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# CHERRY CV BIGARREAU NOIR GROSSA (MISRI) PRODUCTION AS INFLUENCED BY DIFFERENT INTERCROPS

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**ABSTRACT**
Effect of intercrops viz., maize, pea, strawberry, cabbage, red clover, french bean, oats and clean cultivation (control) on Cherry cv Bigarreau noir grossa (Misri) production as influenced by different intercrops, was studied during the years 2008 and 2009 under Kashmir conditions**.** Cherry trees bearing the age of 9 years were grafted on Colt rootstock and were spaced at the distance of 4x4 $m^2$ . Plot size was 16 $m^2$. The results obtained revealed significant improvement in cherry trees intercropped with leguminous crops like pea, red clover and french bean than clean cultivation and heavy feeder crops (requiring high level of soil nutrients) like strawberry, cabbage, oats and maize. Highest per cent fruit set( 13 %), fruit maturity (75 DAFB up to date of harvesting), fruit yield (17.75 kg/tree) fruit weight (4.08g), fruit Anthocyanin (4.47 mg/g of fruit) and fruit physico-chemical characteristics like fruit TSS (19.98%), Fruit Acidity (0.72%) and Total Sugars (11.20%) were recorded maximum in cherry trees with leguminous type of crops i.e pea and red clover respectively.

## INTRODUCTION

Cherry occupies an important position among temperate fruits all over the world and is the season's first tree fruit to reach the market. The areas having good winter rains and dry cool summers are ideal for its cultivation. Southern hill slopes with adequate air drainage is preferable sites. Cherry trees and buds are somewhat hardier to cold and buds require about 1000 hrs of winter chilling. In India, the states of Jammu and Kashmir, Himachal Pradesh and Uttarakhand are main contributors of cherry cultivation. However, Jammu and Kashmir state have major share with an area of 2835 ha and with the production of 8282 metric tonnes (Anonymous, 2016-17).

The most of the area occupied by this crop in the state is under rainfed conditions. The interspaces between the plants under such conditions not only go without productive use but also become vulnerable to weeds. So growing of intercrops within the interspaces not only provides additional crop, high economic returns but there will be also greater utilization of natural resources which enhances uptake of nutrients. Orchardists usually cultivate several crops in between tree spacing to avoid infestation of perennial weeds .These perennial weeds go deeper into soil for moisture and transpire a lot of water. Due to crop-weed competition fruit trees suffer from water stress so cause a set-back to fruit yield and quality. Intercropping is, therefore, one of the most important factors of orchard soil management system (Derr, 2001). So once it is practised, it will be the top agricultural option for today and tomorrow as well as for achieving an upswing growth rate in agriculture on a sustainable basis ensuring food and nutritional security, environmental safety (Vandermeer, 1989), achieving social and gender equity, generating employment and alleviating poverty.

So, this system seems to be the possible solution to meet the continuous increase in demand for food, stability of income and diverse requirements of food, thereby improving the nutrition for small scale farmers with limited resources. Thus keeping in view the above points, the present investigations was carried out to determine cherry cv. Bigarreau Noir Grossa (Misri) production as influenced by different intercrops, at Fruit Research Station, Balpora (Shopian) SKUAST-Kashmir during the year 2008-2009

## MATERIALS AND METHODS

Present investigations were carried out at Ambri Fruit Research Station, Pahnoo, Shopian, SKUAST-Kashmir (Jammu and Kashmir) on 9-year-old uniform plants of cherry cv. Bigarreau Noir Grossa (Misri) grafted on colt rootstock during the years 2008 and 2009. The plants were spaced 4x4m apart. Intercultural operation was done on 4 plants per plot with plot size of 16$m^2$. The experiment comprised of 8 treatments each replicated thrice in a randomized block design. All the

cultural practices were adopted as per SKUAST-K package of practices. Cultivation of rabi crop was followed by kharif in first year and again repeated in next year with same sequence. Data on yield parameters were recorded as percent fruit set and fruit retention of each experimental plot calculated at fruit let stage by using the formula suggested by( Westwood, 1993). Fruit maturity was worked out from the date of full bloom to the date when the fruit was actually harvested. Fruit yield was estimated by taking weight of all the fruits harvested from the tree under each treatment and expressed as kg/tree. Yield of intercrops (qt/ha) was calculated after harvesting the crops and sold them to the nearby market as per the rates estimated by the Local market.

Average fruit weight was determined by individually weighing the fruits obtained from each experimental plant on a top pan sensitive balance and their weight was recorded in grams. Fruit anthocyanin (mg $g^{-1}$ fruit) was measured by calorimetric procedure as suggested by (Rangana, 1986). TSS was measured with the help of Zeiss hand refractometer. Titrable acidity was determined by titration method and values were expressed as percentage of malic acid (Rangana, 1986). Total sugars were determined by Lane and Eynan method (A.O.A.C., 1984). The economics of cherry was worked out by determining the impact of intercrops raised on the relative economics of cherry as (system equivalent yield) and was represented in terms of Benefit : Cost ratio. The data recorded was subjected to statistical analysis in S-plus software.

## RESULTS AND DISCUSSION

### Effect of intercrops on per cent fruit set, fruit maturity and fruit yield

The data presented in Table 1 revealed that per cent fruit set, fruit maturity and fruit yield were significantly influenced by the use of intercrops. Per cent fruit set and fruit yield were recorded highest in cherry trees intercropped with pea followed by red clover, french bean, control (clean cultivation), strawberry, cabbage, oats and maize. However, control (clean cultivation) recorded the higher per cent fruitset, and fruit yield than heavy feeder crops like strawberry, cabbage, oats and maize. This was due to the reason that cherry trees intercropped with leguminous crops received adequate nutrients like N, P and K and moisture, which are capable of producing dark green coloured leaves and thus encourages fruit bud formation, more synthesis of carbohydrates and translocation of photosynthates which might have contributed in improvement of yield and yield attributing traits and in crops like maize and oats, uptake of nutrients gets restricted as these heavy feeder crops transpire more and extract huge amount of moisture from the soil, thereby affecting the nutrient availability and their uptake. These results are in line with (Guerrero-Prieto *et al,* 1985) and ( Kanwar ,2000).

Fruit maturity in cherry trees occurred earlier with leguminous crops (pea, red clover and french bean). However, more number of days to mature fruits was recorded in cherry trees with heavy feeder crops like oats and maize. This might be due to the reason that low nutrient availability to the trees reduces the rate of metabolism, which results in low carbohydrate synthesis and consequently less flower bud formation. Secondly nutrients required for opening of buds also gets restricted thereby enhancing more number of days to mature fruits. These results are in conformity with ( Westwood, 1988) and ( Bhat et al., 2017)

### Effect of intercrops on fruit weight and fruit anthocyanin

**Table 1: Effect of intercrops on per cent fruit set, fruit maturity and fruit yield in cherry cv. Bigarreau Noir Grossa (Misri)**

| Treatment | Per cent fruit set | | | Fruit maturity (DAFB upto date of harvesting) | | | Fruit yield (kg/tree) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled |
| $T_1$Maize | 10.00 | 11.00 | 10.49 | 74.72 | 75.99 | 75.36 | 14.00 | 15.60 | 14.90 |
| $T_2$Pea | 12.09 | 13.33 | 12.48 | 69.22 | 70.08 | 69.97 | 16.84 | 17.75 | 17.30 |
| $T_3$Strawberry | 10.33 | 11.31 | 11.82 | 72.95 | 73.85 | 73.45 | 15.18 | 16.20 | 15.70 |
| $T_4$Cabbage | 10.10 | 11.09 | 10.60 | 72.69 | 73.70 | 73.20 | 14.75 | 15.35 | 15.09 |
| $T_5$Red clover | 11.33 | 12.60 | 11.97 | 69.75 | 70.70 | 70.22 | 16.50 | 17.53 | 17.04 |
| $T_6$French bean | 11.00 | 12.35 | 11.66 | 70.89 | 71.58 | 71.24 | 16.15 | 17.33 | 16.75 |
| $T_7$Oats | 10.07 | 11.01 | 10.51 | 73.57 | 74.78 | 74.18 | 14.10 | 15.66 | 14.89 |
| $T_8$Clean cultivation (control) | 10.50 | 11.83 | 11.18 | 71.72 | 72.96 | 72.36 | 15.55 | 16.40 | 15.98 |
| CD (Pd 0.05) | 0.32 | 0.24 | 0.26 | 0.42 | 0.60 | 0.26 | 0.32 | 0.21 | 0.11 |

**Table 2: Effect of intercrops on fruit weight and fruit anthocyanin in cherry cv. Bigarreau Noir Grossa (Misri)**

| Treatment | Fruit weight (cm) | | | Fruit anthocyanin (mg $g^{-1}$ g fruit) | | |
|---|---|---|---|---|---|---|
| | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled |
| $T_1$Maize | 3.43 | 3.45 | 3.44 | 4.31 | 4.32 | 4.32 |
| $T_2$Pea | 4.05 | 4.08 | 4.06 | 4.25 | 4.28 | 4.29 |
| $T_3$Strawberry | 3.61 | 3.63 | 3.62 | 4.36 | 4.34 | 4.36 |
| $T_4$Cabbage | 3.52 | 3.54 | 3.53 | 4.30 | 4.33 | 4.31 |
| $T_5$Red clover | 3.98 | 4.01 | 3.99 | 4.42 | 4.47 | 4.44 |
| $T_6$French bean | 3.85 | 3.88 | 3.86 | 4.38 | 4.39 | 4.37 |
| $T_7$Oats | 3.48 | 3.50 | 3.49 | 4.25 | 4.28 | 4.29 |
| $T_8$Clean cultivation (control) | 3.74 | 3.76 | 3.75 | 4.29 | 4.30 | 4.30 |
| CD (Pd″0.05) | 0.30 | 0.34 | 0.31 | 0.01 | 0.02 | 0.01 |

**Table 3: Effect of intercrops on fruit TSS, fruit acidity and total sugars in cherry cv. Bigarreau Noir Grossa (Misri)**

| Treatment | Fruit TSS (%) | | | Fruit acidity (%) | | | Total sugars (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled |
| $T_1$Maize | 18.55 | 18.67 | 18.62 | 0.59 | 0.61 | 0.60 | 10.80 | 10.83 | 10.81 |
| $T_2$Pea | 19.93 | 20.05 | 19.98 | 0.65 | 0.68 | 0.67 | 11.17 | 11.23 | 11.20 |
| $T_3$Strawberry | 19.09 | 19.21 | 19.16 | 0.62 | 0.64 | 0.63 | 10.90 | 10.95 | 10.93 |
| $T_4$Cabbage | 18.88 | 19.00 | 18.95 | 0.61 | 0.63 | 0.62 | 10.87 | 10.92 | 10.90 |
| $T_5$Red clover | 19.71 | 19.83 | 19.78 | 0.67 | 0.70 | 0.69 | 11.10 | 11.16 | 11.14 |
| $T_6$French bean | 19.55 | 19.67 | 19.62 | 0.69 | 0.72 | 0.70 | 11.03 | 11.10 | 11.07 |
| $T_7$Oats | 18.63 | 18.75 | 18.70 | 0.60 | 0.62 | 0.61 | 10.82 | 10.86 | 10.85 |
| $T_8$Clean cultivation (control) | 19.28 | 19.40 | 19.35 | 0.63 | 0.65 | 0.64 | 10.96 | 10.99 | 10.98 |
| CD (Pd"0.05) | 0.12 | 0.15 | 0.13 | 0.02 | 0.01 | 0.01 | 0.06 | 0.04 | 0.03 |

**Table 4: Effect of intercrops on relative economic yield of cherry cv. Bigarreau Noir Grossa (Misri)**

| Treatments | Pooled cherry yield (kg/ha) | Yield of inter crop (q/ha) | Income obtained from intercrops (Rs.) | Cherry equivalent intercrops yield (kg/ha) | Total system yield (kg/ha) | Total cost of cultivation (Rs.) | Gross return (Rs/ha) | Net return (Rs./ha) | Benefit cost Ratio |
|---|---|---|---|---|---|---|---|---|---|
| $T_1$ Maize | 3874.00 | 35 | 28000 | 466.60 | 4340.60 | 120426.00 | 260436.00 | 140010 | 1.16 |
| $T_2$ Pea | 4498.00 | 23 | 57500 | 958.30 | 5456.30 | 140550.00 | 327379.00 | 186829.9 | 1.32 |
| $T_3$ Strawberry | 4082.00 | | | 2300.00 | 6382.00 | 177582.00 | 255280.00 | 77698.00 | 0.44 |
| i) Fruit | | 13 | 52000 | | | | | | |
| ii) Runner | | 40,000 | 40000 | | | | | | |
| $T_4$ Cabbage | 3923.40 | 1.35 | 81000 | 1350 | 5273.40 | 138620 | 316404.00 | 177784 | 1.28 |
| $T_5$ Red clover | 4430.40 | 110.00 | 11000 | 1833 | 4613.70 | 145837 | 276823.90 | 130986.9 | 0.89 |
| $T_6$ French bean | 4355.00 | 22 | 55000 | 916.60 | 5272.00 | 150550 | 316296.00 | 165746 | 1.10 |
| $T_7$ Oats | 3871.40 | 210 | 21000 | 350.00 | 4221.40 | 121729 | 253284.00 | 131555 | 1.08 |
| $T_8$ Clean cultivation (control) | 4154.80 | - | - | - | - | 130000 | 249288.00 | 119288 | 0.91 |

The data presented in Table 2 revealed that fruit weight was also appreciably influenced by the use of different intercrops. Fruit weight was recorded highest in cherry trees intercropped with pea, red clover and french bean. However, lowest fruit weight in cherry trees was recorded with heavy feeder crops like oats and maize. This may be due to the reason that leguminous crops particularly clovers have increased water infiltration capacity of soils which, in turn, enhanced the nutrients uptake especially those of K and Ca which needs prerequisite amount of soil moisture for uptake while pea results in higher availability of N, thus increases dry matter accumulation. The control and heavy feeder crops decreased rates of water infiltration perhaps due to surface sealing, compaction and unfavourable particle size distribution. Apart from these factors fruit weight also depends on vigour of variety, crop density and fruit leaf ratio-which is in agreement with the study carried out by ( Brown, 1960) and ( Sirrine *et al.,* 2008).

Fruit anthocyanin in cherry was found to be significant and highest with leguminous crops like red clover followed by french bean and pea and lowest was recorded with oats and maize. These results are in conformity with ( Dever *et al.,* 1996) and ( Bambhaneeya et al., 2017).

**Effect of intercrops on fruit TSS, fruit acidity and total sugars**

The data presented in Table 3 revealed that highest fruit TSS and fruit sugars were recorded in cherry trees under legumes (pea, red clover and french bean) and minimum was recorded in trees under maize. Maximum fruit acidity was recorded in cherry trees under french bean followed by red clover, pea, strawberry, cabbage, oats and maize. However, the lowest fruit acidity was observed in cherry trees under maize. This may be due to the reason that more the uptake of nutrients, more carbohydrate synthesis, more will be formation of sugars which in turn increases the total soluble solid concentration in fruits. These results are in agreement with ( Tang *et al.,* 1984) and ( Bhutani *et al.,*1995).

**Effect of intercrops on relative economic yield**

The data presented in Table 4 revealed that cherry trees intercropped with pea recorded a net income of Rs. 186829.90 per ha with a benefit cost ratio of Rs. 1.32 followed by cabbage (Rs. 177784.00 per ha) with a benefit cost ratio of Rs. 1.28 and french bean to Rs. 165746.00 per ha with a benefit cost ratio of Rs. 1.10, respectively. This was mainly due to the increased yield, better marketing prices and net income obtained from these intercrop legumes while other treatments also appeared to be economical in view of benefit cost ratio. These results are in conformity with (Bhuva *et al.,* 1988) , (Kishore *et al.,* 1997) and ( Kumar et al., 2014).

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