 20% removal of previous season growth, T_4 30% removal of previous season growth, T_5 40% removal of previous season growth, T_6 50% removal of previous season growth, T_7 60% removal of previous season growth. The experiment was laid out in randomized block design with four replications. The pruning was done on one year old shoots in the 3rd week of May with the help of a secateurs & hand saw.

The observations were recorded on Days Taken for sprouting, Number of shoots emerged, Number of Retained shoots, Shoot Length, Girth of primary shoots at base and Fruit yield. Days Taken for sprouting is calculated by counting the number of days taken for the pruned shoots to sprout, Number of shoots emerged was recorded by counting the number of sprouts produced on each pruned tree, Number of Retained shoots was calculated after thinning out excess shoots, only 10 healthy and well spaced shoots were retained on each tree, Shoot Length is measured by taking vegetative shoots on each branch in all the four directions i.e. East, West, North and South were tagged, Data on shoot length were recorded at an interval of 15 days for calculation of growth rates of shoot, Girth of primary shoots at base is recorded by counting of five randomly selected primary shoots at a marked point from base which was measured 60, 80,100 and 120 days after pruning with the help of a vernier callipers and average was calculated. Fruit yield was taken by weighing of fruits from each plant, were recorded by weighing the samples on digital balance and average fruit yield of each plant was calculated and expressed in kilogram. The Data was analyzed using analysis of variance (ANOVA) according to the procedure described by Panse and Sukhatme,(1985) Critical difference (CD) with in the treatment was calculated in order to compare the treatment at 1% and 5% level of significance only. The data on fruit quality parameters were analysed and tabulated.

Results and Discussion

Practically, pruning in the fruit crops depend upon its fruit-bearing pattern. In ber crop, flowers borne in axils of leaves of current season young shoots. Therefore, among all cultural operations, pruning in ber is primarily most important. Annual operation, and judiciously pruned tree improved vigour and shape increasing productivity of fruit tree and yield of fruits. Observations regarding number of days taken for sprouting after pruning were recorded and data thus obtained were analysed statistically it is clear from the table-1 that 60% pruning of previous year shoot growth (T_7) showed significantly earlier sprouting (20.50 days) when compared with control (35.00 days) the lowest pruning intensity that is 10% shoot pruning (T_2) took relatively more number of days for sprouting (26.75 days) being significantly at par with T_3 i.e. 30% pruning intensity (26.25 days) followed by T_4(25.50) and T_5 (25.00). T_6 i.e. 50 per cent pruning of previous year growth took lesser period after T_3 (25.75 days). Number of shoots emerged after pruning were counted and data obtained the mean values are summarized in table-1 which indicated clearly that maximum number of shoots emerged under treatments T_7 (28.25). It was however noted that all the treatments remained at par when compared among themselves. The number of shoots ranged from 20.14 to 28.25 under different treatments. The lowest number of shoots was emerged under control (24.14).

Table.1 Effects of different pruning severity on growth and yield of Ber

Treatments	Days Taken for sprouting	Number of shoots emerged	Number of Retained shoots	Shoot Length (cm)	Girth of primary shoots(cm)	Fruit yield (Kg/plant)
T1	35.00	24.14	10.00	25.94	18.26	080.13
T2	26.75	25.30	10.00	31.12	19.69	087.69
T3	26.25	26.03	10.00	40.27	19.74	090.01
T4	25.50	27.03	10.00	60.18	21.24	109.19
T5	25.00	27.87	10.00	75.36	20.56	104.27
T6	22.75	28.11	10.00	86.52	20.50	102.13
T7	20.50	28.25	10.00	100.29	20.05	100.00
Se(d)	0.50	0.31	-	2.15	0.023	1.409
CD at 5%	1.055	0.654	-	4.532	0.054	2.950

*T_1 (no-pruning)
*T_2 (10% pruning on previous season growth)
*T_3 (20% pruning on previous season growth)
*T_4 (30% pruning on previous season growth)
*T_5 (40% pruning on previous season growth)
*T_6 (50% pruning on previous season growth)
*T_7 (60% pruning on previous season growth)

After thinning out excess shoots, only 10 healthy and well spaced shoots were retained on each tree. Length of ber shoots were recorded periodically and data obtained with the mean values displayed in table-1 indicated that treatments T_7 (60% pruning) includes significantly longer shoots (100.29 cm) as compared to control (25.94 cm). It is from the data that all the treatments induced significantly varying size of length of shoots when compared among themselves the lowest length of shoots were recorded under control. The girth of ber shoots were recorded with the help of vernier callipers, It is obvious from the mean values presented in table-4.1 that all the treatments produced significantly greater diameter of shoots when compared with control 4.04 cm the maximum values 7.83 cm in this regards were noted under T_7 (60% pruning).The maximum fruit yield per tree (109.19kg) has been achieved by employing moderate pruning (30% pruning) intensity which proved significantly superior over 10% pruning intensity and control. Significantly higher fruit yield per tree might be attributed to increased percentage of both setting and retention of fruit, highest fruit weight ,fruit length and width with the help of 30% pruning intensity i.e., all these yields attributing characters paved the way for significant improvement in fruit yield per tree of ber. Another scientific explanation for significantly increasing yield with moderate pruning (30% pruning intensity) may be because of more open tree canopy with wider leaf area resulted allowing more light penetration that led assimilation more photosynthetic materials and also less competition for the growth of individual fruit as compared to unpruned tree under optimum time of pruning (3^{rd} week of May) condition. The present findings are in closed agreement with earlier scientist *viz*., (Hiwale *et al.,* 1993; Singh *et al.*,2004; and Khan and Syamal, 2004)who reported that medium pruning of 30% produced higher yield in ber fruit. As pruning intensity advanced that is severe pruning (60% pruning intensity) yield was reduced. The reduction in yield which severe pruning (60%) might be due to admitted fact that reduction in number of bearing shoot results. It is in accordance with (Gill and Bal (2006) who observed decreased yield by severe pruning.

References

AOAC. 1990. Official and Tentative Methods of Analysis. Association of Officinal Agricultural Chemists (15^{th} Edn.), Washington, DC, USA.

Awasthi, A.M and Mishra, R. (1969). Effect of pruning on subsequent vegetation growth, fruit set, fruit drop and quality in ber (*Zizyphus mauritiana Lamk*.) *cultivars. Punjab Hort. J*., 9 (1-2):54-60.

Bakshi, J.C., Uppal, D.K. and Khajuria, H.N. (1997). The pruning of fruit trees and vines. Kalyani Pub., New Delhi-Ludhiana, PP. 124-126.

Bakshi, J.C., Uppal, D.K. and Khajuria, H.N. (1997). The pruning of fruit trees and vines. Kalyani Pub., New Delhi-Ludhiana, PP. 124-126.

Gill, K.S. and Bal, J.S. (2006). Influence of pruning severity and time on yield and fruit quality of ber (*Zizyphus mauritiana L*.) cv. Umran. Indian *J. Hort.* 63 (2) ; 162-165.

Hiwale, S.S. and Raturi, G.B. (1993). Effect of pruning severity on growth, yield and quality of ber. *prog. Hort.* 25 (3/4): 161-163.

Khan, M. and Syamal, M.M. (2004). Effect of pruning intensity on flowering and fruiting of Kagzi lime

(*Citrus aurantifolia Swingle*) Indian J. Hort. 61 (2) : 171-172.

Khan, M. and Syamal, M.M. (2004). Effect of pruning intensity on flowering and fruiting of Kagzi lime (*Citrus aurantifolia Swingle*) Indian J. Hort. 61 (2) : 171-172.

Kundu, S.S.; Pareek, O.P. and Gupta, A.K. (1995). Effect of time and severity of pruning on physico-chemical characteristics of ber (Zizyphus mauritiana Lamk.). *Haryana J. Hort. Sci*. 24 (1): 53-58.

Mishra, S., Choudhary, M.R., Yadav, B.L. and Singh, S.P. 2011. Studies on the response of integrated nutrient management on growth and yield of ber. Indian j. Hort. 68: 318-321.

Singh, H., and Bal, J.S. and Singh, G (2004). Standarization of pruning techniquein ber. A Review. Indian j. Hort. 61 (3): 259-260.

Singh, Rajbir and Bal, J.S. (2008). Pruning in ber (*Zizyphus mauritana Lamk*.) Agric. Rew., 29 (1) 61-67.

Singh, Rajbir and Bal, J.S. (2008). Pruning in ber (*Zizyphus mauritana Lamk*.) Agric. Rew., 29 (1) 61-67.

Singh, S.K. (2005). "studies on pruning behavior in Aonla (Embilca officinalis Garten.) cv. NA-7" NDUAT thesis Kumarganj, Faizabad, (U.P).x

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

Yadav, A.K., Singh, S.P. and Singh Alok. 2005. Screening of ber (Zizyphus mauritiana Lamk.) cultivars based on external, physical and chemical attributes for cultivation in Eastern Uttar Pradesh. Horticultural Journal. vol. 18(3).144-148.