

**RESPONSE OF BABY CORN TO PLANTING
METHODS AND IRRIGATION SCHEDULES
UNDER DRIP**

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ANIL KUMAR .S. MUGALKHOD

DEPARTMENT OF AGRONOMY
COLLEGE OF AGRICULTURE, DHARWAD
UNIVERSITY OF AGRICULTURAL SCIENCES,
DHARWAD – 580005

NOVEMBER, 2005
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I. INTRODUCTION

Maize is the third important cereal food crop next to rice and wheat. Due to its tremendous yield potential, maize is popularly called as “Queen of cereals” Maize can also be considered a natural agriculture resource similar to sugarcane. Since long, maize has been cultivated for grain and fodder purpose. Already, this crop has been developed into a multi-dollar business in foreign countries (Thailand, Taiwan, Singapore, Malaysia, USA, Canada and Germany) because of its potential as a value added product for export and a good food substitute. During recent times, its potentiality has been extended to the field of vegetable production. The corn ear used as vegetable for cooking purpose is popularly known as “baby corn”, which is dehusked maize ear(s). Young, fresh finger is harvested within 2-3 days of silking but prior to fertilization (Pandey *et al.*, 2000). It is delicate, outside the sweet flavor and crisp nature contribute to its increasing popularity making it an indispensable ingredient in many fancy dishes today. With the increasing concern for health, people have turned towards quality food in place of bulky items. Baby corn has prime place as a safe and quality vegetable.

Baby corn production being a recent development has proved enormously successful in countries like Thailand, Taiwan, Sri Lanka and Myanmar. The countries like Zambia, Zimbabwe and South Africa have also started cultivation. Today, Thailand and China are the world leaders in baby corn production. Attention is now being paid to explore its potential in India for earning foreign exchange besides higher economic returns to the farmers. Baby corn cultivation is now picking up in Meghalaya, Western Uttar Pradesh, Haryana, Maharashtra, Karnataka and Andhra Pradesh (Ramachandrappa *et al.*, 2004).

The tender cobs are consumed raw as a natural food. It is very tasty sweet and easy to consume because of its tenderness and sweetness with nutritive value addition. Cultivation of baby corn generates employment for the rural poor since 3-4 crops can be raised in year a giving good profit per unit area per unit time Besides, its fodder yield is also high.

The increase in production of baby corn is necessary to meet the demand of vegetable for the burgeoning population. For yield maximization per unit area to the fulfillment of vegetable requirement water and time is the possible answer.

Baby corn can be cultivated throughout the year. Its productivity during summer is maximum compared to kharif due to better water management, which aids in additional production and income. A well managed irrigation envisage achieving maximum yields per unit of water applied with minimum unavoidable losses, besides keeping natural supply in view and aiming at environmental preservation and ecological sustainability. Groundwater resource is however dwindling in recent years mainly because of the over exploitation of water on the one hand and uncontrolled increases in number of wells in the area on the other hand.

Water is the prime natural resource, which is often costly and limiting input particularly in semi arid tropics and needs judicious use to reap the maximum benefit of other inputs. Drip irrigation plays an important role in water limiting areas. It provides the efficient use of limited water with higher water use efficiency. The utilization of water by crop varies with different irrigation levels and methods. Optimum irrigation levels with suitable method of planting would help in enhancing both the baby and fodder yields of baby corn apart from higher water use efficiency.

Technological innovations are to be exploited to achieve the objective of higher productivity and better water use efficiency. In this regard, efficient use of water plays a significant role to enhance productivity. Among the irrigation system, drip irrigation helps in maintaining the optimum soil moisture in soil root zone with increased yield and water use efficiency. Efficient use of water is highly critical to sustain agricultural production, more particularly in the context of declining per capita land and water availability. Application of water is deal for the proper crop growth with the irrigation water. The high labour requirement in spreading and collecting laterals every season, the deterioration of exposed drip lines, initial cost of investment and clogging of drippers limit the further expansion of drip irrigation.

Baby corn being a relatively new introduction in our country requires the development of suitable production technology in realizing higher Baby corn yield and monetary returns before it could be popularized among maize growers. Baby corn crop owing to its more profitability than grain maize may be helpful in raising the income of the farmers (Pandey *et al.*, 1998). Since, irrigation is the most important input in irrigated agriculture. The information on proper method of irrigation, its quantity and its interaction effects with other inputs is rather limited and keeping this background in mind, the present study on "Response of baby corn to planting methods and irrigation schedules under drip" was carried out at the Main Agricultural Research Station, Dharwad with the following objectives.

1. To evaluate the planting methods and drip irrigation system in baby corn
2. To find out the saving of irrigation water by drip irrigation system as compared to surface irrigation
3. To find out the water use efficiency of planting methods and drip irrigation system, and
4. To find out the economics

II. REVIEW OF LITERATURE

In India, drip irrigation system is becoming popular though, this technology has been in use in many developed countries notably in Israel and the USA. The review of literature pertaining to "Response of baby corn to planting methods and irrigation schedules under drip" is presented in this chapter. Since the literature on baby corn is limited, the relevant literature on other types of corn are also included. The review is dealt under the following sub-headings.

- 2.1 Advantages of drip irrigation over other methods of irrigation
- 2.2 Effect of irrigation water deficit on growth and yield
- 2.3 Effect of irrigation levels on fodder yield
- 2.4 Effect of planting patterns
- 2.5 Effect of plant population
- 2.6 Water requirement
- 2.7 Water use efficiency
- 2.8 Effect of planting methods and irrigation levels in root growth
- 2.9 Quality parameter
- 2.10 Economics of drip irrigation

2.1 ADVANTAGES OF DRIP IRRIGATION OVER OTHER METHODS OF IRRIGATION

Out of several contributing factors for adoption of drip irrigation economic use of water and potential to maintain the low moisture tension in a portion of root zone are most important (Aljibury *et al.*, 1974; Devis, 1975 and Farrel *et al.*, 1974).

There is an evidence to support the view that yield of many crops is increased by maintaining high soil moisture potential in the effective root zone in drip irrigation (Bresler, 1977; Childs and Hanks, 1975 and Riwitz, 1970).

Padmakumari and Sivanappan (1989) observed higher seed germination of papaya and less weed growth under drip. Plant in drip irrigated plots also flowered one month earlier. Yields were significantly higher (28 and 30.5 kg plant⁻¹ for 1 and 2 laterals and per row, respectively) for drip irrigated plots and basin irrigated plots (24.5 and 23 kg plant⁻¹ for 90 and 180 cm), respectively.

In a study by Umesh Chander *et al.* (1981) on the effect of drip irrigation compared to check basin method for grapes have revealed that the drip method resulted in 88.8 per cent higher yields per unit quantity of water over the control.

Abdhul Khadar (1983) observed on arecanut the variable movement of water was more in drip irrigation compared to surface methods.

The quantity of water applied per season has fallen from 1800 mm to 900 mm but apple yields have almost doubled (150 t ha⁻¹) with removal of 128 kg N, 15 kg P, 187 kg K and 15 kg Ca plus 10-20 per cent of shoots and leaves with drip irrigation, fertilizer efficiencies about 50 per cent owing to leaching (Assaf *et al.*, 1986).

The main banana fruit yield under drip irrigation for plant and ratoon were 83.81 and 68.21 t ha⁻¹, respectively and basin irrigation corresponding figures were 78.98 and 61.42 tonnes per ha. The water economy with drip irrigation was about 25 per cent over basin irrigation (Hegde and Srinivas, 1990).

A similar result was obtained by Patil (1990), while working on banana drip irrigation have 26.4 per cent (76.77 t ha^{-1}) higher yield compared to flood irrigation (63.00 t ha^{-1}) besides increasing number of fruits length and size of the fruits.

Singh *et al.* (1990) reported that variation in soil moisture content was greater in surface system of irrigation compared to trickle irrigation, the variation in soil moisture content at field capacity for furrow irrigation was 82-65 per cent and 93-76 per cent at 30 and 90 cm, respectively.

Pammattiwar *et al.* (1993) reported that yields of pomegranate with daily drip irrigation 20 per cent area gives the maximum yield (60.69 q ha^{-1}) when compared to surface method of irrigation, 0.8 IW/CPE ratio gives the minimum yield of 43.98 q per ha , respectively.

By adopting drip irrigation, there will be economic use of water and potential to maintain the low moisture tension, early flowering and finally greater yield as compared to surface irrigation.

2.2 EFFECT OF IRRIGATION WATER DEFICIT ON GROWTH AND YIELD

McPherson and Boyer (1977) imposed water deficit that reduced photosynthesis to near zero during entire kernel development period. Grain yields were reduced by only 47 to 49 per cent of the well watered control as a result to remobilization of assimilates, accumulated before initiation of stress period in sandy loam soil at London.

Balaswamy *et al.* (1986), observed that the growth characters like plant height, number of functional leaves and shoot dry matter production in maize was higher due to scheduling of water at 40 per cent ASMD (228.94 cm , 13.29 and $288.43 \text{ g plant}^{-1}$, respectively) over 60 and 80 per cent in two year study in sandy clay loam soil at Hyderabad. Yield parameter like cob length, cob girth and grain weight cob^{-1} were higher due to the application of water at 40 per cent ASMD (15.47 cm , 13.9 cm and 236.29 g , respectively) over 60 and 80 per cent ASMD.

Lorens *et al.*, (1987) reported that pioneer brand 3192 recorded higher crop growth rate ($31.8 \text{ g m}^{-2} \text{ day}^{-1}$) in irrigation over vegetative stress ($28.0 \text{ g m}^{-2} \text{ day}^{-1}$) in fine sandy soil of Florida Harvest index was also more in irrigated (0.61) over vegetative stress (0.55).

William *et al.*, (1987) observed that scheduling of irrigation at different levels recorded good husked yield of sweet corn which was more in 100% ASMD (208.0 q ha^{-1}) but on par with 70 and 50% (266.0 and 196.0 q ha^{-1} , respectively) over 24 and 0% (171.0 and 115.0 q ha^{-1} , respectively) in silty loam soil at Corvallis.

Narang *et al.*, (1989) reported that the growth characters like leaf area index and dry matter plant^{-1} at harvest were higher in irrigation scheduled at 75 % CPE (3.2 and 143 g plant^{-1} , respectively) over 50 and 100 % CPE in sandy loam soil of Punjab. Yield parameters like grains cob^{-1} and grain yield were higher 75 % CPE (300 and 42.4 q ha^{-1} , respectively) over the 50 and 100 % CPE.

Sridhar and Singh (1989) reported increased leaf area per plant, leaf area index, dry weight of leaves, stem, sheath and ear as a result of increased frequency of irrigation from 0.6 to 0.8 IW/CPE ratio with 6 cm depth of water for maize grown at Varanasi during winter season.

Jadhav *et al.*, (1993) revealed that irrigation scheduled at 0.8 and 1.0 IW/CPE ratio produced significantly more stover maize yield (775.1 and 791.0 q ha^{-1} , respectively) at 0.4 and 0.6 ratio owing to increase in plant height, number of functional leaves, dry matter accumulation and cob number plant^{-1} in clay loam soil during *rabi* season at Kolhapur. Similar results were also reported by Bajwa *et al.* (1988) on clay loam soil at Kolhapur.

Rajender Kumar *et al.*, (1996) reported that number of cobs plant^{-1} , number of grains cob^{-1} and stover yield was higher in no stress condition (3.19 , 215.31 and 53.46 q ha^{-1} , respectively) which was at par with water stress at dough stage (2.97 , 214.39 and 53.84 q ha^{-1}

¹, respectively) over stress at knee high, tasseling and silking stages in loamy soil at Karnal (Haryana).

Sachan and Gangawar (1996) observed that growth attribute like plant height, stem girth and number of functional leaves was higher in moisture conserving treatment (157.5 cm, 6.3 cm and 3.9, respectively) over control in R-2 variety of maize in sandy loam at Kanpur during *kharif*. The yield attributes like number of cobs plant⁻¹, test weight, stover and grain yield was higher in moisture conserving treatment (1.5, 158.9 g, 40.6 q ha⁻¹ and 12.75 q ha⁻¹, respectively) over control (1.3, 155.6, 33.8 q ha⁻¹ and 10.71 q ha⁻¹, respectively).

Leta Tulu *et al.*, (1998) observed that the value of cob diameter, cob length and grain yield (5.70 cm, 16.20 cm and 76.25 q ha⁻¹, respectively) was maximum in IW/CPE ratio of 1.0 at all the stages of crop of maize in red sandy loam soil of Bangalore during summer 1997.

Tyagi *et al.*, (1998) recorded higher cob plant⁻¹ (1.53), length cob⁻¹ (18.13 cm), grain cob⁻¹ (393.30), test weight (188.27 g) and grain yield (50.72 q ha⁻¹) with scheduling of irrigation at 0.6 IW: CPE ratio over 0.2 and 0.4 ratio in spring maize. Stover yield was also higher in 0.6 ratio (139.09 q ha⁻¹) during 1995 on sandy loam soil of Hissar.

Lehrsch *et al.*, (2000) noticed that the application of water in alternate furrow with 0.76 M row spacing recorded higher yield (207.0 q ha⁻¹) over same furrow (196.0 q ha⁻¹) whereas alternate furrow with 0.56 M recorded (193.0 q ha⁻¹) over same furrow (182.0 q ha⁻¹), which was due to increased available water as well as solar radiation interception in 0.76 M.

Vishwanatha *et al.*, (2000) recorded maximum grain yield and stover yield by drip at 0.8 Epan in normal planting (200.7 and 248.7 q ha⁻¹, respectively) over 0.4 and 0.6 Epan by drip (159.3, 202.3 and 167.0, 214.0 q ha⁻¹, respectively) in red sandy loam soil of Bangalore during the summer 1998.

Hussaini *et al.* (2001) in Nigeria recorded maximum total dry matter, plant height, CGR and RGR (96.3 g plant⁻¹, 171.0 cm, 1.12, 85.1 g m⁻² week⁻¹ and 610 mg g⁻¹ week⁻¹, respectively) with scheduling of irrigation at 1.0 IW/CPE ratio over 0.6 and 0.8 ratios in sandy soil during *rabi* season in maize crop.

Manish Kumar *et al.* (2001) reported that scheduling of water at 1.0 IW/CPE ratio recorded higher grain yield (34.38 q ha⁻¹) of winter maize over 0.7 ratio (28.78 q ha⁻¹) during 1997-98 on sandy loam soil of Raipur (Madhya Pradesh).

Sunder Singh (2001) observed that scheduling of water of 1.0 IW/CPE ratio recorded higher plant height (23.0 cm), dry matter production (13500 kg ha⁻¹) over 0.5 and 0.75 ratio in baby corn. Yield attributes like number of cob plant⁻¹ was maximum in 1.0 IW/CPE ratio (3.78) over 0.5 and 0.75 ratio (2.99 and 3.67, respectively) and young cob yield and stover yield was also maximum in IW/CPE ratio of 1.0 (50.74 and 27.97 q ha⁻¹, respectively) over others in sandy soil during summer at TNAU.

Hussaini *et al.* (2002) reported that scheduling of irrigation at 1.0 IW/CPE ratio recorded higher grain yield (21.18 q ha⁻¹) over 0.6 and 0.8 ratio (18.04 and 19.02 q ha⁻¹, respectively) in grain maize in Nigeria on sandy soil during summer 1997-1998.

Jiotode *et al.*, (2002) observed that scheduling of irrigation at 40 mm CPE recorded higher plant height (173.48 cm) Number of leaves plant⁻¹ (11.38) leaf area plant⁻¹ (35.22 dm² plant⁻¹), LAI (5.66) and dry matter plant⁻¹ (103.66 g) over 60 and 80 mm CPE due to better water use, in clay loam soil of Akola during *rabi* season. The grain yield was also higher in 40 mm CPE (29.71 q ha⁻¹) over 60 and 80 mm CPE (28.74 and 25.37 q ha⁻¹, respectively).

Mahdi *et al.*, (2003) observed that grain yield was maximum due to scheduling of irrigation at 1.00 ET (Evapo-transpiration) in 3 year study over 0.6 and 0.8 ET at Yuma in sandy loam soil. Further the yield at 0.6 ET was 45% lower than 1.0 ET.

Okten and Simsek (2004) at Turkey revealed that maximum grain yield of dent corn was observed at application of 10 per cent deficit irrigation and four day irrigation frequency, while minimum yield was at application of 30 per cent deficit irrigation and eight day irrigation

frequency. Yield characteristics were affected negatively by 30 per cent deficit irrigation and eight day irrigation frequency in clay soil under arid condition.

Thus, the scheduling irrigation at an IW/CPE ratio of lower levels developed stress in plant. Higher levels perform better in baby corn.

2.3 EFFECT OF IRRIGATION LEVELS ON FODDER YIELD

Jagdev Singh *et al*, (1989) on sandy loam soil of Hissar during summer season observed significantly higher green fodder and dry matter yield at IW/CPE ratio of 0.5 and 0.75 over 0.25 ratio. Similar results were reported by Rana and Malik (1981).

Bhup Singh *et al*, (1989) noticed on sandy loam soil at Hissar during summer that the plant height and other growth attributes number of leaves, leaf area and leaf area index increased with irrigation at 0.75 IW/CPE ratio over 0.5 ratio.

Mansfield *et al*, (1990) at Belvatagi during rainy season in clay loam recorded maximum dry matter yield of maize. The plant height of the fodder maize was significantly higher due to irrigation at 0.9 IW/CPE ratio (220.1 to 225.9 cm) over 0.7 and 0.5 ratio and unirrigated control. Maximum forage yield was recorded at 0.7 IW/CPE ratio (445.0 q ha⁻¹).

Manhi and Shukla (1992) observed that green forage yield was more with the application of irrigation at 75% available soil moisture over 50% available soil moisture and no irrigation during rainy season at Jhansi.

Abu-Awwad (1994) recorded higher dry matter production of sweet corn 144.0 q ha⁻¹ due to irrigation at 1.0 Epan over 0.25 and 0.5 Epan (70.0 and 104.0 q ha⁻¹, respectively) in clay soils.

Thus, scheduling of irrigation to corn at higher levels of irrigation (Epan 0.8 and 1.0) results in better fodder yield of baby corn.

2.4 EFFECT OF PLANTING PATTERNS

Balaswamy *et al*, (1986) recorded greater amount of dry matter and improved yield attributes except 1000 grain weight in normal planting (45 cm) with irrigation in all furrow. Normal planting with alternate furrow irrigation recorded significantly shorter plants with least amount of dry matter of maize in sandy clay to sandy loam soil of Hyderabad during 1972-73.

Sachan and Gangawar (1996) reported higher yield was in 45 cm row spacing (13.66 q ha⁻¹) over 60 cm row spacing (9.69 q ha⁻¹). The stover yield was also more in 45 cm row spacing (43.3 q ha⁻¹) over 60 cm (31.1 q ha⁻¹) in sandy loam soil during *kharif* season at Kanpur under rainfed condition.

Lehrsch *et al*, (2000) revealed that planting of corn at 0.76 m row spacing recorded lower grain yield (75.50 q ha⁻¹) over 0.56 m row spacing (79.90 q ha⁻¹). Silage yield was also higher in 0.56 m row spacing (229.0 q ha⁻¹) over 0.76 m (210.0 q ha⁻¹) due to better utilization of nutrient as well as applied water at Kimberly ID.

Vishwanatha *et al*, (2000) observed that planting of sweet corn with paired planting recorded lower yield of green cob and green fodder yield (124.8 and 171.3 q ha⁻¹) over normal planting (167.3 and 213.0 q ha⁻¹, respectively) in red sandy loam soil of Bangalore during summer 1998.

Jiotode *et al*. (2002) observed during *rabi* 1996-97 at Akola that planting of maize at 60 cm row spacing recorded higher dry matter plant⁻¹ (162.39 g) and higher yield (38.97 q ha⁻¹) over 30 cm and 45 cm row spacing which was due to availability of more area plant⁻¹ for energy harvesting. Similar observations were also recorded by Lucos (1986), Tetio-Kagho and Gardner (1988).

Stewart *et al*, (2003) reported that canopy photosynthate production for a 76 cm row spacing was lower (32.3g cm⁻² day⁻¹) over 38 cm row spacing (37.9 g cm⁻² day⁻¹) in Yuyu.

Thus, baby corn performs better in higher plant density (1,11,111 ha⁻¹).

2.5 EFFECT OF PLANT POPULATION

Singh *et al.* (1982) observed that in popcorn plant population of 60,000 plants ha⁻¹ recorded lesser yield (34.4 q ha⁻¹), whereas 70,000 plants ha⁻¹ gave higher yield (38.2 q ha⁻¹) compared to 80,000 plants ha⁻¹ (36.6 q ha⁻¹).

Roy and Singh (1986) noticed plant population of 60,000 plants ha⁻¹ gave lower yield (25.8 q ha⁻¹) while 70,000 plants ha⁻¹ recorded 32.2 q ha⁻¹ yield, whereas 80,000 plants ha⁻¹ registered further increase in yield to 36.8 q ha⁻¹ of popcorn.

Tetio-Kagho and Gardner (1988) reported that the LAI was 1.7, 2.6 and 4.0 at tasselling for 1.7, 2.6 and 6.3 plants m⁻², respectively. Light interception by tassel was approximately 20, 30 and 40 per cent for 19, 35 and 63 plants m⁻², respectively. Increase in plant population density increased the vegetative dry matter.

Babu and Mitra (1989) conducted field experiment at Allahabad in *rabi* season with maize cv. Gangasafed-2 and Kissan sown at three plant densities *viz.*, 33,333, 66,666 and 99,999 ha⁻¹. They recorded an average yield of 49.4 q ha⁻¹ in Gangasafed-2 and 40.2 q ha⁻¹ in Kissan averaged over cultivars, grain yield was higher in 99,999 plants ha⁻¹.

Bangarwa *et al.* (1989) reported in maize that plant population of 40,000, 65,000 or 90,000 plants ha⁻¹ yielded 36.0 to 52.2, 41.7 to 64.9 and 42.3 to 72.7 q grains ha⁻¹, respectively.

Ramachandra Prasad *et al.* (1990) found that 40,500 plants ha⁻¹ had highest RGR (131 mg g⁻¹ day⁻¹) compared to 55,500 (126 mg g⁻¹ day⁻¹) and 70,500 plants ha⁻¹ (127 mg g⁻¹ day⁻¹). Also AGR, NAR, CGR, LAD was highest in case of less plant population in red sandy loam during summer 1978.

Rushel and Zimmermann (1990) investigated the effect of 80 and 90 cm row spacing with plant densities of 40 to 75 m⁻² in maize cv. Cortimaz 322A, Emeopa2, 60-8801/U, EGO-17 CP and BR-106. BR-106 recorded highest yield with intermediate densities of 63 to 65 plants m⁻². Spike number plant⁻¹ decreased with increase in plant density, whereas lodged and damaged plants and population of astigmatic style in the spikes increased.

Thakur *et al.* (1997) observed that in wider spacing of 60 cm × 20 cm, there was significantly increase in almost all the growth and yield attributes in baby corn but could not compensate baby corn yield obtained in narrow spacing. A plant spacing of 40 cm × 20 cm increased the baby corn yield by 28.2, 11.3 and 9.4 per cent over 60 cm × 20 cm, 60 cm × 10 cm and 40 cm × 10 cm spacing, respectively in sandy loam soil of Kullu valley during the rainy season of 1993-94.

Pandey *et al.* (1999) found that the number of cobs plant⁻¹ has significantly increased due to thinning at 22.50 cm. Number of grains cob⁻¹, grain weight cob⁻¹ and 1000 grain weight also significantly increased. Thinning at 11.25 cm significantly increased the grain yield by 5.31 q ha⁻¹ (13.39%) and stover yield by 82.47 q ha⁻¹ (55.50%) over the thinning.

Sahoo and Panda (1999) revealed that spacing 40 cm × 20 cm appeared to be more advantages in terms of baby corn yield (16.30 q ha⁻¹) and Benefit : Cost ratio. The green fodder yield was higher (414.0 q ha⁻¹) in winter with a plant population of 0.167 million ha⁻¹ which was 31 per cent more than that observed with a plant population of 1 million ha⁻¹ at Joshipur (Orissa) in loamy sand soil during wet and winter season of 1996-97.

Gollar and Patil (2000) stated that in maize, plant population of 55555 ha⁻¹ recorded higher total dry matter production as compared to 74074, 83333, 111111 plant population ha⁻¹. But in case of LAI it was higher in higher plant population. But grain yield ha⁻¹ was higher in higher plant population during *rabi* season.

Thakur and Sharma (2000) noticed that in baby corn reduced spacings accommodating 1.25 to 1.78 lakhs plants ha⁻¹ with 2 plants hill⁻¹ planting remained statistically at par with each other in influencing baby corn yield and were found superior to increased spacing of 60 × 30 cm² (2 plants hill⁻¹) accommodating 0.111 million plants ha⁻¹. With an

increase in plant density there was increase in green fodder yield, discarded baby corn and barrenness was observed, whereas decrease was observed in cobs plant⁻¹ and husk : baby corn ratio.

Narwood (2001) reported in hybrid corn that early sowing (17th April) with population of 60000 plants ha⁻¹ gave lowest yield (22.1 q ha⁻¹) compared to lower population 30000 plants ha⁻¹ (23.2 q ha⁻¹). Similarly under late sowing (May 6) with a population of 60000 plant ha⁻¹ gave higher yield (40.2 q ha⁻¹) as compared to 30000 plants ha⁻¹ (26.9 q ha⁻¹).

Raja (2001) reported in sweet corn that 53333 plants ha⁻¹ gave 56.72 q ha⁻¹ whereas 88888 plant population gave 80.12 q ha⁻¹. Similarly the number of primers, non-primers, green ear and kernel yield increased by increasing plant population but decreased the length and girth of the ear.

Umesha *et al.* (2001) observed in popcorn varieties that the highest grain and straw yield was obtained when sowing was taken at 45 x 20 cm² (28.49 and 75.17 q ha⁻¹). However 60 x 15 cm², 75 x 15 cm² and 60 x 30 cm² spacing were statistically on par with each other.

Thus, it could be summarized that better green fodder yield in maize can be achieved due to higher plant density.

2.6 WATER REQUIREMENT

Kaliappa *et al.*, (1974) reported that the total water requirement of corn was 382 mm when irrigation scheduled at 75 per cent available soil moisture depletion during vegetative period and 50 per cent during maturity period.

Braunworth (1987) observed that water requirement of sweet corn ranged from 311 to 604 mm under silty clay loam soil to recorded an yield level of 210 q ha⁻¹ green cobs. Similarly in another study, sweet corn crop utilized 481 mm of water as calculated by soil water balance equation (Braunworth and Mack, 1987).

Eneva and V'Lchanov (1987) registered the maximum yield with 100 per cent evaporation with the total water use of 272 mm ha⁻¹ over 60 and 80 per cent evaporation.

Panchanathan *et al.*, (1987) recorded the average grain yield of 36.6 q ha⁻¹ with the application of 553 mm of water over other regimes (449, 429 and 351 mm). The water requirement ranged from 1.94 to 5.96 mm day⁻¹ during the crop growth period in dark red latosol soil (Andrade *et al.*, 1988).

Costa *et al.*, (1988) observed that increased application of water from 180 to 520.6 mm increased the seed yield from 10.0 to 63.0 q ha⁻¹.

Gozzalez-Fuentes and Gayal (1988) estimated that the net water requirement for sweet corn was 35.7 cm in Puerto Rico.

Braunworth and Mack (1989) recorded maximum grain yield of sweet corn with application of 449 to 518 mm under silty clay loam soils. Gozzalez-fuentes and Gayal (1988) observed that water requirement if sweet corn was 35.7 cm in Puerto Rico to harvest optimum green cob yield.

Narang *et al.*, (1989) observed that seasonal water use at CPE 75 mm varied between 50 cm (in the wet year) and 80 cm (in the dry year). In the first three years in sandy loam soil of Ludhiana. The seasonal ETa was around 50-55 cm.

Bowman *et al.*, (1991) stated that in mid west region of USA the water requirement of maize was generally vary according to evaporative demand and rainfall.

Jadhav *et al.*, (1994) observed that in Maharastra total water consumption of maize at 0.4 IW/CPE ratio was 436 to 441 mm during *rabi* season. Similarly, the water used by maize was 30.4 cm during summer season in silty clay loam soil of Kashmir valley at 0.75 IW/CPE ratio with maximum yield (Khan *et al.*, 1996).

Rajendra kumar *et al.*, (1996) reported that water use was lowest 400 mm and 400 mm in 1991 and 1992, respectively with water stress created at tasseling stage followed by

water stress at knee high and silking stage and highest water use recorded was 475 and 469 mm in 1991 and 1992, respectively in fully irrigated plots.

Vishwanatha *et al.*, (2000) noticed that yield of sweet corn was higher at 0.8 Epan (200.7 q ha^{-1}) with total water use of 517 mm over other treatment 0.4 Epan and 0.6 Epan (330 and 424 mm, respectively) during summer 1998 in red sandy loam soil of Bangalore.

Sunder Singh (2001) observed that scheduling of irrigation in baby corn at 1.0 IW/CPE ratio recorded higher water uses 352 and 433 mm during summer and *kharif*, respectively. Which was higher than 0.50 and 0.75 ratio in sandy clay loam soil of TNAU in summer and *kharif* season.

Hussaini *et al.*, (2002) stated that the water use of maize crop in sandy soil of Nigeria during dry period was 355.8 to 444.4 mm and recorded higher yield with scheduling of irrigation at 1.0 IW/CPE (21.19 g ha^{-1}) as compared to 0.6 and 0.8 ratio (18.04 and 19.02 q ha^{-1} , respectively).

Mahdi *et al.*, (2003) noticed that water requirement of corn was 38 cm to 64 cm with 0.6 ET to 1.0 ET. Application of water at 1.0 ET recorded higher yield (108.2 q ha^{-1}) compared to 0.6 and 0.8 ET (71.5 and 94.6 q ha^{-1} , respectively) at Yuma on sandy loam soil.

Thus, the water requirement of maize was found to vary (200 to 600 mm) depending on the location, soil type, season, variety, irrigation schedules, crop growth stage and amount of rainfall.

2.7 WATER USE EFFICIENCY

Stewart *et al.* (1975) observed maximum WUE of $0.17 \text{ q ha}^{-1} \text{ mm}^{-1}$ at Davis, California. Although maximum corn yield differed only slightly from semiarid to more humid environment, seasonal ET rates were considerably different. As a result of the lower seasonal ET in the humid regions, WUE's as high as $0.30 \text{ q ha}^{-1} \text{ mm}^{-1}$ have been reported for maize grown in the south Eastern USA.

Musik and Dusek (1980) compared WUE obtained in their studies to data from various other geographic locations and revealed that WUE for fully irrigated maize ranged from $0.12 \text{ q ha}^{-1} \text{ mm}^{-1}$ at Bush land, Texas to as high as $0.22 \text{ q ha}^{-1} \text{ mm}^{-1}$ for maize grown in the southern Nagar region of Isreal in silty clay loam soil during summer season.

Stegman (1982) observed that WUE of maize generally declined when compared to that of well watered crop because maize yield was shown to be linearly related to ET.

Balaswamy *et al.*, (1986) noticed that the water use efficiency of maize crop in sandy clay to sandy loam soil at Hyderabad was $38.8 \text{ kg ha}^{-1} \text{ mm}^{-1}$ at 40 per cent ASMD over 60 and 80 per cent ASMD (37.9 and $35.8 \text{ kg ha}^{-1} \text{ mm}^{-1}$, respectively) during summer in sandy clay loam soil.

Narang *et al.*, (1989) observed that higher water use efficiency was recorded at 50 mm CPE over 100 mm and 75 mm CPE during wet year whereas 80 mm CPE during dry year in red sandy loam soils of Punjab.

Leta Tulu *et al.* (1998) moisture stress due to irrigation scheduled at IW/CPE ratio at 0.6 continuously during reproductive and grain filling stages resulted in the highest WUE of $142.24 \text{ kg ha}^{-1} \text{ cm}^{-1}$.

Vishwanatha *et al.*, (2000) reported that water use efficiency was significantly higher in drip at 0.4 Epan ($40.04 \text{ kg ha}^{-1} \text{ mm}^{-1}$) over 0.6 and 0.8 Epan (33.27 and $32.69 \text{ kg ha}^{-1} \text{ mm}^{-1}$), which were significantly better than weekly surface at 0.8 Epan ($27.19 \text{ kg ha}^{-1} \text{ mm}^{-1}$) during summer 1998 in Red sandy loam soil of Bangalore.

Sunder Singh (2001) observation scheduling of irrigation at 0.5 IW/CPE ratio recorded maximum water use efficiency in summer and *kharif* (20.7 and $17.4 \text{ kg ha}^{-1} \text{ cm}^{-1}$) over 0.75 and 1.0 ratio (summer 18.6, 144 and *kharif* 11.8 and $11.2 \text{ kg ha}^{-1} \text{ cm}^{-1}$, respectively) in sandy clay loam soil of Tamilnadu.

Hussaini *et al*, (2002) at Samaru, Nigeria recorded higher WUE with irrigations scheduling at 0.6 IW/CPE ratio ($6.96 \text{ kg ha}^{-1} \text{ mm}^{-1}$) over 0.8 and 1.0 ratio (6.37 and $6.33 \text{ kg ha}^{-1} \text{ mm}^{-1}$, respectively) in sandy soil during *rabi* season.

Jiotode *et al*, (2002) observed that water use efficiency was more in irrigations scheduled as per critical growth stages ($5.86 \text{ kg ha}^{-1} \text{ mm}^{-1}$) over 40 mm, 60 mm and 80 mm CPE (3.29 , 3.86 and $4.19 \text{ kg ha}^{-1} \text{ mm}^{-1}$, respectively) in clay loam soil of Akola in Maharashtra.

Mahdi *et al*, (2003) observed that in sandy loam soil of Yuma, scheduling of irrigation and its interaction with plant population WUE was higher at 1.00 ET ($20.02 \text{ kg ha}^{-1} \text{ mm}^{-1}$) with 81,000 plant population over 0.6 and 0.8 ET (17.62 and $18.17 \text{ kg ha}^{-1} \text{ mm}^{-1}$, respectively).

The trickle irrigation causes for efficient application of water to maintain favourable soil moisture for realizing higher water use efficiency.

2.8 QUALITY PARAMETERS

Bharthi *et al*, (1997) recorded higher EC, sugar and amino acid with scheduling of irrigation at 0.50 IW/CPE ratio in maize (242.9 dS m^{-1} , $436.8 \text{ mg } 100 \text{ g}^{-1}$ and $75.5 \text{ mg } 100 \text{ g}^{-1}$) over 0.75 ratio (185.3 dS m^{-1} , $284.5 \text{ mg } 100 \text{ g}^{-1}$ and $55.5 \text{ mg } 100 \text{ g}^{-1}$) where as protein content and dehydrogenase activity was higher in 0.75 ratio (9.69 and 0.835 , respectively) over 0.50 ratio (9.00 and 0.636) in sandy soil at TNAU.

Manish Kurmar *et al*, (2001) noticed that scheduling of irrigation at 1.0 IW/CPE ratio recorded the lowest protein content in grain (9.87%) over one irrigation at tasseling at 0.7 IW/CPE ratio (10.41%) in sandy loam soil of Raipur during 1997.

Sunder Singh (2001) revealed higher crude protein (%) and vitamin C ($\text{mg } 100 \text{ g}^{-1}$) due to irrigation at 1.0 IW/CPE ratio (13.23 and 12.65 , respectively) over 0.75 and 0.5 IW/CPE ratio (12.78 and 12.57 , and 12.11 and 12.44) and in sandy clay loam during summer 1997 at TNAU.

Thus, sugars and amino acids were higher in lower IW/CPE ratio. Whereas, crude fibre and crude protein were higher in higher IW/CPE ratio.

2.9 BENEFIT:COST RATIO

Balaswamy *et al*, (1986) observed that net return was higher in paired row planting ($\text{Rs. } 71000 \text{ ha}^{-1}$) over normal planting ($\text{Rs. } 58000 \text{ ha}^{-1}$) in sandy clay to clay loam soil. Further the net return was maximum in scheduling of irrigation at 40% ($\text{Rs. } 56000 \text{ ha}^{-1}$) over 60 and 80% ($\text{Rs. } 38000$ and $\text{Rs. } 22000 \text{ ha}^{-1}$, respectively) ASMD in sandy loam soil of Hyderabad.

Jadhav *et al*, (1993) noticed that scheduling or irrigation at 1.0 IW/CPE recorded higher B: C ratio (0.83) over 0.4, 0.6 and 0.8 ratio (0.58 , 0.74 and 0.80 , respectively) during *rabi* season of 1986-87 in clay loam soil of Kolhapur (Maharashtra).

Rajendra Kumar *et al*, (1996) reported that higher net return of maize ($\text{Rs. } 7459 \text{ ha}^{-1}$) was with water stress at dough (84 DAS) over knee high, tasseling, silking stages ($\text{Rs. } 4038$, $\text{Rs. } 5919$ and $\text{Rs. } 3854 \text{ ha}^{-1}$, respectively) Silking stage was most critical for moisture, which recorded lowest returns ($\text{Rs. } 3524 \text{ ha}^{-1}$) due to stress in loamy soil of karnal during summer 1991.

Sachan and Gangawar (1996) recorded higher net return in row spacing of 45 cm ($\text{Rs. } 2957 \text{ ha}^{-1}$) of maize over 60 cm row spacing ($\text{Rs. } 1488 \text{ ha}^{-1}$) in sandy loam soil of Kanpur during 1990.

Thakur *et al*, (1998) reported that planting of baby corn at 40 cm x 20 cm recorded higher net return rupees⁻¹ (3.00) over 60 cm x 20 cm, 60 cm x 10m cm and 40 cm x 10 cm (2.57 , 2.60 and 2.52 , respectively) in sandy loam soil oat Kullu valley during rainy season 1993 and 1994.

Channakeshava *et al*, (2000) observed that planting of African tall fodder maize with 75 cm x 45 cm spacing recorded maximum net return $\text{Rs. } 56973.75 \text{ ha}^{-1}$ over other

treatments during *kharif* due to higher grain yield (53.27 q ha^{-1}) in red sandy loam soil of Bangalore.

Gollar and Patil (2000) studied the response of maize at different plant density with different spacing of Deccan 103 (hybrid) in clay loam soil at Dharwad during *rabi* 1990-91 and 1991-92. Higher B:C ratio (4.23) was observed at density of 1,11,111 (45 cm x 20 cm) over other plant densities.

Vishwanatha *et al*, (2000) observed that scheduling of irrigation by weekly surface irrigation at 1.0 Epan recorded higher B: C ratio (5.8) which was on par with drip at 0.8 Epan (5.2) over other 0.4 and 0.6 Epan by drip (3.9 and 4.3, respectively) in sweet corn in red sandy loam soil during summer 1998 at Bangalore.

Thus, the higher yield helps in getting higher B:C ratio this was due to paired row planting with drip at 0.8 Epan.

III. MATERIAL AND METHODS

A field experiment was conducted to investigate the “Response of baby corn to planting methods and irrigation schedules under drip”, during early summer 2004. The details of the materials used, methods and techniques adopted during the experimentation are described in this chapter.

3.1 LOCATION OF EXPERIMENTAL SITE

The experiment was conducted at the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad which is located at a latitude of 15° 26' N, longitude of 75° 7' E and at an altitude of 678 meters above mean sea level. The experiment was laid out in plot No. 131 of 'E' Block (Plate 1). The Research Station is situated in Northern Transitional Zone (Zone 8) of Karnataka.

3.2 SOIL CHARACTERISTICS OF THE EXPERIMENTAL SITE

The topography of the experimental site was fairly uniform. Soil of the experimental site was black clay loam. The composite soil samples to a depth of 30 cm from the experimental area were collected before sowing and were analysed for their physical and chemical properties. The values obtained along with the methods employed for their determination are presented in Table 1.

3.3 CLIMATE

The data with regard to rainfall and ambient temperatures (maximum and minimum) that prevailed during the crop growth period as recorded at Main Agricultural Research Station, Dharwad are presented in Table 2 and the rainfall data are illustrated in Figure 1.

The monthly mean annual total rainfall for 55 years was 751.53 mm. During the cropping period (December-March) 6.6 mm rainfall was received.

During the cropping season, the monthly mean maximum temperature ranged from 29.4°C in December to 30.7°C in February. Whereas, mean minimum temperature ranged from 14.7°C in December to 15.0°C in March. The mean monthly relative humidity during December was 45 per cent while in 4th March was 42 per cent.

3.4 EXPERIMENTAL DETAILS

The research programme involved an experiment entitled “Response of baby corn to planting methods and irrigation schedules under drip” with the following details.

3.4.1 Treatment details

T₁ – Drip irrigation at 100% PE (pan evaporation) with single row

T₂ - Drip irrigation at 75% PE with single row

T₃ - Drip irrigation at 50% PE with single row

T₄ – Drip irrigation at 100% PE with paired row

T₅ - Drip irrigation at 75% PE with paired row

T₆ - Drip irrigation at 50% PE with paired row

T₇ – Surface irrigation with single row

T₈ – Surface irrigation with paired row

Note : The drip system was operated daily, while surface irrigation was followed once in a week.

Single row : 37.5 cm × 24 cm (1,11,111 plants ha⁻¹)

Paired row : 25/50 cm × 20 cm (1,33,333 plants ha⁻¹)



Plate 1: General view of the experimental site

Table 1. Physical and chemical properties of the soil of experimental field

Sl. No.	Properties	Value		Method employed	
I.	Physical properties				
	A. Textural composition				
	Coarse sand (%)	5.80		Hydrometer method (Piper, 1966)	
	Fine sand (%)	14.32			
	Silt (%)	26.55			
	Clay (%)	53.33			
	Soil texture	Clay loam			
		B. Field capacity (%)			
		0-15 cm	32.73		Field method (Dastane, 1967)
		15-30 cm	33.32		
	30-45 cm	33.85			
	45-60 cm	33.97			
	C. Bulk density (Mg m⁻³)				
	0-15 cm	1.20		Core sampler method (Dastane, 1967)	
	15-30 cm	1.23			
	30-45 cm	1.27			
	45-60 cm	1.29			
II.	Chemical properties	Value	Rating		
	Available nitrogen (kg ha ⁻¹)	243.00	Low	Alkaline permanganate method (Subbaiah and Asija, 1956)	
	Available phosphorus (P ₂ O ₅) (kg ha ⁻¹)	28.15	Medium	Olsen's method (Muhr <i>et al.</i> , 1965)	
	Available potassium (kg ha ⁻¹)	308.64	High	Flame Photometer method (Jackson, 1967)	
	Organic carbon (%)	0.55	Medium	Walkley and Black wet oxidation method (Jackson, 1973)	
	Soil pH (1:2.5 soil:water)	7.58	Neutral	Potentiometric method (Piper, 1966)	

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

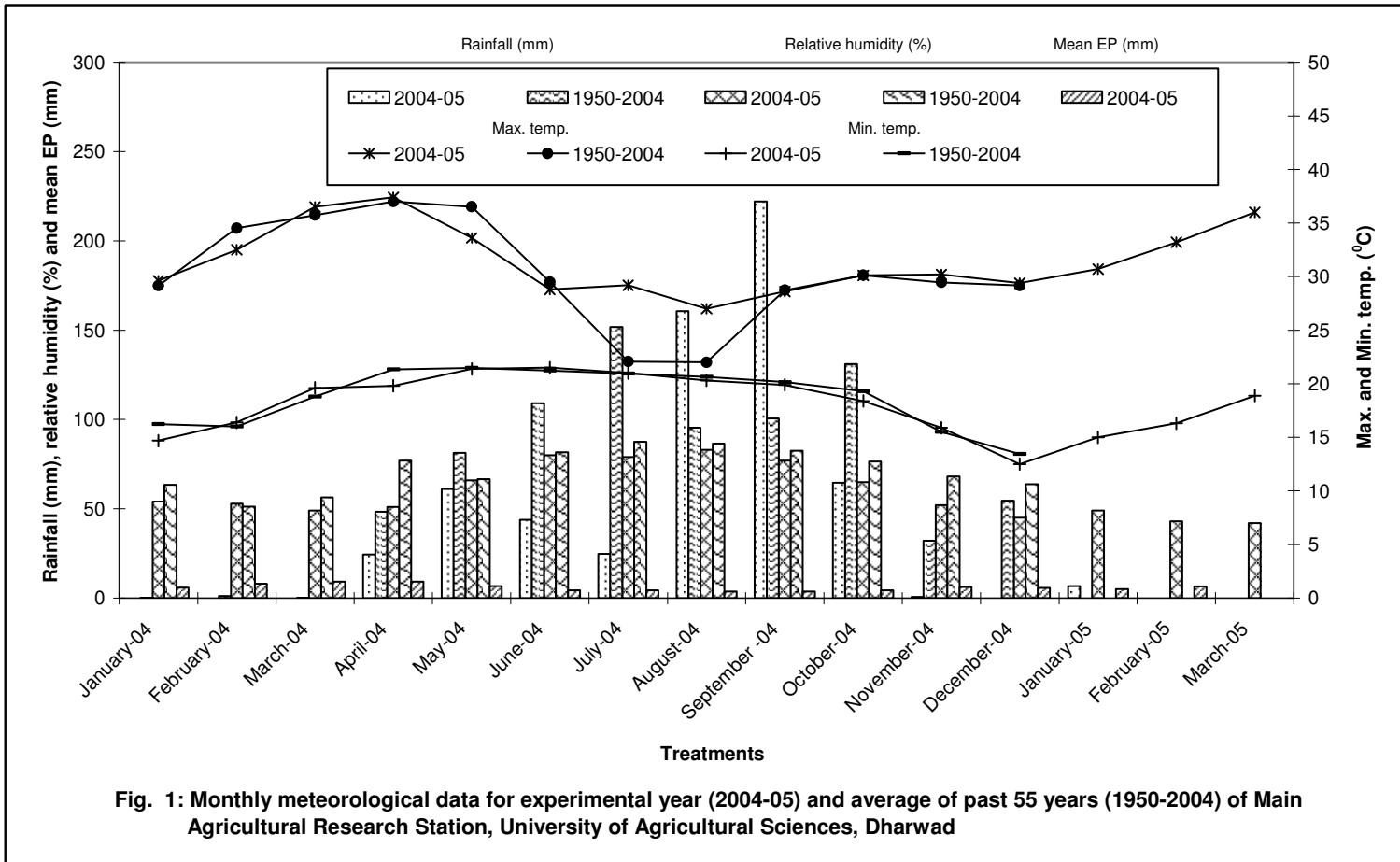


Fig. 1: Monthly meteorological data for experimental year (2004-05) and average of past 55 years (1950-2004) of Main Agricultural Research Station, University of Agricultural Sciences, Dharwad

LEGEND

T1 – Drip irrigation at 100% PE (Pan evaporation) with single row

T2 – Drip irrigation at 75% PE with single row

T3 – Drip irrigation at 50% PE with single row

T4 – Drip irrigation at 100% PE with paired row

T5 – Drip irrigation at 75% PE with paired row

T6 – Drip irrigation at 50% PE with paired row

T7 – Surface irrigation with single row

T8 – Surface irrigation with paired row

Note: The drip system was operated daily, while surface irrigation was followed once
in a week

Single row : 37.5 cm x 24 cm (1,11,111 plants ha-1)

Paired row : 25 / 50 cm x 20 cm (1,33,333 plants ha-1)

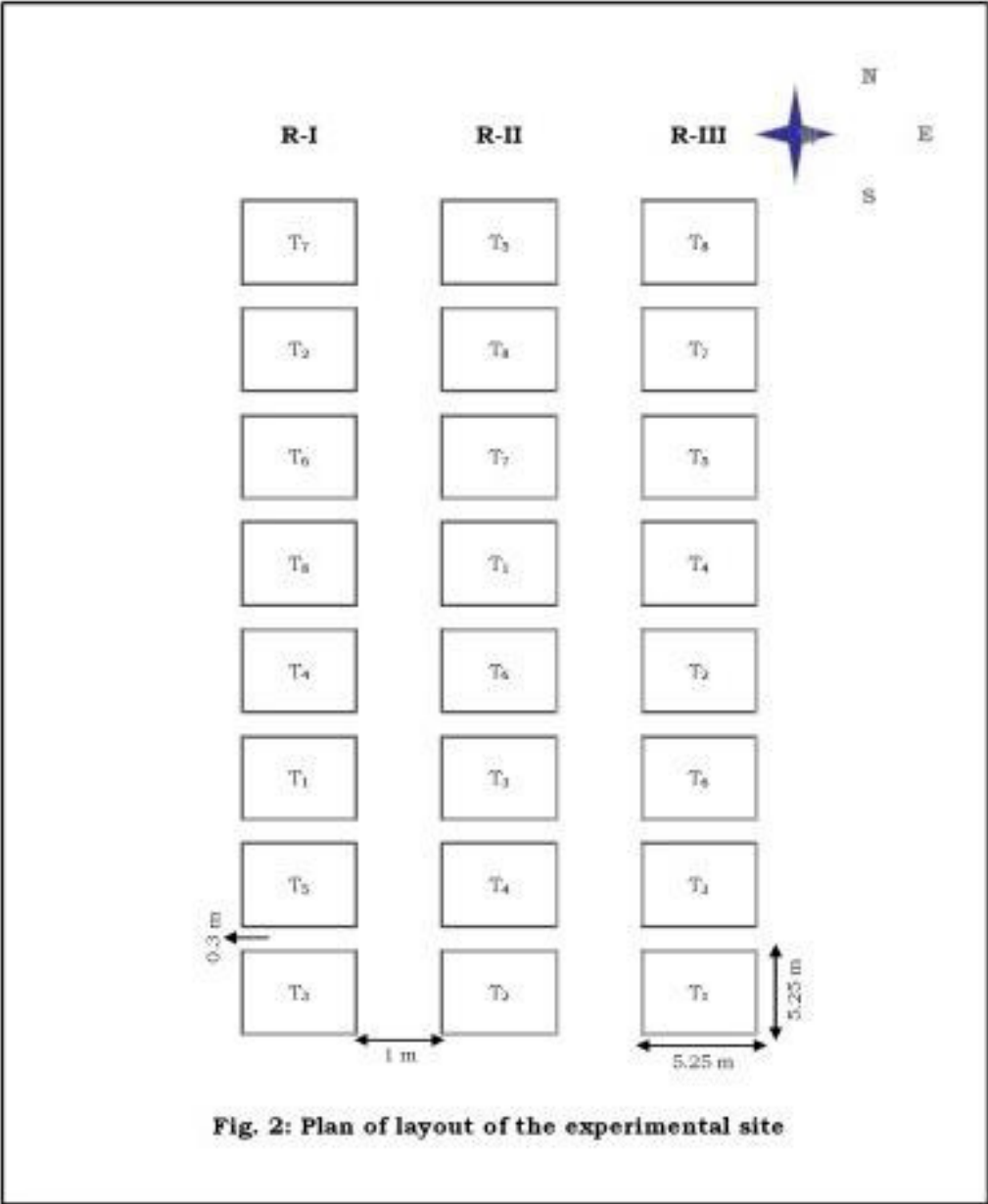


Fig. 2. Plan of layout of the experimental site

The plan of layout is given in Fig. 2.

A. Spacing

1. 37.5 cm × 24 cm (single row)
2. 25/50 cm × 20 cm (paired row)

B. Irrigation schedules

1. Drip irrigation at 100% PE
2. Drip irrigation at 75% PE
3. Drip irrigation at 50% PE
4. Surface irrigation

Design - Randomized Block Design with factorial concept

Replications - Three

Treatments - Eight

Total No. of plots - 24

Season - Early summer, 2004

Crop variety - Baby corn hybrid (Cv. PAC-792)

Fertilizer dose - 150:75:40 NPK kg ha⁻¹

Normal spacing - 37.5 cm × 24 cm

Paired row spacing - 25/50 cm × 20 cm

Surface irrigation - 37.5 cm × 24 cm

- 25/50 cm × 20 cm

Plot size

Gross plot size - 5.25 × 5.25 m² = 27.56 sq. m.

Net plot - T1, T2, T3 and T7 → 3.75 m × 4.29 m

- T4, T5, T6 and T8 → 3.75 m × 4.45 m

3.4.2 Salient features of variety

The baby corn variety named "PAC-792" is a hybrid variety specially suited for baby corn. The main characters of the variety viz., early maturity (70-75 days), tall plant height (cm), high yield (q ha⁻¹), better utilization of resources, resistance against pest and diseases (stem borer and powdery mildew) and better response to irrigation.

3.4.3 Details of cultivation

3.4.3.1 Land preparation

The land was ploughed with the help of tractor by using mould board plough and disc plough, cultivator was passed to crush the clods and to get the fine tilth. The land was levelled and the field was laid out in to plots according to requirement and the bunds were made to all the plots.

3.4.3.2 Fertilizer application

The crop received 150:75:40 NPK kg ha⁻¹ during growth period of which 50 per cent of nitrogen and full quantity of P₂O₅ and K₂O were applied just before the sowing as basal application. The nutrients were supplied in the form of Urea, Single super phosphate and Muriate of potash. The remaining 50 per cent of nitrogen was topdressed 28 days after sowing through urea and 10 t FYM was applied before sowing.

3.4.3.3 Sowing

The furrows were opened with the help of marker as per the spacing. In these furrows, 2-3 seeds were dibbled at each hill. The seeds were placed at a depth of 3-5 cm on 20th December 2004 and covered with the soil. Baby corn hybrid (Cv. PAC-792) seeds were used for sowing with recommended seed rate of 25-30 kg ha⁻¹.

3.4.3.4 Irrigation

Just after sowing 50 mm of common surface irrigation was applied for better germination and plant stand by using Parshal flume (7.5 cm size).

3.4.4 After care

3.4.4.1 Gap filling and thinning

Gap filling was done after 10 days after sowing (DAS). Thinning was done after 15 days after planting by keeping one healthy seedling per hill.

3.4.4.2 Weeding

Weeding was done by passing hoe at 15 days after sowing and followed by one hand weeding at 25 DAS to remove all the weeds from the plots.

3.4.4.3 Earthing up

Earthing up was done at 28 DAS just after the topdressing of nitrogenous fertilizer.

3.4.4.4 Plant protection measures

The crop was sprayed with Endosulfan @ 2 ml l⁻¹ at 35 DAS and phorate was applied to avoid the incidence of stem borer.

3.4.4.5 Detasseling

The removal of tassels commenced from 47 days onwards and continued till all the tassels emerged.

3.4.4.6 Installation of drip system

The drip unit consisted of pump, filters, main and sub-main pipes, control valves and laterals. On-line drippers were used in the study with a discharge rate of 1.6 litres hour⁻¹. The discharge rate and uniformity coefficient were 2 lph and 85.80 per cent, respectively.

3.4.4.7 Source of water

The drip system was directly connected to a borewell through syntax tank. The water quality used for irrigation was as follows,

SAR - 4.43

RSC - 2.12 me l⁻¹

EC - 1.3 dS m⁻¹

3.4.4.8 Control valve

Valve was fixed next to the filter on the main pipe to regulate water supply as per the treatment requirement.

3.4.4.9 Treatment imposition

The irrigation treatments were imposed on the 10th day of sowing. Before imposing treatments, a common irrigation of 50 mm depth was applied to all the treatments.

3.4.4.10 Scheduling irrigation

Based on the daily evaporation from the open (USWB) class A pan evaporimeter, calculated volume of water was given under drip and surface irrigation levels. In drip irrigation system, irrigation was given daily (63 days). During rainy days the volume of water applied to each treatment was adjusted for the effective rainfall received. In surface irrigation, the depth of irrigation was 60 mm and irrigation was scheduled weekly.

3.5 COLLECTION OF EXPERIMENTAL DATA

Details of the observation collected are given in the Table 3. The first picking of babies was started from 51 days after sowing and subsequent five pickings done at an interval of 3-4 days depending on the emergence of babies. The final crop was harvested after 75 days after sowing on March 04, 2005.

3.6 CORRELATION STUDIES

Correlation studies were made between important yield and growth components. The values of correlation coefficients (r) were calculated and tested for their significance as per the procedure outlined by Panse and Sukhatme (1967).

3.7 STATISTICAL ANALYSIS

The analysis and interpretation of data were done using the Fischer's method of analysis of variance technique as described by Gomez and Gomez (1984). The levels of significance used in 'F' and 't' test was $P = 0.05$ and 0.01 and critical values were calculated wherever the 'F' test was significance.

Table 3. Collection of experimental data

The details of the experimental data collected are provided below.

Sl. No.	Observations recorded	Periodicity	Methods followed
3.11	Growth attributing characters		
3.11.1	Plant height (cm)	20, 40, 60 DAS and at harvest	From base of the plant to base of fully opened leaf
3.11.2	No. of leaves	20, 40, 60 DAS and at harvest	Fully opened leaves were counted
3.11.3	Leaf area (cm ²)	20, 40, 60 DAS and at harvest	By leaf area meter
3.11.4	Leaf area index (LAI)	20, 40, 60 DAS and at harvest	$\frac{\text{Leaf area (cm}^2\text{)}}{\text{Spacing (cm}^2\text{)}}$ (Sestak <i>et al.</i> , 1971)
3.11.5	Leaf area duration (LAD) (days)	20, 40, 60 DAS and at harvest	$\frac{\text{LAI1} + \text{LAI2}}{2} \times (t_2 - t_1)$ (Power <i>et al.</i> , 1967)
3.11.6	Dry matter production (g) of leaf, stem and babycorn	20, 40, 60 DAS and at harvest	From destructive sample
3.11.7	Stem girth (cm)	40, 60 and at harvest	Recorded by measuring average diameter with thread
3.11.8	Average growth rate (AGR) (g day ⁻¹)	20-40, 40-60 DAS and 60 DAS-harvest	$\frac{W_2 - W_1}{t_2 - t_1}$ (Radford, 1967)
3.11.9	Crop growth rate (CGR) (g day ⁻¹ dm ⁻²)	20-40, 40-60 DAS and 60 DAS-harvest	$\frac{W_2 - W_1}{t_2 - t_1} \times \frac{1}{P}$ (Watson, 1952)
3.11.10	Harvest index	At harvest	$\frac{\text{Economic yield}}{\text{Biological yield}}$ Donald (1962)
3.12	Yield attributing characters		
3.12.1	Length of husked baby	At harvest	Recorded from base to tip of the baby
3.12.2	Girth of husked baby	At harvest	Recorded by measuring average diameter with thread

3.12.3	Number of babies plant ⁻¹	At harvest	From tagged plants
3.13	<i>Yield studies</i>		
3.13.1	Husk baby yield (g plant ⁻¹)	At harvest	From tagged plants
3.13.2	Husk baby yield (q ha ⁻¹)	At harvest	From net plot
3.13.3	Green fodder yield (g plant ⁻¹)	At harvest	From tagged plants
3.13.4	Green fodder yield (Mg ha ⁻¹)	At harvest	From net plot
3.14	Quality parameters		
3.14.1	Reducing sugar content in babies (mg/100 g)	At harvest	Nelson-Somogyi method (Nelson, 1944)
3.14.2	Crude protein in babies (%)	At harvest	Lowery method (Lowery <i>et al.</i> , 1951)
3.14.3	Crude fibre in babies (%)	At harvest	Volume method (Piper, 1966)
3.15	Plant water studies		
3.15.1	Leaf water potential (bars)	20, 40, 60 DAS before irrigation	HR-33T Dew point micro volt meter Wescar Co.
3.15.2	Relative water content percentage	20, 40, 60 DAS before irrigation	$\frac{\text{Fresh weight} - \text{oven dry weight}}{\text{Turgid weight} - \text{oven dry weight}} \times 100$ (Slatyer and Barrs, 1965)
3.16	<i>Soil moisture studies</i>		
3.16.1	Soil moisture content (%)	Before sowing After sowing After harvest	Gravimetric method
3.17	Water use studies		
3.17.2	Water use efficiency (kg ha-mm ⁻¹)	At harvest	$\text{WUE} = \frac{\text{Cob/Fodder yield (kg)}}{\text{Total water used (ha-mm)}}$
3.19	Economics		
3.19.1	Net return (Rs. ha ⁻¹)	At harvest	Gross return – cost of cultivation
3.19.2	Benefit :cost ratio	At harvest	$\frac{\text{Net return (Rs. ha}^{-1}\text{)}}{\text{Cost of cultivation (Rs. ha}^{-1}\text{)}}$

IV. EXPERIMENTAL RESULTS

The results of field experiment conducted during early summer season of 2004 at MARS, Dharwad to study the "Response of baby corn to planting methods and irrigation schedules under drip" are presented in this chapter.

4.1 GROWTH PARAMETERS

The data on growth attributing characters like plant height, number of leaves, leaf area, leaf area index, leaf area duration, dry matter accumulation in leaf, stem, husked baby corn and total dry matter, stem girth, average growth and crop growth rate in baby corn as influenced by planting methods and irrigation schedules at different growth stages are furnished in Table 4 to 10.

4.1.1 Plant height (cm)

The data on plant height at different growth stages as influenced by planting methods and irrigation schedules are presented in Table 4.

The plant height was not significantly influenced by planting methods at all the growth stages (20, 40, 60 DAS and at harvest).

The plant height was significantly influenced by irrigation schedules at all the growth stages. At 20 DAS, drip irrigation scheduled at 100% PE recorded significantly higher plant height (26.3) over 75% PE (23.13) and 50% PE (20.63), but was on par with surface irrigation (25.77 cm). In turn 75% PE was significantly superior over 50% PE and significantly lowest plant height was observed in 50% PE. The same trend was observed at 40, 60 DAS and at harvest except that at harvest 75% PE and surface irrigation were on par.

Interaction of planting methods and irrigation schedules did not differ significantly at all the growth stages with respect to plant height.

4.1.2 Number of leaves plant⁻¹

The data on number of leaves plant⁻¹ at different growth stages as influenced by planting methods and irrigation schedules are presented in Table 4.

Number of leaves plant⁻¹ were not affected significantly by planting methods at all the growth stages (20, 40, 60 DAS and at harvest).

Irrigation schedules influenced the number of leaves plant⁻¹ significantly at all the growth stages except 40 DAS. At 20 DAS, significantly highest number of leaves plant⁻¹ was observed in drip irrigation scheduled at 100% PE (7.50) over 75% PE (6.47), 50% PE (6.27) and surface irrigation (6.00). At 60 DAS also, same trend was noticed except that drip irrigation scheduled at 75% PE (12.95) was significantly superior over 50% PE (11.40). At harvest, significantly higher number of leaves plant⁻¹ were observed in drip irrigation scheduled at 100% PE (18.00) over 75% PE (15.83) and 50% PE (14.37), but was on par with surface irrigation (17.70).

The interaction effect of planting methods and irrigation schedules on number of leaves plant⁻¹ was not significant at all the growth stages of the crop.

4.1.3 Leaf area plant⁻¹

The data on leaf area plant⁻¹ of baby corn as influenced by planting methods and irrigation schedules at different growth stages (20, 40, 60 DAS and at harvest) are furnished in Table 5 and depicted in Fig. 3.

The leaf area plant⁻¹ was not affected significantly by planting methods at all the growth stages of crop.

Irrigation schedules influenced the leaf area plant⁻¹ at all the growth stages of crop. At 20 DAS, the highest leaf area plant⁻¹ was observed in drip irrigation scheduled at 100% PE

Table 4. Plant height and number of leaves plant⁻¹ of baby corn at different growth stages (20, 40, 60 DAS and at harvest) as influenced by planting methods and irrigation schedules

Treatments	Plant height (cm)				Number of leaves			
	20 DAS	40 DAS	60 DAS	At harvest	20 DAS	40 DAS	60 DAS	At harvest
A. Planting method								
P ₁ : 37.5 cm × 24 cm (Single row)	23.74	93.31	168.33	174.51	6.47	10.57	13.51	16.63
P ₂ : 25-50-25 cm × 20 cm (Paired row)	24.20	97.93	169.38	176.84	6.65	10.72	13.65	16.33
SEm _±	0.38	1.44	2.71	3.28	0.14	0.24	0.28	0.32
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS
B. Irrigation schedules								
I ₁ : Drip at 100% PE	26.35	103.58	180.95	191.64	7.5	11.03	15.95	18.00
I ₂ : Drip at 75% PE	23.13	93.74	164.15	173.48	6.47	10.57	12.95	15.83
I ₃ : Drip at 50% PE	20.63	89.81	152.13	153.93	6.00	10.20	11.40	14.37
I ₄ : Surface irrigation	25.77	99.35	178.18	184.63	6.27	10.78	14.02	17.7
SEm _±	0.53	2.04	3.83	4.64	0.19	0.33	0.39	0.45
CD at 5%	1.62	6.18	11.62	14.07	0.58	NS	1.19	1.37
C. Interaction A × B								
SEm _±	0.75	2.88	5.42	6.56	0.27	0.47	0.56	0.64
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS

DAS : Days after sowing

NS : Non-significant

Table 5. Leaf area and leaf area index of baby corn at different growth stages (20, 40, 60 DAS and at harvest) as influenced by planting methods and irrigation schedules

Treatments	Leaf area (cm ² plant ⁻¹)				Leaf area index			
	20 DAS	40 DAS	60 DAS	At harvest	20 DAS	40 DAS	60 DAS	At harvest
A. Planting method								
P ₁ : 37.5 cm × 24 cm (Single row)	223.95	3052.78	6357.78	6159.37	0.25	3.39	7.06	6.68
P ₂ : 25-50-25 cm × 20 cm (Paired row)	225.46	3069.03	6490.05	6245.75	0.30	4.10	8.65	8.34
SEm _±	4.59	104.23	139.30	137.25	0.005	0.06	0.14	0.12
CD at 5%	NS	NS	NS	NS	0.015	0.19	0.43	0.35
B. Irrigation schedules								
I ₁ : Drip at 100% PE	250.15	3625.63	6975.07	6842.48	0.31	4.44	8.53	8.37
I ₂ : Drip at 75% PE	224.31	3073.70	6555.85	6378.55	0.27	3.75	8.02	7.87
I ₃ : Drip at 50% PE	199.75	2484.18	5584.83	5202.32	0.24	3.04	6.84	5.99
I ₄ : Surface irrigation	224.62	3060.12	6579.92	6386.88	0.28	3.74	8.05	7.81
SEm _±	6.49	147.40	196.99	194.09	0.01	0.09	0.20	0.16
CD at 5%	19.69	447.09	597.51	588.72	0.02	0.27	0.61	0.50
C. Interaction A × B								
SEm _±	9.18	208.46	278.59	274.49	0.01	0.13	0.28	0.23
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS

DAS : Days after sowing

NS : Non-significant

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂: 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

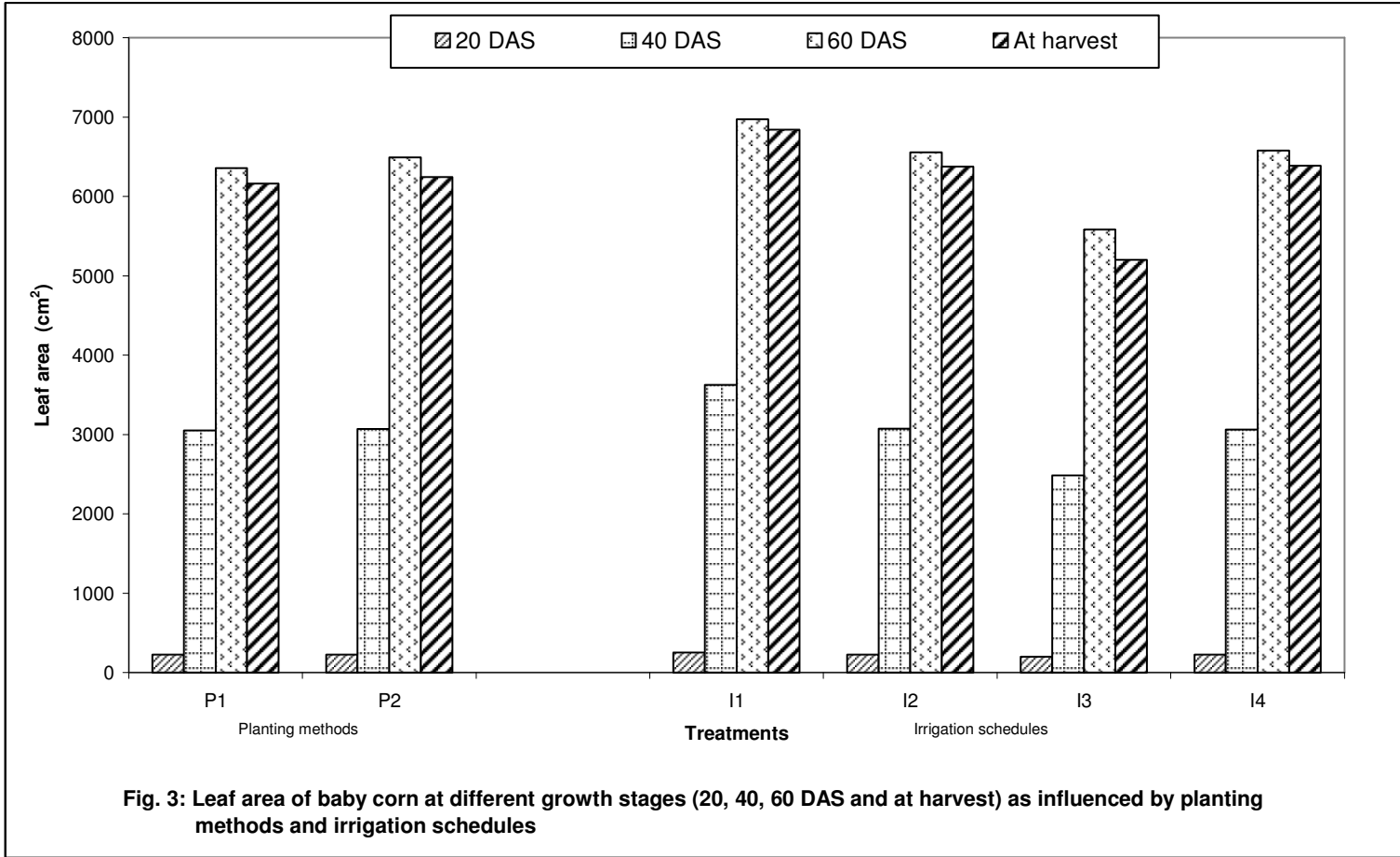


Fig. 3: Leaf area of baby corn at different growth stages (20, 40, 60 DAS and at harvest) as influenced by planting methods and irrigation schedules

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

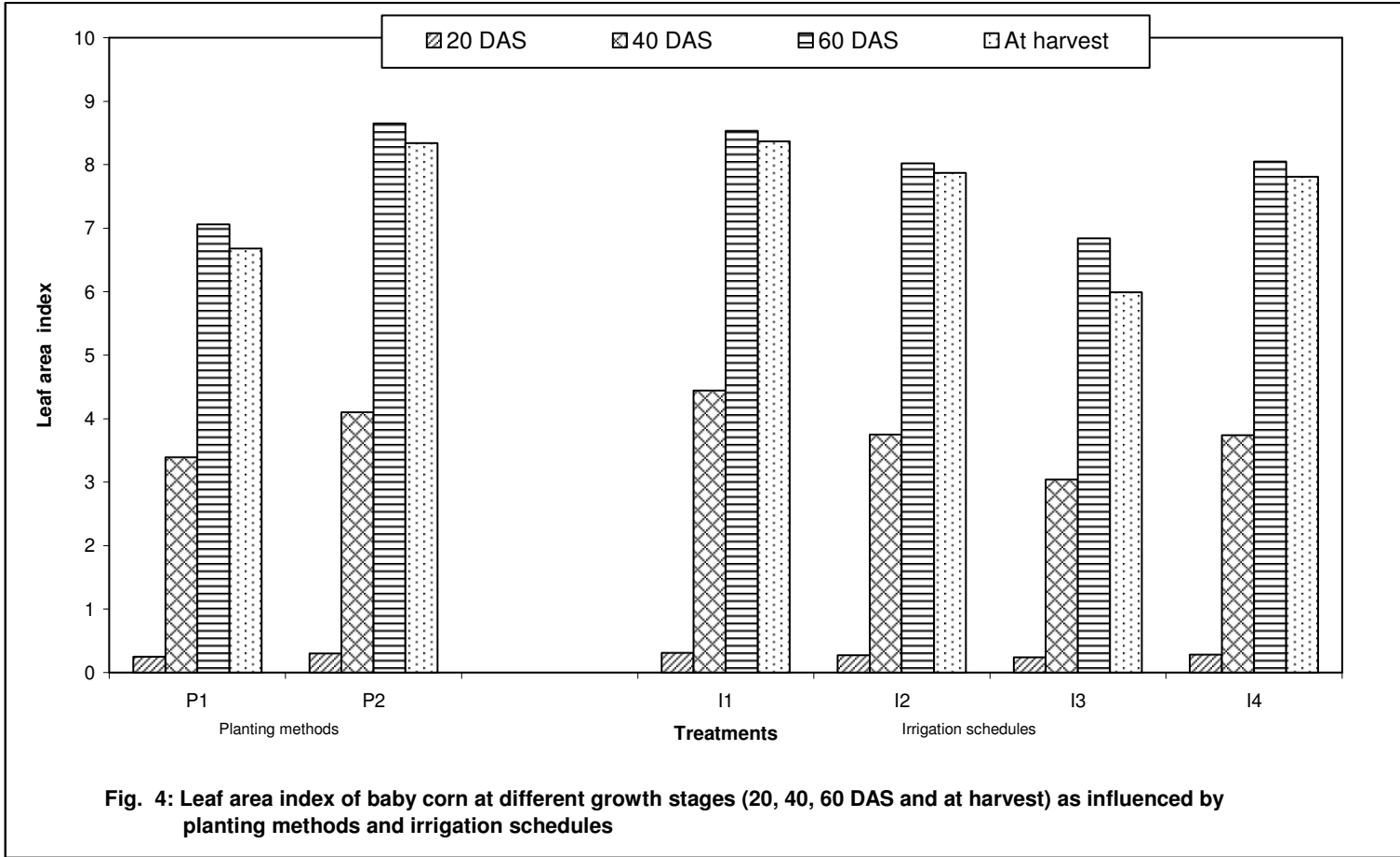


Fig. 4: Leaf area index of baby com at different growth stages (20, 40, 60 DAS and at harvest) as influenced by planting methods and irrigation schedules

(250.15) over rest of the treatments (surface irrigation – 224.62, 75% PE – 224.31 and 50% PE – 199.75 cm²). Surface irrigation and 75% PE were on par and together were significantly superior over drip irrigation scheduled at 50% PE. The same trend was observed at 40 and 60 DAS and at harvest except that drip irrigation scheduled at 100% and 75% PE and surface irrigation were at par.

The interaction effect of planting methods and irrigation schedules on leaf area plant⁻¹ was not significant at all the growth stages of the crop.

4.1.4 Leaf area index

The data on leaf area index of baby corn as influenced by planting methods and irrigation schedules at different growth stages (20, 40, 60 DAS and at harvest) are presented in Table 5 and depicted in Fig. 4.

The planting methods influenced the leaf area index significantly at all the growth stages of the crop. At all the growth stages, paired row planting recorded significantly higher leaf area index over normal row planting.

Irrigation schedules influenced the leaf area index significantly at all the growth stages of crop. At 20 DAS, significantly highest leaf area index was observed in drip irrigation scheduled at 100% PE (0.31) over rest of the treatments (surface irrigation – 0.28, 75% PE – 0.27 and 50% PE – 0.24). Surface irrigation and 75% PE were on par while significantly lowest leaf area index was observed in drip irrigation scheduled at 50% PE. The similar trend was observed at 40, 60 DAS and at harvest stages also. Except that at 60 DAS, 100% PE was on par with 75% PE and surface irrigation.

The interaction effect of planting methods and irrigation schedules on leaf area index was not significant at all the growth stages of the crop.

4.1.5 Leaf area duration (days)

The data relating to leaf area duration of baby corn as influenced by planting methods and irrigation schedules at different growth stages (20-40, 40-60 DAS and 60 DAS-harvest) are given in Table 10.

The planting methods influenced the leaf area duration significantly at all the growth stages of the crop. At all the growth stages, paired row planting recorded significantly higher leaf area duration over normal row planting.

Irrigation schedules influenced the leaf area duration significantly at all the growth stages of crop. At 20-40 DAS, the significantly highest leaf area duration was noticed in drip irrigation scheduled at 100% PE (47.32) over 75% PE (40.28), surface irrigation (40.15) and 50% PE (32.82 days). Whereas, 75% PE and surface irrigation were on par and significantly lowest leaf area duration was observed in 50% PE. Similar trend was noticed at 40-60 DAS and 60 DAS–harvest also.

The interaction effect of planting methods and irrigation schedules on leaf area duration was not significant at all the growth stages of the crop.

4.1.6 Dry matter accumulation in leaf (g plant⁻¹)

The data on dry matter accumulation in the leaf of baby corn as influenced by planting methods and irrigation schedules (20, 40, 60 DAS and at harvest) are presented in Table 6 and depicted in Fig. 5.

The dry matter accumulation in leaf (g plant⁻¹) was not influenced significantly at all the growth stages (20, 40, 60 DAS and at harvest) by planting methods.

Irrigation schedules affected the dry matter accumulation in leaf at all the growth stages of crop. At 20 DAS, significantly highest dry matter accumulation in leaf area noticed in drip irrigation scheduled at 100% PE (3.51) over 75% PE (2.33), 50% PE (1.68) and surface irrigation (1.64 g plant⁻¹). In turn 75% PE was significantly superior over 50% PE and surface irrigation. Whereas, 50% PE and surface irrigation were on par. At 40-60 DAS and 60 DAS-

Table 6. Dry matter accumulation (g plant⁻¹) in leaf and stem of baby corn at different growth stages (20, 40, 60 DAS and at harvest) as influenced by planting methods and irrigation schedules

Treatments	Dry matter accumulation (g plant ⁻¹)							
	Leaf				Stem			
	20 DAS	40 DAS	60 DAS	At harvest	20 DAS	40 DAS	60 DAS	At harvest
A. Planting method								
P ₁ : 37.5 cm × 24 cm (Single row)	2.25	18.72	70.56	74.38	1.38	58.49	261.47	271.32
P ₂ : 25-50-25 cm × 20 cm (Paired row)	2.33	19.26	71.44	74.89	1.42	58.91	263.58	270.83
SEm _±	0.04	0.34	1.35	1.59	0.02	1.11	4.01	4.15
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS
B. Irrigation schedules								
I ₁ : Drip at 100% PE	3.51	22.31	83.23	88.38	1.65	64.52	268.11	283.25
I ₂ : Drip at 75% PE	2.33	19.63	77.00	80.92	1.39	58.14	261.43	272.02
I ₃ : Drip at 50% PE	1.68	15.44	49.34	54.07	1.16	53.26	256.63	256.72
I ₄ : Surface irrigation	1.64	18.57	74.45	75.18	1.40	58.88	263.93	272.31
SEm _±	0.06	0.48	1.91	2.24	0.03	1.57	5.68	5.86
CD at 5%	0.18	1.46	5.78	6.80	0.10	4.75	NS	17.79
C. Interaction A × B								
SEm _±	0.09	0.68	2.69	3.17	0.05	2.22	8.03	8.29
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS

DAS : Days after sowing

NS : Non-significant

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

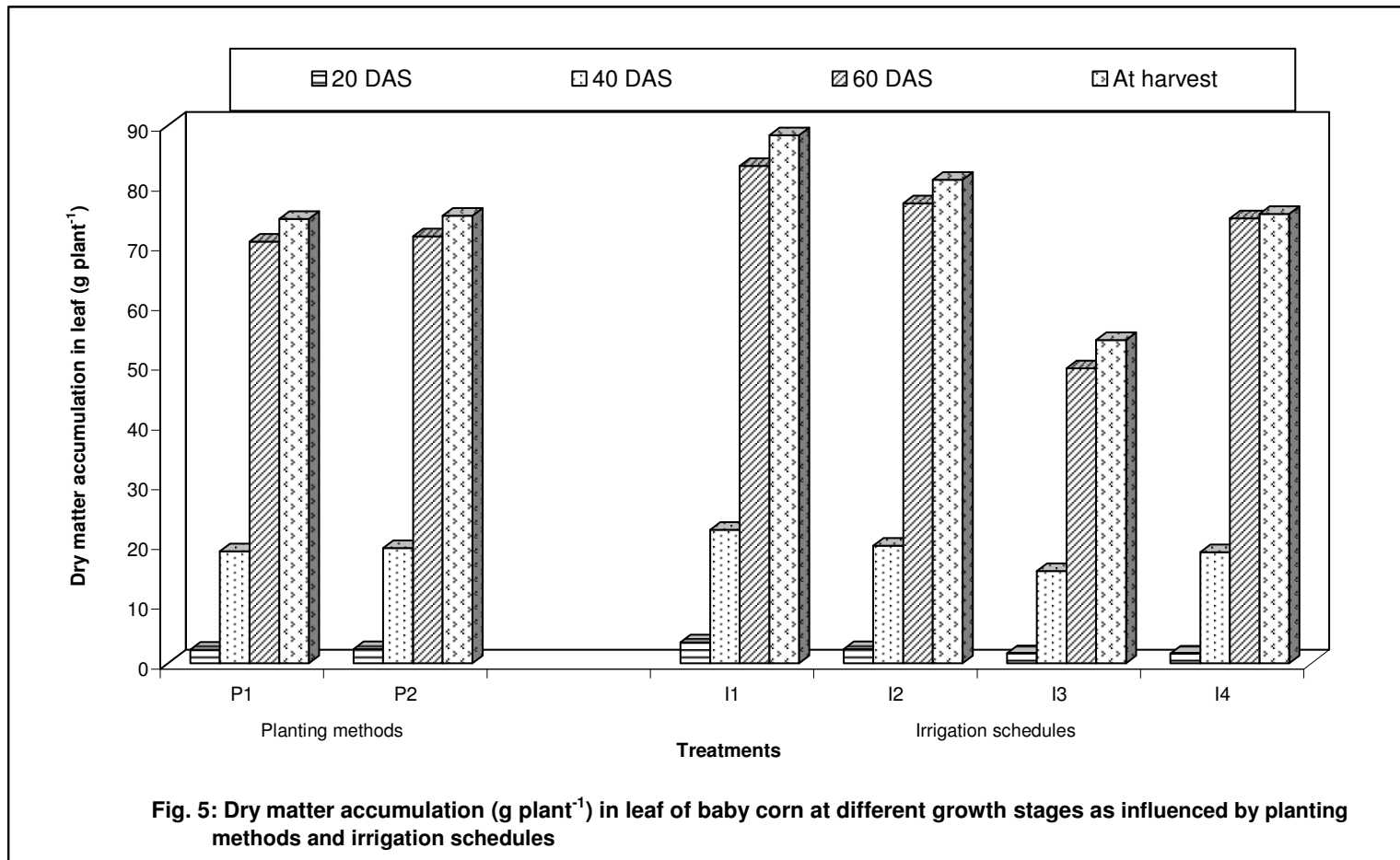


Fig. 5: Dry matter accumulation (g plant⁻¹) in leaf of baby corn at different growth stages as influenced by planting methods and irrigation schedules

harvest same trend was noticed except that drip irrigation schedule 75% PE was significantly superior over 50% PE but was on par with surface irrigation. Significantly lowest leaf dry matter accumulation was noticed in 50% PE

The interaction effect of planting methods and irrigation schedules on dry matter accumulation in leaf was not significant at all the growth stages of the crop.

4.1.7 Dry matter accumulation in stem (g plant^{-1})

The results on dry matter accumulation in stem of baby corn as influenced by planting methods and irrigation schedules (20, 40, 60 DAS and at harvest) are presented in Table 6 and depicted in Fig. 6.

The dry matter accumulation in stem was not affected significantly by planting methods at all the growth stages (20, 40, 60 DAS and at harvest).

The dry matter accumulation in stem influences significantly by irrigation schedules at all the growth stages except 60 DAS. At 20 DAS, significantly highest dry matter accumulation in stem was noticed in drip irrigation scheduled at 100% PE (1.65) over surface irrigation (1.40), 75% PE (1.39) and 50% PE (1.16 g plant^{-1}). In turn surface irrigation was significantly superior over 50% PE but was on par with drip irrigation scheduled at 75% PE and significantly lowest dry matter accumulation in stem was observed in drip irrigation scheduled at 50% PE. Similar trend was observed at 40 DAS and at harvest, also except that at harvest drip irrigation scheduled at 100% PE (283.25), 75% PE (272.02) and surface irrigation (272.31 g plant^{-1}) were on par. The drip irrigation scheduled at 50% PE, 75% PE and surface irrigations were on par at harvest.

The interaction effect of planting methods and irrigation schedules on dry matter accumulation in stem was not significant at all the growth stages of the crop.

4.1.8 Dry matter accumulation in husked baby (g plant^{-1})

The data on dry matter accumulation in husked baby as influenced by planting methods and irrigation schedules are presented in Table 7 and depicted in Fig. 7.

The dry matter accumulation in husked baby was not significantly influenced by planting methods at harvest of crop.

The dry matter accumulation in husked baby at harvest was influenced significantly by irrigation schedules. Significantly higher dry matter accumulation in husked babies at harvest was observed in drip irrigation scheduled at 100% PE (51.33) over 75% PE (36.20), surface irrigation (21.85) and 50% PE (21.58 g plant^{-1}). In turn 75% PE was significantly superior over surface irrigation and 50% PE and significantly lowest dry matter accumulation in husked baby was observed in drip irrigation scheduled at 50% PE.

The interaction effect of planting methods and irrigation schedules on dry matter accumulation in husked baby was not significant at all the growth stages of the crop.

4.1.9 Total dry matter accumulation (g plant^{-1})

The data on total dry matter accumulation in plant as influenced by planting methods and irrigation schedules are presented in Table 7.

The total dry matter accumulation was not influenced significantly at all the growth stages by planting methods.

Irrigation schedules influenced total dry matter accumulation significantly at all the growth stages (20, 40, 60 DAS and at harvest) of crop. At 20 DAS, significantly highest total dry matter accumulation was observed in drip irrigation scheduled at 100% PE (5.16) over 75% PE (3.72), 50% PE (2.84) and surface irrigation (3.04 g plant^{-1}). In turn 75% PE was significantly higher over 50% PE and surface irrigation. However, surface irrigation and 50% PE were on par. The lowest total dry matter accumulation was observed in drip irrigation scheduled at 50% PE. The same trend was noticed at 40 DAS and at harvest except that the drip irrigation scheduled at 75% PE and surface irrigation were on par and were significantly

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

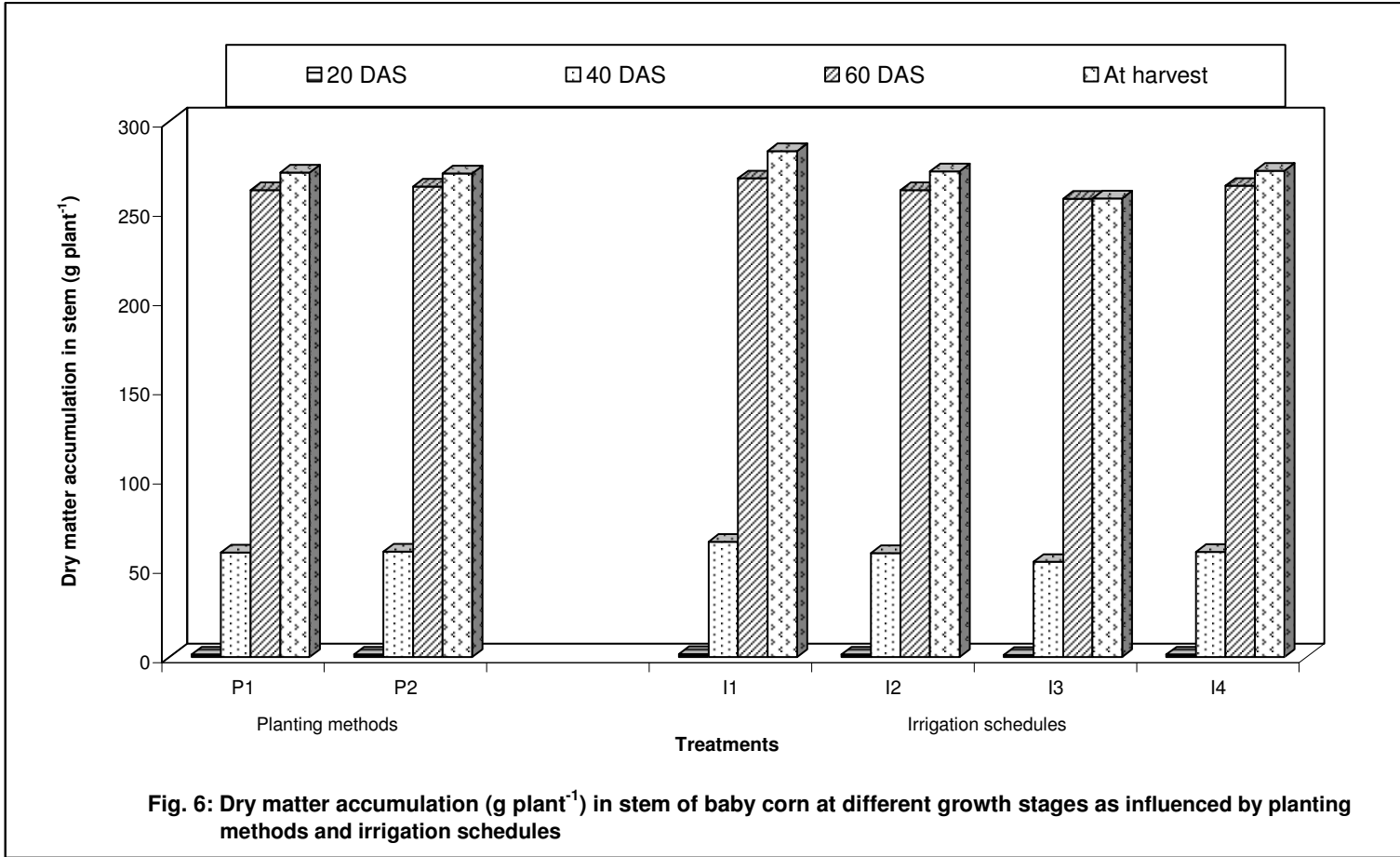


Fig. 6: Dry matter accumulation (g plant⁻¹) in stem of baby corn at different growth stages as influenced by planting methods and irrigation schedules

Table 7. Dry matter accumulation in dry husked baby and the total dry matter accumulation (g plant^{-1}) of plant (at 20, 40, 60 DAS and at harvest) as influenced by planting methods and irrigation schedule

Treatments	Dry matter accumulation in husked baby (g plant^{-1}) at harvest	Total dry matter accumulation (g plant^{-1})			
		20 DAS	40 DAS	60 DAS	At harvest
A. Planting method					
P ₁ : 37.5 cm × 24 cm (Single row)	33.06	3.63	77.21	332.04	378.76
P ₂ : 25-50-25 cm × 20 cm (Paired row)	33.93	3.75	78.21	334.60	379.65
SEm \pm	0.49	0.06	1.21	4.74	4.68
CD at 5%	NS	NS	NS	NS	NS
B. Irrigation schedules					
I ₁ : Drip at 100% PE	51.33	5.16	86.83	351.33	422.96
I ₂ : Drip at 75% PE	36.20	3.72	77.86	338.43	389.14
I ₃ : Drip at 50% PE	21.58	2.84	68.70	305.97	332.37
I ₄ : Surface irrigation	24.85	3.04	77.45	337.54	372.34
SEm \pm	0.70	0.08	1.72	6.71	6.62
CD at 5%	2.12	0.25	5.20	20.35	20.08
C. Interaction A × B					
SEm \pm	0.99	0.12	2.43	9.49	9.36
CD at 5%	NS	NS	NS	NS	NS

DAS : Days after sowing

NS : Non-significant

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

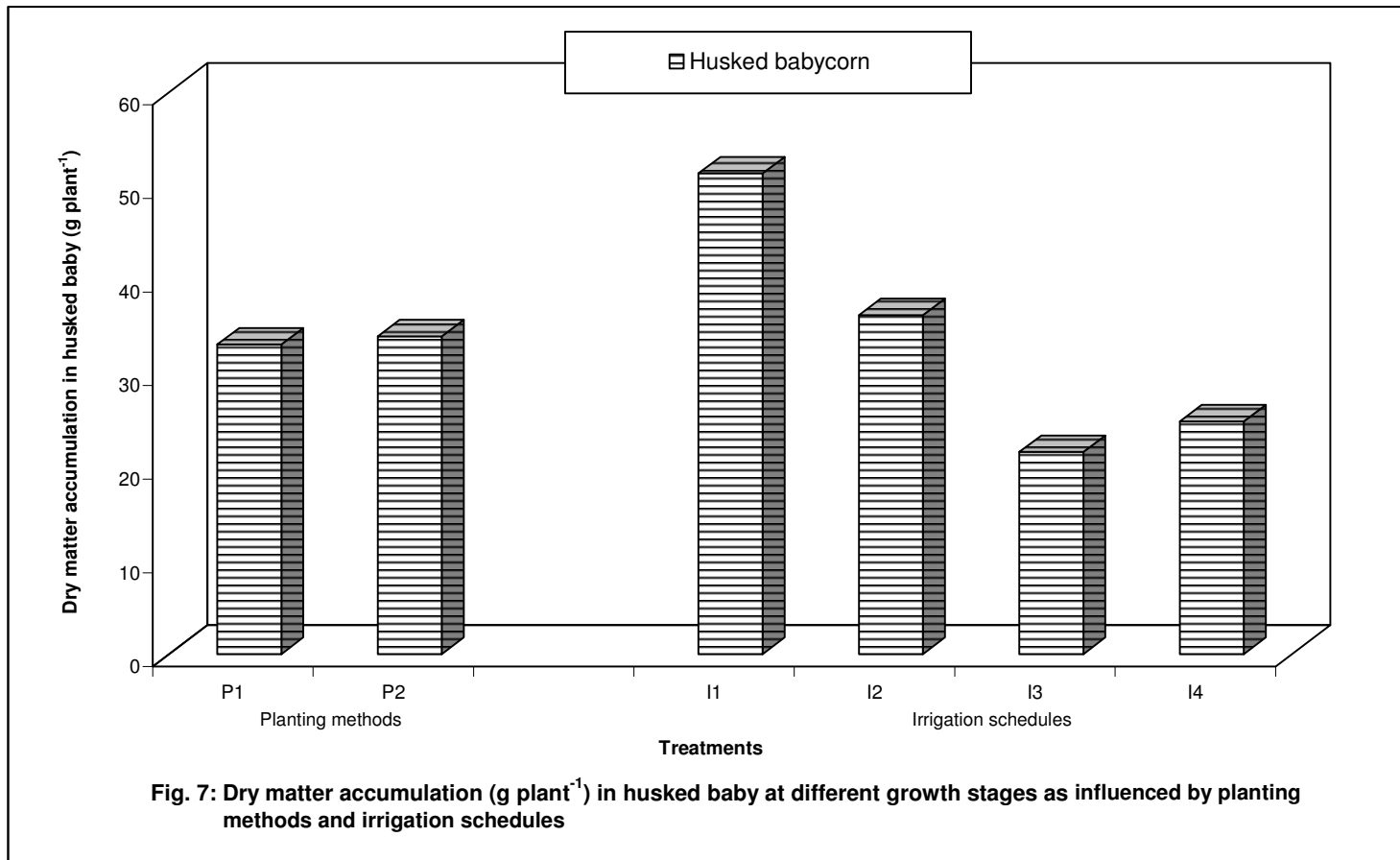


Fig. 7: Dry matter accumulation (g plant⁻¹) in husked baby at different growth stages as influenced by planting methods and irrigation schedules

Table 8. Average growth rate (g day^{-1}) and crop growth rate ($\text{g day}^{-1} \text{dm}^{-2}$) of baby corn (at 20-40, 40-60 DAS and 60 DAS-harvest) as influenced by planting methods and irrigation schedules

Treatments	Average growth rate (g day^{-1})			Crop growth rate ($\text{g day}^{-1} \text{dm}^{-2}$)		
	20-40 DAS	40-60 DAS	60 DAS- At harvest	20-40 DAS	40-60 DAS	60 DAS- harvest
A. Planting method						
P ₁ : 37.5 cm × 24 cm (Single row)	3.68	12.74	3.11	0.41	1.41	0.35
P ₂ : 25-50-25 cm × 20 cm (Paired row)	3.73	12.82	3.02	0.50	1.71	0.40
SEm \pm	0.06	0.21	0.05	0.01	0.03	0.01
CD at 5%	NS	NS	NS	0.02	0.08	0.02
B. Irrigation schedules						
I ₁ : Drip at 100% PE	4.08	13.23	4.77	0.50	1.62	0.58
I ₂ : Drip at 75% PE	3.71	13.03	3.38	0.45	1.60	0.41
I ₃ : Drip at 50% PE	3.30	11.86	1.75	0.40	1.45	0.21
I ₄ : Surface irrigation	3.72	13.01	2.32	0.46	1.59	0.28
SEm \pm	0.08	0.30	0.07	0.01	0.04	0.01
CD at 5%	0.25	0.92	0.22	0.03	0.11	0.03
C. Interaction A × B						
SEm \pm	0.12	0.43	0.10	0.02	0.05	0.01
CD at 5%	NS	NS	NS	NS	NS	NS

DAS : Days after sowing

NS : Non-significant

superior over 50% PE. At 60 DAS, the drip irrigation scheduled at 100% PE, 75% PE and surface irrigation were on par and were significantly superior over 50% PE. Significantly lowest total dry matter accumulation was observed in drip irrigation scheduled at 50% PE.

The interaction effect of planting methods and irrigation schedules on total dry matter accumulation was not significant at all the growth stages of the crop.

4.1.10 Stem girth (cm)

The data related to stem girth of baby corn as influenced by planting methods and irrigation schedules at all the growth stages (40, 60 DAS and at harvest) are furnished in Table 10.

The stem girth was not influenced significantly at all the growth stages of the crop by planting methods.

Irrigation schedules affected the stem girth significantly at all the growth stages of crop. At 40 DAS, significantly highest stem girth was noticed in drip irrigation scheduled at 100% PE (7.45) over 75% PE (6.72) and 50% PE (6.42 cm), but was on par with surface irrigation (7.28 cm). Significantly lowest stem girth was observed in drip irrigation scheduled at 50% PE and was on par with 75% PE at 60 DAS, similar trend was noticed except that drip irrigation scheduled at 75% PE was significantly superior over 50% PE but was on par with surface irrigation. At harvest, drip irrigation scheduled at 100% PE (8.80) was significantly superior over surface irrigation (7.88) and 50% PE (6.88%) but was on par with 75% PE (7.27 cm). Like-wise 75% PE was on par with surface irrigation and significantly lowest stem girth was observed in 50% PE.

The interaction effect of planting methods and irrigation schedules on stem girth was not significant at all the growth stages of the crop.

4.1.11 Average growth rate (g day^{-1})

The data related to average growth rate at different growth stages (20-40 DAS, 40-60 DAS and 60 DAS-harvest) as influenced by planting methods and irrigation schedules are given in Table 9 and depicted in Fig. 8.

The average growth rate was not influenced significantly by planting methods at all the growth stages of crop.

The average growth was affected significantly by irrigation schedules at all the growth stages of crop. At 20-40 DAS, significantly highest average growth rate was noticed in drip irrigation scheduled at 100% PE (4.08) over surface irrigation (3.72), 75% PE (3.71) and 50% PE (3.30 g day^{-1}). However, 75% PE and surface irrigation were on par. While, 50% PE registered significantly lowest average growth rate. Similar trend was noticed at 40-60 DAS except that drip irrigation scheduled at 100% PE and 75% PE were on par with surface irrigation. At 60 DAS-harvest, drip irrigation scheduled at 100% PE recorded significantly highest average growth rate over rest of the treatments (75% PE, surface irrigation and 50% PE).

The interaction effect of planting methods and irrigation schedules on average growth rate (g day^{-1}) was not significant at all the growth stages of the crop.

4.1.12 Crop growth rate ($\text{g day}^{-1} \text{dm}^{-2}$)

The data related to crop growth rate of baby corn at different growth stages (20-40, 40-60 DAS, 60 DAS-harvest) as influenced by planting methods and irrigation schedules are given in Table 9 and depicted in Fig. 9.

The plating method influenced the crop growth rate significantly at all the growth stages of crop. The paired row planting registered significantly highest crop growth rate over normal row planting at all the growth stages of crop.

Irrigation schedules influenced the crop growth rate ($\text{g day}^{-1} \text{dm}^{-2}$) significantly at all the growth stages of crop. At 20-40 DAS, drip irrigation scheduled at 100% PE recorded

Table 9. Leaf area duration (at 20-40, 40-60 DAS and 60 DAS-harvest) and harvest index of baby corn as influenced by planting methods and irrigation schedules

Treatments	Leaf area duration (days)			Harvest index
	20-40 DAS	40-60 DAS	60 DAS-harvest	
A. Planting method				
P ₁ : 37.5 cm × 24 cm (Single row)	36.41	104.56	103.06	0.14
P ₂ : 25-50-25 cm × 20 cm (Paired row)	43.93	127.48	127.44	0.14
SEm _±	0.60	1.77	1.71	0.003
CD at 5%	1.83	5.38	5.18	NS
B. Irrigation schedules				
I ₁ : Drip at 100% PE	47.32	129.66	126.72	0.12
I ₂ : Drip at 75% PE	40.28	117.71	119.11	0.13
I ₃ : Drip at 50% PE	32.82	98.76	96.23	0.16
I ₄ : Surface irrigation	40.15	117.91	118.95	0.13
SEm _±	0.85	2.51	2.42	0.004
CD at 5%	2.59	7.60	7.33	0.013
C. Interaction A × B				
SEm _±	1.21	3.55	3.42	0.006
CD at 5%	NS	NS	NS	NS

DAS : Days after sowing

NS : Non-significant

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

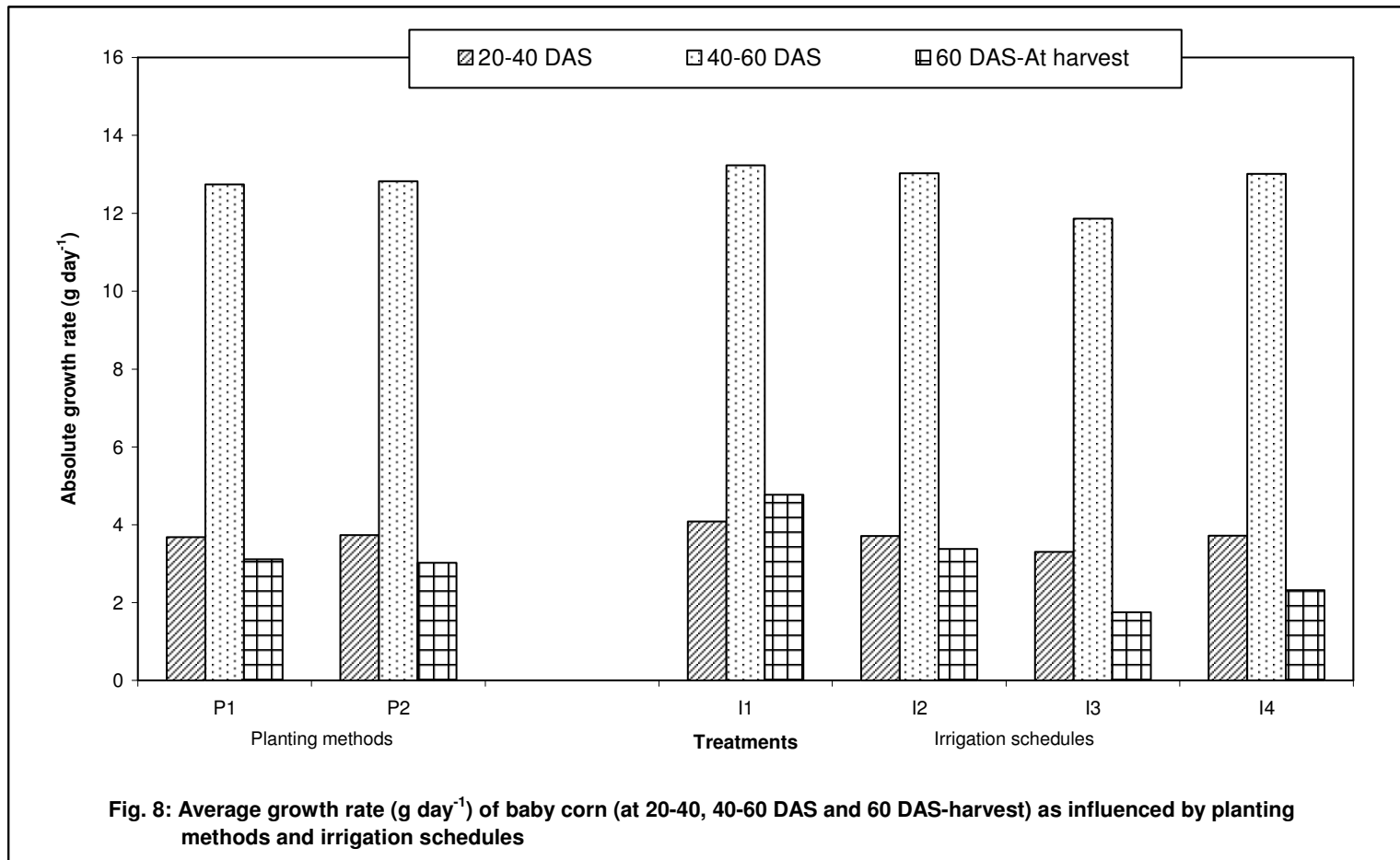


Fig. 8: Average growth rate (g day⁻¹) of baby (at 20-40, 40-60 DAS and 60 DAS – harvest) as influenced by planting methods and irrigation schedule

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

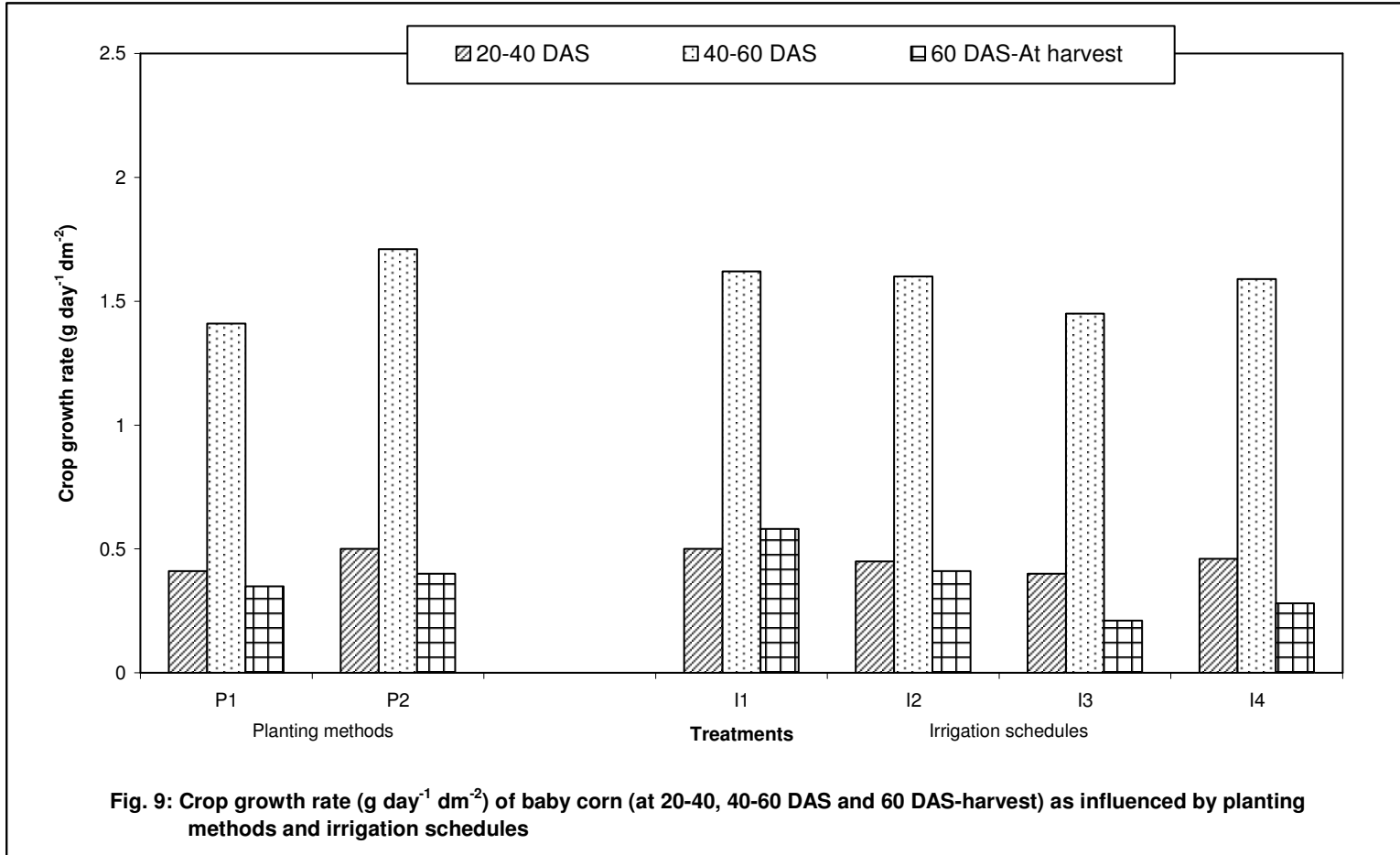


Fig. 9: Crop growth rate (g day⁻¹ dm⁻²) of baby corn (at 20-40, 40-60 DAS and 60 DAS – harvest) as influenced by planting methods and irrigation schedules

Table 10. Stem girth of baby corn (at 40, 60 DAS and at harvest) as influenced by planting methods and irrigation schedule

Treatments	Stem girth (cm plant ⁻¹)		
	40 DAS	60 DAS	At harvest
A. Planting method			
P ₁ : 37.5 cm × 24 cm (Single row)	6.95	7.52	7.91
P ₂ : 25-50-25 cm × 20 cm (Paired row)	6.98	7.63	8.01
SEm _±	0.13	0.14	0.13
CD at 5%	NS	NS	NS
B. Irrigation schedules			
I ₁ : Drip at 100% PE	7.45	8.43	8.80
I ₂ : Drip at 75% PE	6.72	7.60	8.27
I ₃ : Drip at 50% PE	6.42	6.85	6.88
I ₄ : Surface irrigation	7.28	7.60	7.88
SEm _±	0.18	0.20	0.19
CD at 5%	0.54	0.61	0.56
C. Interaction A × B			
SEm _±	0.25	0.28	0.26
CD at 5%	NS	NS	NS

DAS : Days after sowing

NS : Non-significant

significantly highest crop growth rate (0.50) over surface irrigation (0.46), 75% PE (0.45) and 50% PE (0.40 g day⁻¹ dm⁻²). Surface irrigation and 75% PE were on par and together were significantly superior over 50% PE. Significantly lowest crop growth rate was observed in 50% PE. Similar trend was noticed at 40-60 DAS except that 100% PE, 75% PE and surface irrigation were on par. At 60 DAS to harvest, drip irrigation scheduled at 100% PE recorded highest crop growth rate (0.58) over 75% PE (0.41), surface irrigation (0.28) and 50% PE (0.21 g day⁻¹ dm⁻²). Similarly, 75% PE was significantly superior over surface irrigation and 50% PE and significantly lower crop growth rate was observed in 50% PE.

The interaction effect of planting methods and irrigation schedules on crop growth rate was not significant at all the growth stages of the crop.

4.1.13 Harvest index

The data pertaining to harvest index of baby corn as influenced by planting methods and irrigation schedules are given in Table 10.

The harvest index was not affected significantly by planting methods.

Irrigation schedules affected the harvest index significantly. Significantly highest harvest index was noticed in drip irrigation scheduled at 50% PE (0.16) over 75% PE (0.13), surface irrigation (0.13) and 100% PE (0.12). However, 75% PE, surface irrigation and 100% PE were on par and the lowest harvest index was observed in 100% PE.

4.2 YIELD COMPONENTS

The data pertaining to yield components like husked baby length, husked baby girth, number of babies plant⁻¹, husked baby corn yield plant⁻¹ and green fodder yield plant⁻¹ are presented in Table 11, depicted in Fig. 10 and Plate 2.

4.2.1 Husked baby length (cm)

The husked baby length was not affected significantly by planting methods at harvest.

Irrigation schedules affected the length of husked baby significantly at harvest. Significantly highest length of husked baby was noticed in drip irrigation scheduled at 100% PE (21.77) over 75% PE (18.72), surface irrigation (18.48) and 50% PE (16.15 cm). Drip irrigation scheduled at 75% PE was on par with surface irrigation. Significantly lowest length of husked baby was noticed in drip irrigation scheduled at 50% PE.

The interaction effect of planting methods and irrigation schedules on length of husked baby was not significant at harvest.

4.2.2 Husked baby girth (cm)

The husked baby girth was not affected significantly by planting methods at harvest.

Irrigation scheduled affected the girth of husked baby significantly at harvest. Significantly highest girth of husked baby was noticed in drip irrigation scheduled at 100% PE (11.58) over surface irrigation (9.82), 75% PE (9.73) and 50% PE (7.72 cm). However, 75% PE and surface irrigation were at par. Significantly lowest husked baby girth was noticed in drip irrigation scheduled at 50% PE.

The interaction effect of planting methods and irrigation schedules on girth of husked baby yield was not significant at harvest.

4.2.3 Number of babies plant⁻¹

The number of babies plant⁻¹ was not affected significantly by planting methods at harvest.

The number of babies plant⁻¹ was influenced significantly by irrigation schedules. Significantly highest number of babies plant⁻¹ was noticed in drip irrigation scheduled at 100% PE (1.91) over 75% PE (1.64) and 50% PE (1.39) plant⁻¹, but was on par with surface

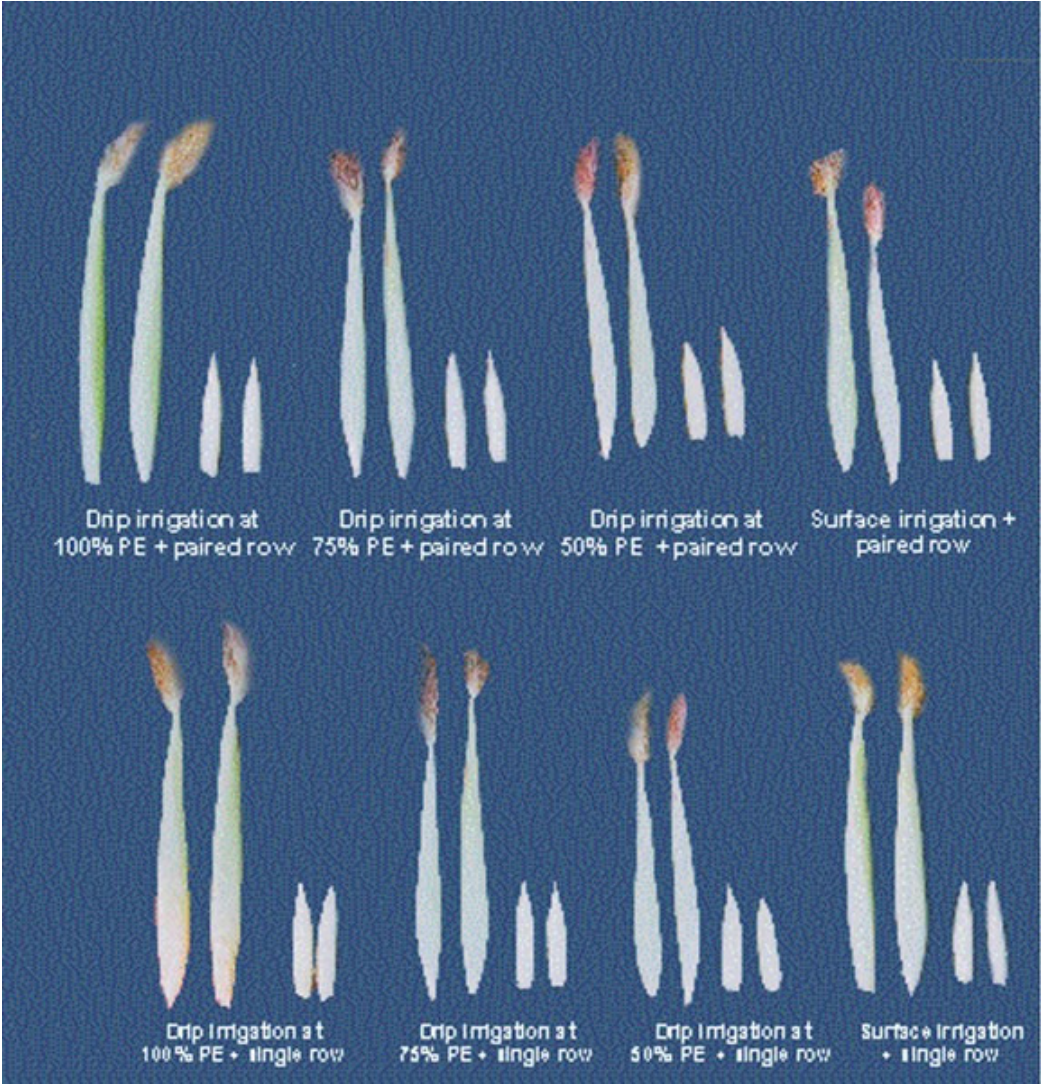


Plate 2: Effect of different treatment combination on baby corn

irrigation. Significantly lowest number of babies was observed in drip irrigation scheduled at 50% PE.

The interaction effects of planting methods and irrigation schedules on number of babies plant⁻¹ were not significant at harvest.

4.2.4 Husked baby yield (g plant⁻¹)

The husked baby yield was not affected significantly by planting methods at harvest.

Irrigation schedules affected the husked baby yield significantly at harvest. Significantly highest husked baby yield was observed in drip irrigation scheduled at 100% PE (69.93) over surface irrigation (64.55), 75% PE (64.33) and 50% PE (59.18 g plant⁻¹). Surface irrigation and drip irrigation scheduled at 75% PE were on par. Significantly lowest husked baby yield was noticed in drip irrigation scheduled at 50% PE.

The interaction effect of planting methods and irrigation schedules on husked baby yield was not significant at harvest.

4.2.5 Green fodder yield (g plant⁻¹)

The planting method was not influenced by green fodder yield significantly at harvest.

Irrigation scheduled affected the green fodder yield significantly at harvest. Significantly highest green fodder yield was noticed in drip irrigation schedules at 100% PE (543.60) over surface irrigation (418.13), 75% PE (417.55) and 50% PE (310.95 g plant⁻¹). However, surface irrigation and drip irrigation scheduled at 75% PE were at par. Significantly lowest green fodder yield was observed in drip irrigation scheduled at 50% PE.

The interaction effect of planting methods and irrigation schedules on green fodder yield was not significant at harvest.

4.3 HUSKED BABY YIELD AND GREEN FODDER YIELD

The data pertaining to husked baby yield (q ha⁻¹), green fodder yield (t ha⁻¹) and harvest index of baby corn as influenced by planting methods and irrigation scheduled are given in Table 12.

4.3.1 Husked baby yield (q ha⁻¹)

The planting methods influenced significantly the husked baby yield at harvest. Significantly highest husked baby yield was recorded in paired row planting (86.39) over normal row planting (71.34 q ha⁻¹) (Fig. 11).

Irrigation schedules affected the husked baby yield significantly at harvest. Significantly highest husked baby corn yield was observed in drip irrigation scheduled at 100% PE (85.53) over surface irrigation (78.92), 75% PE (78.66) and 50% PE (72.36 q ha⁻¹). Surface irrigation recorded significantly higher husked baby corn yield over 50% PE, but was on par with 75% PE. Significantly lowest husked baby corn yield was noticed in 50% PE.

The interaction effect of planting methods and irrigation schedules on husked baby corn yield was not significant at harvest.

4.3.2 Green fodder yield (Mg ha⁻¹)

The planting methods influenced significantly the green fodder yield at harvest. The paired row planting recorded significantly higher green fodder yield (56.45) over normal row planting (46.27 Mg ha⁻¹) at harvest.

Irrigation schedules influenced the green fodder yield significantly at harvest. Significantly highest green fodder yield was noticed in drip irrigation scheduled at 100% PE (65.14) over surface irrigation (51.12), 75% PE (51.04) and 50% PE (38.01 Mg ha⁻¹). However, surface irrigation was on par with 75% PE and together were significantly superior over 50% PE. Significantly lowest green fodder yield was observed in 50% PE at harvest.

Table 11. Yield component of baby corn (at harvest) as influenced by planting methods and irrigation schedules

Treatments	Husked baby corn length (cm)	Husked baby corn girth (cm)	No. of babies per plant	Husked baby corn yield (g plant ⁻¹)	Green fodder yield (g plant ⁻¹)
	At harvest				
A. Planting method					
P ₁ : 37.5 cm × 24 cm (Single row)	18.73	9.60	1.69	64.21	421.73
P ₂ : 25-50-25 cm × 20 cm (Paired row)	18.83	9.83	1.71	64.79	423.38
SEm±	0.52	0.23	0.03	1.12	6.36
CD at 5%	NS	NS	NS	NS	NS
B. Irrigation schedules					
I ₁ : Drip at 100% PE	21.77	11.58	1.91	69.93	543.60
I ₂ : Drip at 75% PE	18.72	9.73	1.64	64.33	417.55
I ₃ : Drip at 50% PE	16.15	7.72	1.39	59.18	310.95
I ₄ : Surface irrigation	18.48	9.82	1.86	64.55	418.13
SEm±	0.73	0.33	0.04	1.58	8.99
CD at 5%	2.23	0.99	0.11	4.79	27.28
C. Interaction A × B					
SEm±	1.04	0.46	0.05	2.23	12.72
CD at 5%	NS	NS	NS	NS	NS

NS : Non-significant

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

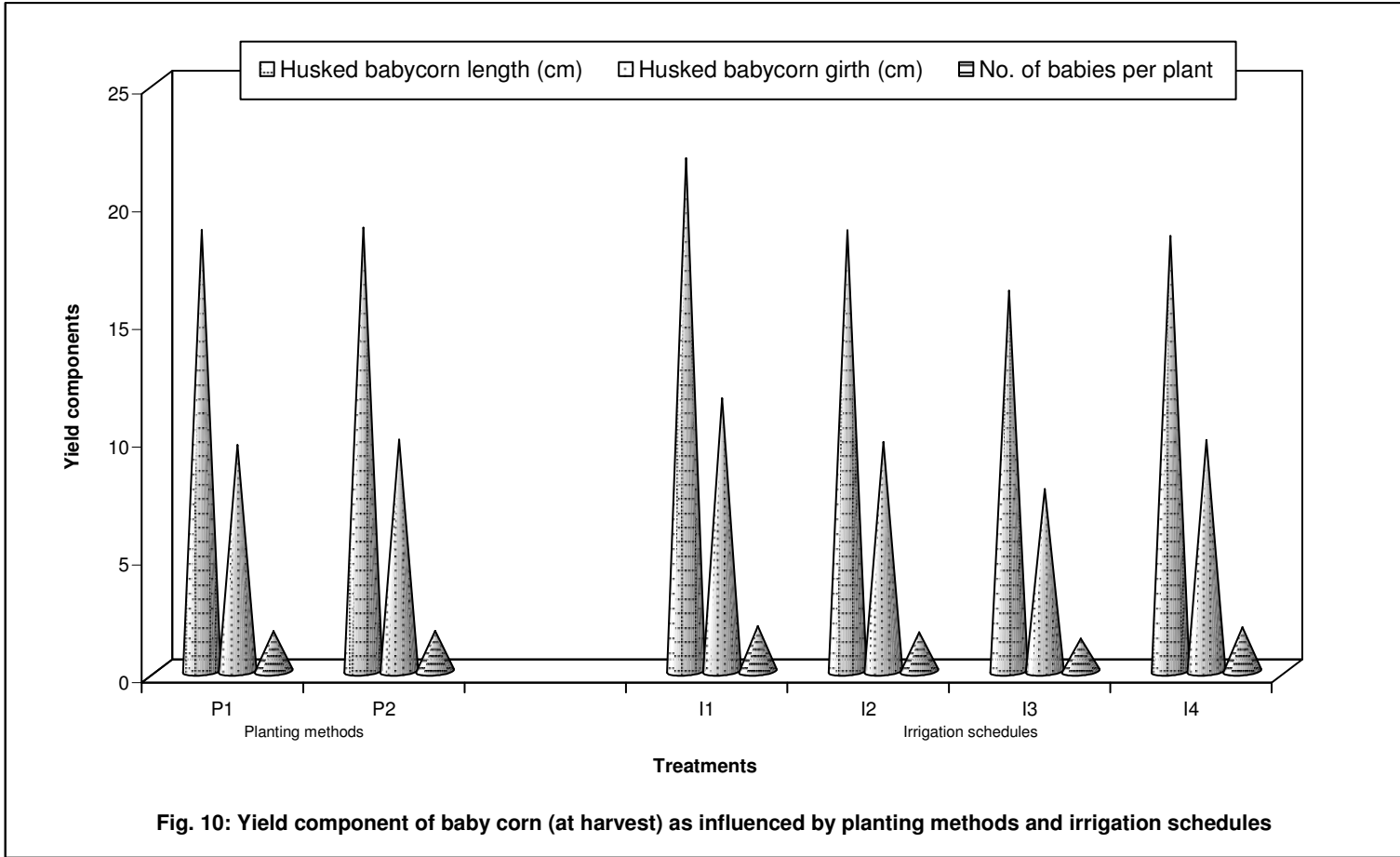


Fig. 10: Yield component of baby corn (at harvest) as influenced by planting methods and irrigation schedules

Table 12. Husked baby corn ($q\ ha^{-1}$) and green fodder yield ($t\ ha^{-1}$) as influenced by planting methods and irrigation schedules

Treatments	Husked baby corn yield ($q\ ha^{-1}$)	Green fodder yield ($Mg\ ha^{-1}$)
A. Planting method		
P ₁ : 37.5 cm × 24 cm (Single row)	71.34	46.20
P ₂ : 25-50-25 cm × 20 cm (Paired row)	86.39	56.45
SEm±	1.22	1.06
CD at 5%	3.70	3.21
B. Irrigation schedules		
I ₁ : Drip at 100% PE	85.53	65.14
I ₂ : Drip at 75% PE	78.66	51.04
I ₃ : Drip at 50% PE	72.36	38.01
I ₄ : Surface irrigation	78.92	51.12
SEm±	1.72	1.50
CD at 5%	5.23	4.54
C. Interaction A × B		
SEm±	2.44	2.12
CD at 5%	NS	NS

NS : Non-significant

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

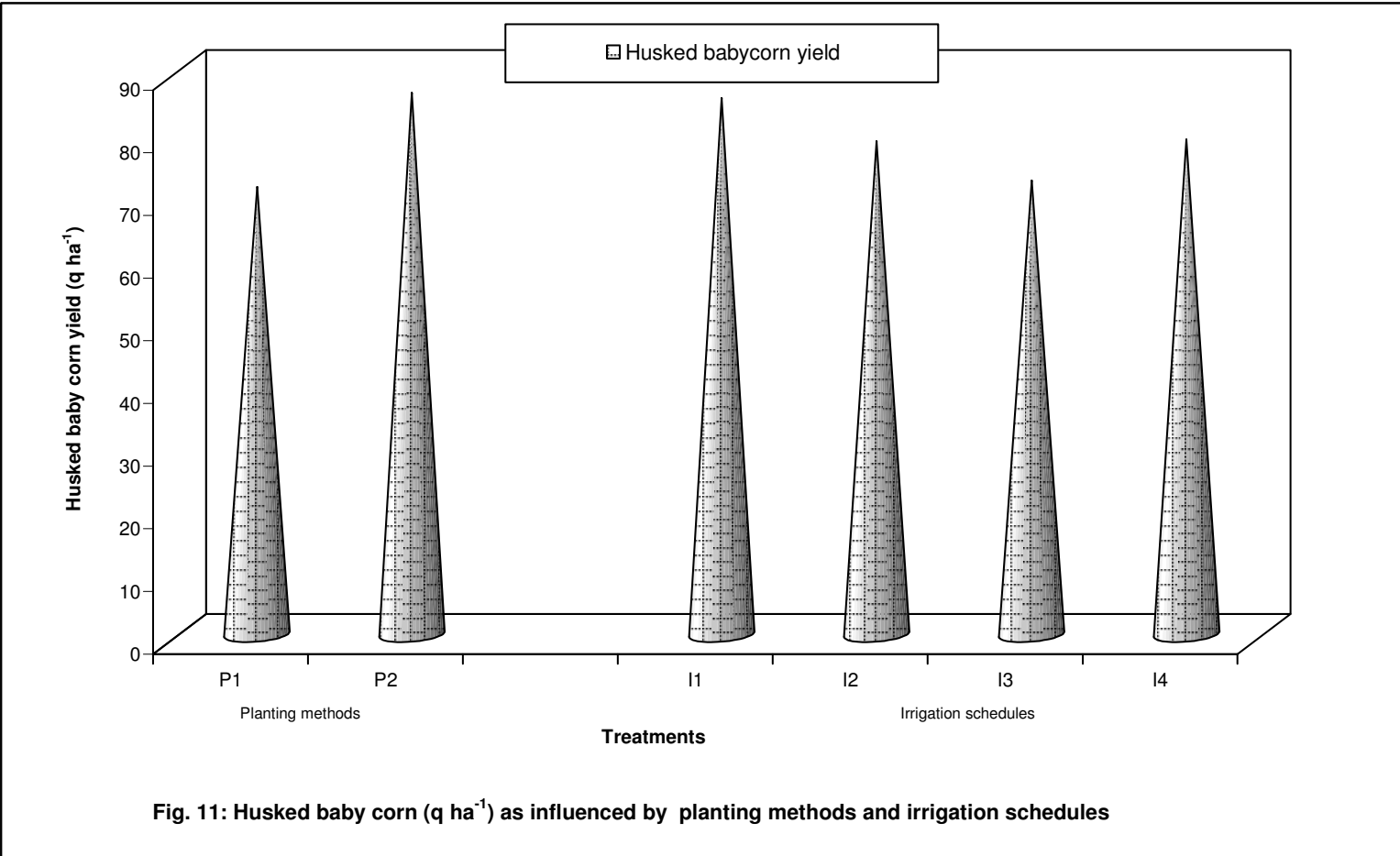


Fig. 11: Husked baby corn (q ha⁻¹) as influenced by planting methods and irrigation schedules

Fig. 11: Husked baby corn (q ha⁻¹) as influenced by planting methods and irrigation schedules

Table 13. Crude protein (%), crude fibre (%) and reducing sugar (mg 100 g⁻¹) of baby corn at harvest as influenced by planting methods and irrigation schedules

Treatments	Crude protein (%)	Crude fibre (%)	Reducing sugar (mg 100 ⁻¹ g)
A. Planting method			
P ₁ : 37.5 cm × 24 cm (Single row)	14.34	3.57	55.97
P ₂ : 25-50-25 cm × 20 cm (Paired row)	14.47	3.58	57.09
SEm±	0.27	0.08	1.00
CD at 5%	NS	NS	NS
B. Irrigation schedules			
I ₁ : Drip at 100% PE	16.73	3.20	47.54
I ₂ : Drip at 75% PE	14.23	3.55	54.07
I ₃ : Drip at 50% PE	12.52	3.96	70.95
I ₄ : Surface irrigation	14.14	3.58	53.55
SEm±	0.38	0.18	1.41
CD at 5%	1.15	0.33	4.28
C. Interaction A × B			
SEm±	0.54	0.15	1.99
CD at 5%	NS	NS	NS

NS : Non-significant

The interaction effect of planting methods and irrigation schedules on green fodder yield was not significant at harvest.

4.4 QUALITY PARAMETERS

The data related to crude protein, crude fibre and reducing sugars of baby corn as influenced by planting methods and irrigation schedules are furnished in Table 13 and depicted in Fig. 12.

4.4.1 Crude protein (%)

The planting methods did not influence the crude protein (%) in baby corn significantly at harvest.

Irrigation scheduled affected significantly the crude protein at harvest. Significantly highest crude protein was noticed in drip irrigation scheduled at 100% PE (16.73) over 75% PE (14.23), surface irrigation (14.14) and 50% PE (12.52%). In turn, drip irrigation scheduled at 75% PE and surface irrigation were on par. Significantly lowest crude protein (%) was observed in drip irrigation scheduled at 50% PE at harvest.

The interaction effects of planting methods and irrigation schedules on crude protein (%) was not significant at harvest.

4.4.2 Crude fibre (%)

The planting methods did not influence the crude fibre (%) in baby corn significantly at harvest.

Irrigation scheduled affected significantly the crude fibre at harvest. Significantly highest crude fibre was noticed in drip irrigation scheduled at 50% PE (3.96) over surface irrigation (3.57), drip irrigation scheduled at 75% PE (3.55) and 100% PE (3.20%). In turn, drip irrigation scheduled at 75% PE and surface irrigation were on par. Significantly lowest crude fibre (%) was observed in drip irrigation scheduled at 100% PE at harvest.

The interaction effects of planting methods and irrigation schedules on crude fibre (%) were not significant at harvest.

4.4.3 Reducing sugar (mg 100 g⁻¹)

The reducing sugar (mg 100 g⁻¹) was not affected significantly by planting methods at harvest.

The reducing sugar content was influenced significantly by irrigation schedules at harvest. Significantly highest reducing sugar (70.95) was observed in drip irrigation scheduled at 50% PE over 75% PE (54.07), surface irrigation (53.55) and 100% PE (47.54 mg 100 g⁻¹). Surface irrigation and 75% PE were on par and significantly lowest reducing sugar content was observed in drip irrigation scheduled at 100% PE.

The interaction effects of planting methods and irrigation schedules on reducing sugar content (mg 100 g⁻¹) were not significant at harvest.

4.5 PLANT WATER STATUS

The data on leaf water potential (bars) and relative water content (%) of baby corn at various growth stages (20, 40 and 60 DAS) as influenced by planting methods and irrigation schedules are furnished in Table 15 and illustrated in Fig. 13.

4.5.1 Leaf water potential (MPa)

The leaf water potential (bars) was not influenced significantly by planting methods at different growth stages (20, 40 and 60 DAS).

Irrigation schedules influenced significantly leaf water potential at all growth stages of crop. At 20 DAS significantly highest leaf water potential (10.93) was observed in surface

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

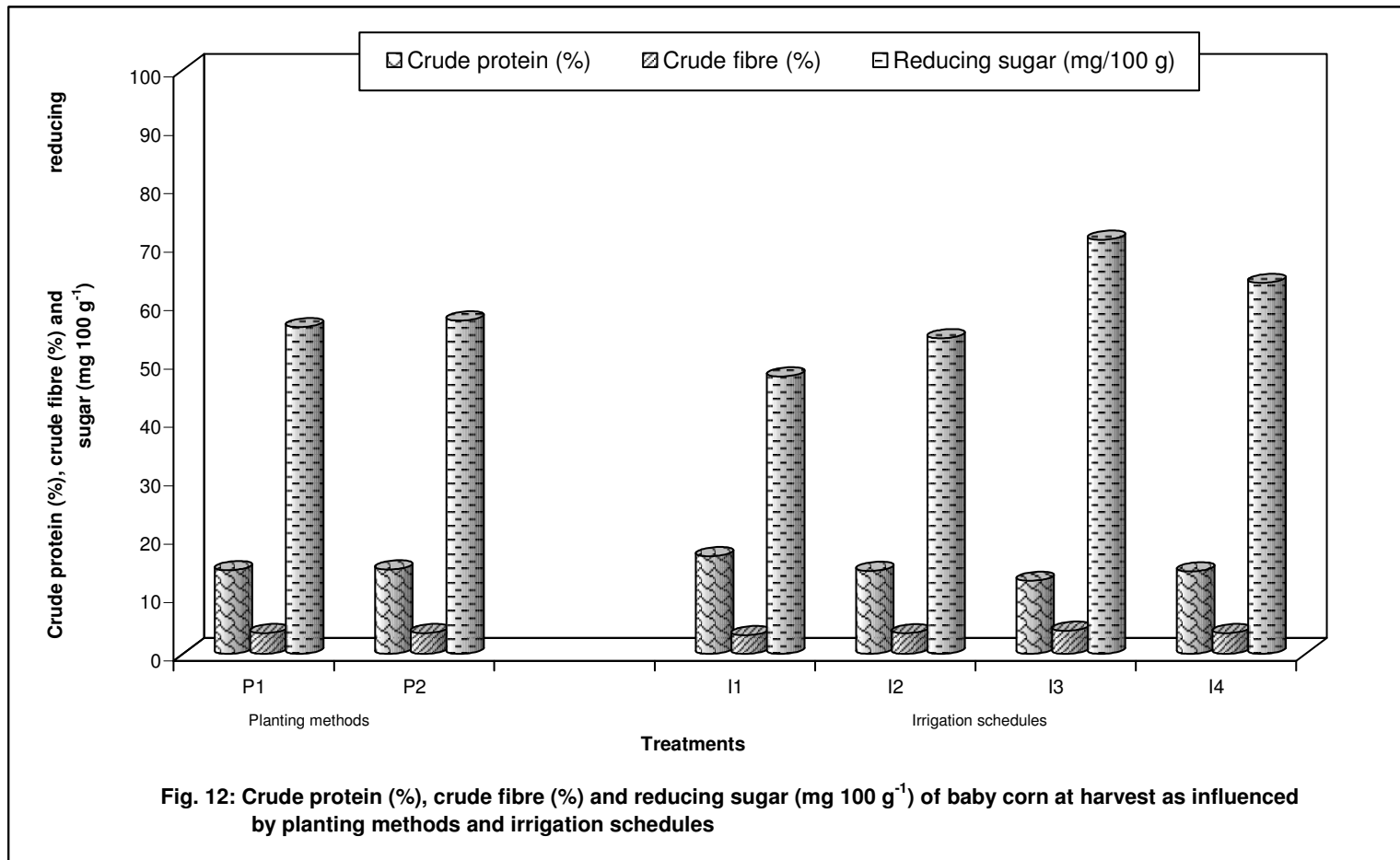


Fig. 12: Crude protein (%), crude fibre (%) and reducing sugar (mg 100 g⁻¹) of baby corn at harvest as influenced by planting methods and irrigation schedules

Table 14. Leaf water potential (bar) and relative leaf water content (%) of baby corn (at 20, 40 and 60 DAS) as influenced by planting methods and irrigation schedules

Treatments	Leaf water potential (MPa)			Relative leaf water content (%)		
	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS
A. Planting method						
P ₁ : 37.5 cm × 24 cm (Single row)	9.41	8.20	9.41	86.20	81.73	78.27
P ₂ : 25-50-25 cm × 20 cm (Paired row)	9.46	8.30	9.46	83.86	78.69	75.51
SEm±	0.14	0.13	0.14	1.40	1.28	1.25
CD at 5%	NS	NS	NS	NS	NS	NS
B. Irrigation schedules						
I ₁ : Drip at 100% PE	7.78	6.50	7.78	95.31	90.70	88.25
I ₂ : Drip at 75% PE	9.08	7.82	9.08	85.92	81.21	78.36
I ₃ : Drip at 50% PE	9.98	9.10	9.98	76.63	72.09	68.62
I ₄ : Surface irrigation	10.93	9.58	10.93	82.25	76.84	72.34
SEm±	0.20	0.18	0.20	1.97	1.80	1.77
CD at 5%	0.61	0.56	0.61	5.99	5.47	5.38
C. Interaction A × B						
SEm±	0.28	0.26	0.28	2.79	2.55	2.51
CD at 5%	NS	NS	NS	NS	NS	NS

DAS : Days after sowing

NS : Non-significant

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

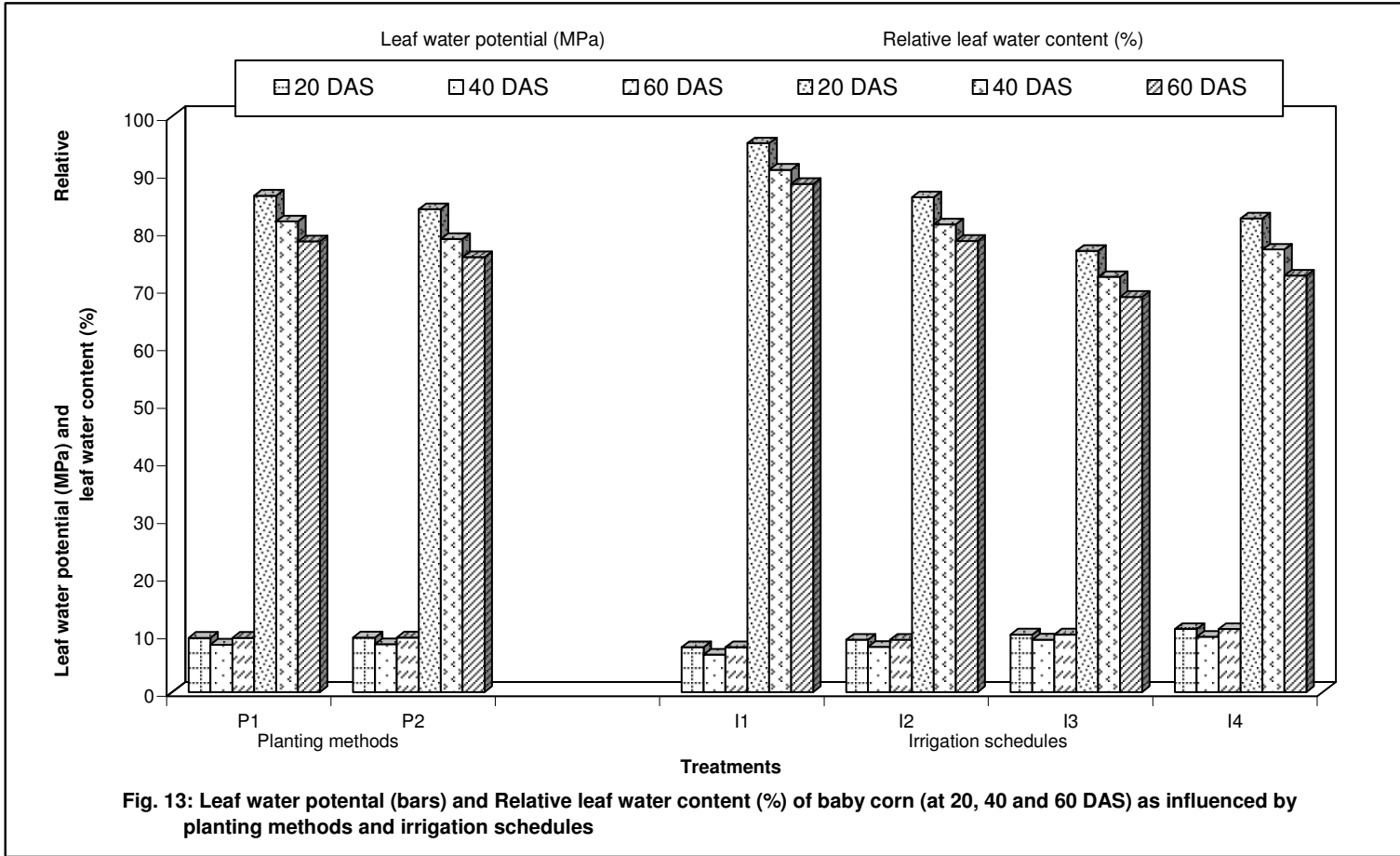


Fig. 13: Leaf water potential (bars) and Relative leaf water content (%) of baby corn (at 20, 40 and 60 DAS) as influenced by planting methods and irrigation schedules

irrigation over drip irrigation scheduled at 50% PE (9.98), 75% PE (9.08) and 100% PE (7.78 MPa). In turn, drip irrigation scheduled at 50% PE was significantly superior over 75% PE and 100% PE. Significantly lower leaf water potential was observed in 100% PE. The similar trend was observed at 40 and 60 DAS as that of 20 DAS except that at 40 DAS, surface irrigation and 50% PE were on par.

The interaction effect of planting methods and irrigation schedules on leaf water potential at various growth stages was not found significantly.

4.5.2 Relative leaf water content (%)

The relative leaf water content (%) was not influenced significantly by planting methods at different growth stages (20, 40 and 60 DAS).

The relative leaf water content was significantly influenced by irrigation schedules at various growth stages. At 20 DAS, irrigation schedule at 100% PE recorded significantly higher relative leaf water content (95.31) over 75% PE (85.92), surface irrigation (82.25) and 50% PE (76.63%). However, 75% PE and surface irrigations were on par and significantly lowest relative leaf water content was observed in 50% PE. At 40 and 60 DAS, similar trend was observed as that of 20 DAS except that at 60 DAS 75% PE was significantly superior over surface irrigation.

The interaction effect of planting methods and irrigation schedules on relative leaf water content at various growth stages was not significant.

4.6 WATER USE STUDIES

The data on total water use (mm) and water use efficiency (kg ha-mm^{-1}) of baby corn as influenced by planting methods and irrigation schedules are furnished in Table 16.

4.6.1 Water use efficiency of husked baby corn (kg ha-mm^{-1})

The planting methods influenced water use efficiency of husked baby corn (kg ha-mm^{-1}) significantly. Paired row planting recorded significantly higher water use efficiency of husked baby corn (23.05) over normal row planting ($19.04 \text{ kg ha-mm}^{-1}$).

Irrigation schedules influenced the water use efficiency of husked baby corn significantly. Significantly highest water use efficiency of husked baby corn was observed in drip irrigation scheduled at 50% PE (28.97) over 75% PE (22.70), 100% PE (19.31) and surface irrigation ($13.23 \text{ kg ha-mm}^{-1}$). Significantly lowest water use efficiency of husked baby corn was noticed in surface irrigation.

The interaction effects of planting methods and irrigation schedules on water use efficiency of husked baby corn was not significant.

4.7 ECONOMIC ANALYSIS

The data showing cost of cultivation, gross and net returns and B:C ratio of baby corn as influenced by planting methods and irrigation scheduled are presented in Table 17.

4.7.1 Cost of cultivation

Paired row planting recorded higher cost of cultivation (Rs. 17591) over normal row planting.

High cost of cultivation was recorded in drip irrigation scheduled at 100% PE, 75% PE and 50% PE (Rs. 18391) and lower cost of cultivation was recorded in surface irrigation (Rs. 14391 ha^{-1}).

4.7.2 Gross returns

The total gross returns influenced by planting methods significantly. Paired row planting recorded significantly higher gross returns (Rs. 108885) over normal row planting (Rs. 89618 ha^{-1}).

Table 15. Water applied, effective rainfall and water use efficiency of husked baby corn at harvest as influenced by planting methods and irrigation schedules

Treatments	Depth of common irrigation (mm)	Effective rainfall (mm)	Irrigation schedule (mm)	Total water used (mm)	Water use efficiency of husked baby (kg ha-mm ⁻¹)
A. Planting method					
P ₁ : 37.5 cm × 24 cm (Single row)					19.04
P ₂ : 25-50-25 cm × 20 cm (Paired row)					23.05
SEm±					0.37
CD at 5%					1.12
B. Irrigation schedules					
I ₁ : Drip at 100% PE	50.00	6.60	386.40	443.00	19.31
I ₂ : Drip at 75% PE	50.00	6.60	289.80	346.00	22.70
I ₃ : Drip at 50% PE	50.00	6.60	193.20	250.00	28.97
I ₄ : Surface irrigation	50.00	6.60	540.00	597.00	13.23
SEm±					0.52
CD at 5%					1.58
C. Interaction A × B					
SEm±					0.77
CD at 5%					NS

NS : Non-significant

Table 16. Cost of cultivation, gross returns, net returns and B.C ratio of baby corn at harvest as influenced by planting methods and irrigation schedules

Treatments	Cost of cultivation (Rs. ha ⁻¹)	Gross returns (Rs. ha ⁻¹)			Net returns (Rs. ha ⁻¹)	B:C ratio
		Husked baby corn	Green fodder	Total		
A. Planting method						
P ₁ : 37.5 cm × 24 cm (Single row)	20491	64208	25410	89618	69127	3.41
P ₂ : 25-50-25 cm × 20 cm (Paired row)	21241	77837	31047	108885	87727	4.16
SEm±		1099	582	1491	1505	0.07
CD at 5%		3332	1767	4524	4564	0.21
B. Irrigation schedules						
I ₁ : Drip at 100% PE	21866	77141	35826	112967	91101	4.12
I ₂ : Drip at 75% PE	21866	70793	28071	98864	77164	3.56
I ₃ : Drip at 50% PE	21866	66126	20905	86030	64164	2.93
I ₄ : Surface irrigation	17866	71030	28114	99144	81278	4.54
SEm±		1554	824	2109	2128	0.10
CD at 5%		4712	2499	6397	6454	0.30
C. Interaction A × B						
SEm±		2197	1165	2983	3009	0.14
CD at 5%		NS	NS	NS	NS	NS

NS : Non-significant

Note : Market price of husked baby corn is Rs. 9 kg⁻¹, fodder is Rs. 550 t⁻¹, Cost of drip system – drip system has considered life span of 10 years and three crops per year along with maintenance cost of Rs. 800 year⁻¹. Total cost of drip system is Rs. 4000 per crop season

LEGEND

A. Planting method

P₁ : 37.5 cm x 24 cm (Single row)

P₂ : 25-50-25 cm x 20 cm (Paired row)

B. Irrigation schedules

I₁ : Drip at 100% PE

I₂ : Drip at 75% PE

I₃ : Drip at 50% PE

I₄ : Surface irrigation

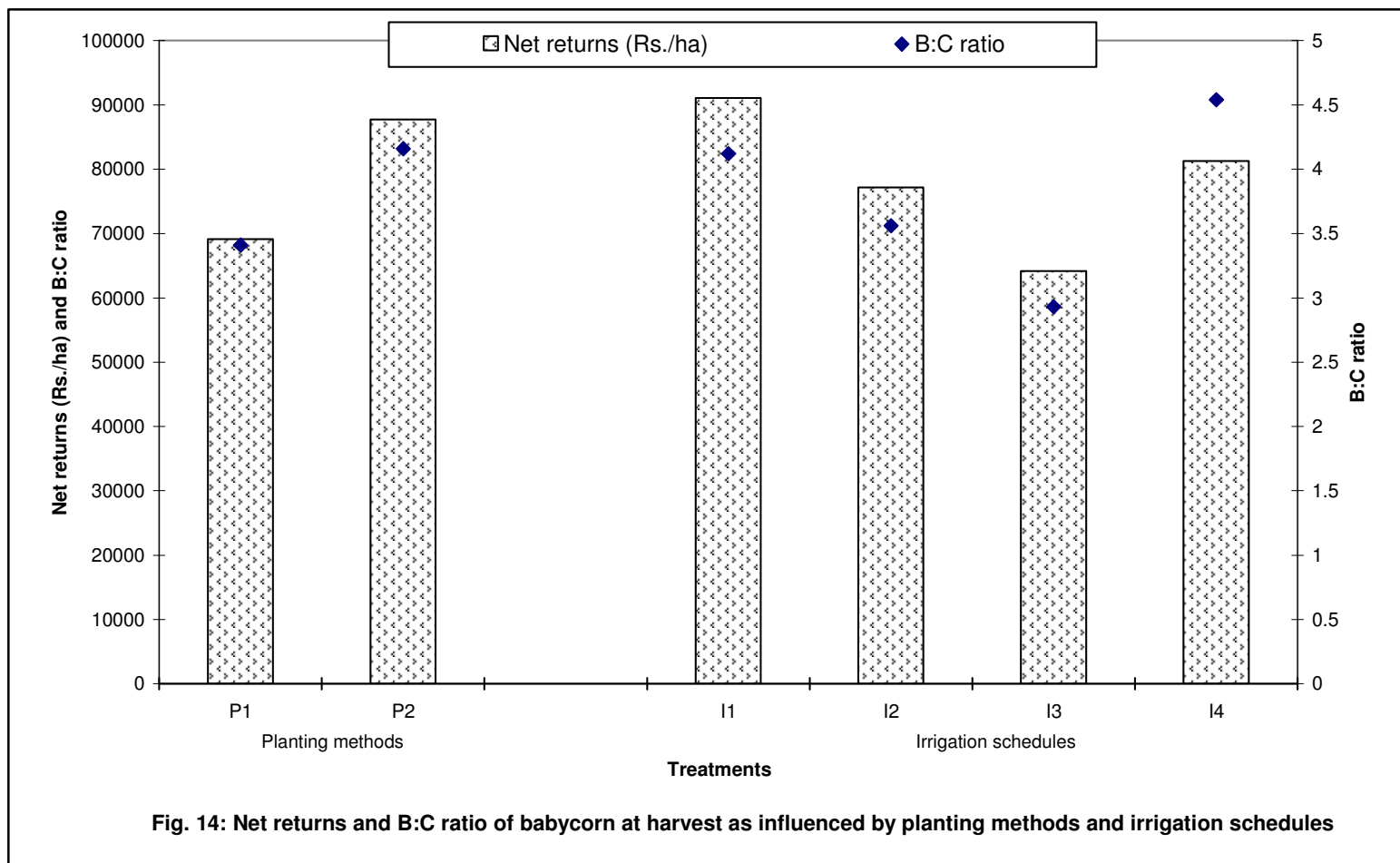


Fig. 14: Net returns and B:C ration of babycorn at harvest as influenced by planting methods and irrigation schedules

The gross returns influenced by irrigation schedules significantly. Significantly highest gross returns was observed in drip irrigation scheduled at 100% PE (Rs. 112967) over surface irrigation (Rs. 99144), 75% PE (Rs. 98864) and 50% PE (Rs. 86030 ha⁻¹). However, surface irrigation and 75% PE were on par. Significantly lowest gross returns was observed in drip irrigation at 100% PE.

The interaction effects of planting methods and irrigation schedules on gross returns were not significant.

4.7.3 Net returns

Planting method influenced significantly the net returns. Paired row planting method recorded significantly highest net returns (Rs. 87727) over normal row planting (Rs. 69127) (Fig. 14).

Irrigation schedules influenced the net returns significantly. Drip irrigation scheduled at 100% PE recorded significantly highest net returns (Rs. 91101) over surface irrigation (Rs. 81278), 75% PE (Rs. 77164) and 50% PE (Rs. 64164). Wherein, surface irrigation and 75% PE were on par. Significantly lowest net returns was recorded in drip irrigation scheduled at 50% PE.

The interaction effects of planting methods and irrigation schedules on net returns were not significant.

4.7.4 B:C ratio

The B:C ratio influenced significantly by planting methods. Paired row planting recorded significantly highest B:C ratio (4.16) over normal row planting (3.41) (Fig. 14).

The B:C ratio influenced by irrigation schedules significantly. Surface irrigation recorded significantly higher B:C ratio (4.54) over drip irrigation scheduled at 100% PE (4.12), 75% PE (3.56) and 50% PE (2.93). Significantly lowest B:C ratio was recorded in drip irrigation scheduled at 50% PE.

The interaction effects of planting methods and irrigation schedules on B:C ratio were not significant.

4.8 CORRELATION STUDIES

The data showing correlation study between husked baby corn yield and growth components like dry weight of husked baby, number of babies, husked baby girth, husked baby length, total dry weight, leaf area index, leaf area, number of leaves and plant height are presented in Table 18.

There was positive and significant correlation between husked baby corn yield and growth components.

Table 17. Correlation coefficient (r) between husked baby corn yield and growth and yield components of baby corn as influenced by planting methods and irrigation schedules

Characters	Correlation coefficient (r)
Plant height (cm)	0.64099**
No. of leaves plant ⁻¹	0.74311**
Total dry weight plant ⁻¹	0.78234**
Leaf area (cm ²)	0.74879**
Leaf area index	0.49231*
Husked baby length (cm)	0.41229*
Husked baby girth (cm)	0.53677**
Dry weight of husked baby (g)	0.64434**
No of babies plant ⁻¹	0.59845**

* - Significant at 5% level

** - Significant at 1%

V. DISCUSSION

The results from the field experiment conducted on “Response of baby corn to planting methods and irrigation schedules under drip” conducted at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during early summer 2005 are discussed in this chapter.

5.1 WEATHER AND CROP GROWTH

The monthly average of the meteorological data recorded during cropping period December 2004 – March 2005 at meteorological observatory of the Main Agricultural Research Station, Dharwad are presented in Table 2 and depicted in Fig. 1.

There was very less amount of rainfall (6.6 mm) recorded during the cropping period. At the early growth stage (first week of January) 4.8 mm was recorded which was meagre. At the end of January, 1.8 mm of rainfall was recorded. The monthly mean maximum temperature during crop growth period was slightly higher (30.7°C) than the mean of 54 years average (29.15°C).

The mean monthly minimum temperature recorded during cropping season in early growth period (December) was low (12.5°C) as compared to 55 years average (13.44°C). Like-wise, the mean minimum temperature during January (15.0°C) was also low compared to 55 years average (16.23°C). A lower mean relative humidity (44.75%) was observed throughout the growth period (December-March) as compared to the 54 years average (58.7%). As this crop is adopted to tropical and subtropical climate with well distributed seasonal rainfall of 400 mm, and desirable temperature for growth is 21-32°C with permissible limit of lower temperature is 15°C. The minimum and maximum temperature varied during crop growth period from 15-16.3°C and 30.7-33.2°C, respectively, which is with in the desirable range for the optimum crop growth. The overall impact of all weather parameters was favourable for the crop growth and no incidence of major pests and diseases were observed.

Effect of planting method on growth and yield of husked baby corn

Planting methods differed significantly with respect to husked baby corn yield. Paired row planting recorded significantly higher husked baby corn yield (86.39) as compared to normal row planting (71.34 q ha⁻¹) (Table 12). The paired row planting recorded 21.10 per cent increase in baby corn yield over normal row planting. The probable reason for higher husked baby yield is attributed to 20 per cent increase in plant density in paired row planting over normal row planting. The results are in confirmation with the results reported by Sachan and Gangawar (1996) and Lehrsch (2000), who reported higher grain yield of corn due to higher plant density. On the contrary, Vishwanatha *et al.* (2000) reported higher sweet corn yield with normal row planting over paired row planting on red sandy loam soil of Bangalore.

Effect of planting method on green fodder yield

The paired row planting differed significantly with respect to green fodder yield. Paired row planting recorded significantly higher green fodder yield (35.65 Mg ha⁻¹) as compared to normal row planting (46.20 Mg ha⁻¹). The paired row planting recorded 22.19 per cent increase in green fodder yield over normal row planting. This is because of higher plant population in paired row planting (Table 12). These results corroborate the findings of Thakur and Sharma (2000), who observed with an increase in plant density there was increase in green fodder yield.

Effect of planting methods on net returns and B:C ratio

Maximum net returns was realized under paired row planting (Rs. 87727) over normal row planting (Rs. 69127 ha⁻¹) (Table 17). It was because of higher husked baby corn and green fodder yield due to higher plant density in paired row planting. These results corroborate the findings of Balaswamy *et al.* (1986), who observed higher net returns in paired row planting (Rs. 71000) over normal row planting (Rs. 58000 ha⁻¹) in sandy loam soil of Hyderabad. Significantly higher B:C ratio (4.16) was recorded in paired row planting over

normal row planting (3.41). It was because of higher husked baby corn and green fodder yield due to higher plant density. The present results are analogous to those reported by Balaswamy *et al.* (1986) and Vishwanatha *et al.* (2000).

Effect of irrigation schedules on growth and yield of husked baby corn

Economic yield of a crop is the result of many physiological processes under which the crop is grown. Among many factors that govern the crop growth and subsequently the grain yield, water plays an important role in affecting the internal processes, which are governed by the environment. Thus, the microclimate to some extent can be manipulated by proper agronomic practices for achieving higher production. In the present study, the baby corn responded significantly in terms of husked baby corn yield to different drip irrigation schedules. Husked baby corn yield was significantly higher (85.53 q ha^{-1}) (Table 12) in drip irrigation scheduled at 100% PE (Pan evaporation) over surface irrigation (78.92), 75% PE (78.66) and 50% PE (72.36 q ha^{-1}). Significantly lower husked baby corn yield was observed in drip irrigation scheduled at 50% PE. The increase in husked baby corn yield in drip irrigation scheduled at 100% PE was 8.38 per cent over surface irrigation. The increased husked baby corn yield was mainly attributed to significant increase in yield components like husked baby corn yield (g plant^{-1}), husked baby length (cm) and husked baby girth (cm) (Table 11).

The present findings are in accordance with the findings of Vishwanatha *et al.* (2000), who reported maximum grain yield by drip irrigation at 0.8 Epan over 0.4 and 0.6 Epan on red sandy loam soil of Bangalore. Similar findings were also reported by Mahdi *et al.* (2003).

Husked baby corn yield is a manifestation of yield contributing characters *viz.*, husked baby length, husked baby girth and number of babies per plant. In the present experiment, significantly higher husked baby corn yield per plant, husked baby length, husked baby girth were observed in drip irrigation scheduled at 100% PE over surface irrigation (Table 11), which contributed to higher husked baby corn yield in 100% PE. Significant and positive correlation was observed between husked baby corn yield and growth and yield components (Table 17). Many workers have reported a positive relation between yield components *viz.*, leaf area, total dry matter and number of leaves and husked baby yield (Jadhav *et al.*, 1993, Naranga *et al.*, 1999, Hussaini *et al.*, 2001 and Sundar Singh, 2003). Higher husked baby corn yield observed in 100% PE is mainly due to daily irrigation resulting in availability of higher soil moisture in the root zone throughout the crop period which reflected in higher relative leaf water content, growth parameters and dry matter production (Table 7) and subsequently in development of yield components and the husked baby corn yield in the treatment (100% PE). The present findings lend support to the findings of Vishwanatha *et al.* (2000).

The yield components largely depend upon total dry matter production and its distribution to husked baby. In the present study, the total dry matter production differed significantly at 20, 40, 60 DAS and at harvest. Significantly higher dry matter accumulation in husked baby ($51.33 \text{ g plant}^{-1}$) at harvest was noticed in 100% PE over surface irrigation, 75% PE and 50% PE (Table 7). The dry matter accumulation in economic part (husked baby corn) depends on photosynthetic capacity of plant during at its grand growth stages (Stewart *et al.*, 2003).

The photosynthetic activity of plant largely depends on dry matter accumulation in leaf, stem and husked baby corn and leaf area. These parameters (dry matter accumulation in leaf, stem, husked baby corn and leaf area) were higher in drip irrigation scheduled at 100% PE over surface irrigation (Table 5, 6 and 7). These results are in agreement with the results of Balaswamy *et al.* (1986) and Sundar Singh (2001).

More accumulation of dry matter in leaves in 100% PE treatment (Table 5) helped the photosynthetic area to develop and remain active for longer period and was responsible for overall growth of plant. In the present study, the leaf area, leaf area index and leaf area duration remained higher in drip irrigation scheduled at 100% PE compared to rest of the treatments (at all the growth stages) (Table 5 and 10), which clearly indicated the superiority of drip irrigation scheduled at 100% PE over other treatments. The lower moisture availability, in surface irrigation might have hindered the total dry matter production which reflected in

reduced dry matter accumulation in husked baby thus, affecting the economic part (husked baby) formation. In the present study, husked baby corn yield (78.92 q ha^{-1}) was significantly lower in surface irrigation as compared to 100% PE. Significantly higher relative leaf water content (Table 14) was observed in drip irrigation scheduled at 100% PE over other treatments indicating adequacy of soil moisture for crop growth at all the growth stages. Significantly lowest husked baby corn yield in surface irrigation is due to relatively low leaf water content and water potential during crop growth period (Table 14), resulting in the decline in leaf number as well as the leaf area in surface irrigation treatment at all the growth stages (20, 40 and 60 DAS) (Table 4 and 5). Sachan and Gangawar (1996) have indicated that the cell division and cell expansion processes are very sensitive to low moisture and water deficits have marked effect on leaf area.

The decrease in the yield with surface irrigation was due to lower relative leaf water content and water potential at different growth stages (Table 15). Chetti *et al.* (1997) reported that relative water content of leaf decreases with decrease in soil moisture content and results in an increase in leaf temperature and consequently reduction in the sink capacity, which results in decreased net photosynthesis due to increase in the rate of photorespiration resulting in decreased crop growth rate. Thus, the reduced moisture during crop growth period results in closer of stomata to reduce the water loss, which at the same time interferes with the carbon dioxide diffusion, ultimately reducing the photosynthetic rate of the plant. In the present study, the surface irrigation did not receive sufficient irrigation water during crop growth period, resulting in a significant reduction in growth and yield. The leaf expansion rate is one of the important growth character adversely affected by slight decrease in tissue water potential (Muchow *et al.*, 1986).

Plant water deficit affects the corn yield through biomass production. The decrease in husked baby corn yield is proportional to the decrease in accumulated biomass. Water stress affects practically every aspect of plant growth, modifies anatomy, morphology and physiology and biochemistry (Evenari, 1960 and Crafts, 1968). The fundamental physiological processes involved in the growth and development of leaves are cell division and cells expansion. Both the number and volume of cells were reduced in individual leaves as the soil matric potential dropped (Alhedi *et al.*, 1999) (Table 14).

The moisture stress results in reduced cell expansion and photosynthetic leaf area, reducing the crop growth and yield. As a consequence, increase in respiration rate and reduction in photosynthetic rate and thus reduction in dry matter accumulation. This confirms the results of Sridhar and Singh (1989), who reported in maize the increased leaf area per plant, leaf area index, dry weight of leaves, stem, sheath and ear as a result of increased frequency of irrigation from 0.8 to 1.0 IW/CPE ratio with 6 cm depth of water.

Effect of irrigation scheduled on green fodder yield

The drip irrigation scheduled at 100% PE registered higher green fodder yield (65.14 Mg ha^{-1}), which was 27.42 per cent more than surface irrigation (Table 12). The increase in green fodder yield is mainly due to significant increase in dry matter accumulation in leaf and stem and total dry matter production of plant (Table 6 and 7). The present findings are in accordance with Vishwanatha *et al.* (2000), who reported the maximum stover yield by drip irrigation scheduled at 0.8 Epan over 0.4 and 0.6 Epan on red sandy loam soil of Bangalore. Similar findings were also reported by Abu-Awwad (1994) and Mahdi *et al.* (2003).

It is well known fact that under reduced moisture (stress) condition all the growth factors are affected adversely to a great extent. This was evident from the significant reduction in plant height and number of leaves with surface irrigation as compared to drip irrigation scheduled at 100% PE (Table 4). This was the consequence of higher relative plant water content in drip irrigation scheduled at 100% PE over surface irrigation. The reduction in dry matter production was due to relative moisture stress in the surface irrigation (Hariguchi *et al.*, 1986).

The effect of irrigation on quality parameters

Crude protein content was influenced by irrigation schedules. Drip irrigation scheduled at 100% PE recorded significantly higher crude protein content (16.73%) over

surface irrigation (14.14%) (Table 13). It was due to more uniform application of water, which facilitates in production and translocation of assimilates from source to sink. Similar results were reported by Manish Kumar *et al.* (2001) and Sundar Singh (2001), which revealed significantly higher crude protein content in higher levels of IW/CPE ratios. Surface irrigation recorded significantly higher crude fibre content (3.58%) over drip irrigation scheduled 100% PE (3.20%) (Table 13), which may be attributed to the deposition of lignin and cellulose resulting in increased crude fibre content.

Significantly higher reducing sugar was found in surface irrigation (53.55) over drip irrigation scheduled at 100% PE (47.54%) (Table 13). It could be attributed to the fact that during reduced moisture condition, the plant adopts dehydration tolerance by deposition of osmolytes such as sugars (trehalose, mannose and fructose) resulting in higher reducing sugars. This was in agreement with the results of Bharati *et al.* (1997).

Effect of irrigation schedules on water use efficiency of baby corn

The drip irrigation scheduled at 50% PE recorded higher water use efficiency of husked baby corn over drip irrigation scheduled at 75% PE and 100% PE and were better than surface irrigation (Table 15). This was attributed to reduced water loss and more efficient plant water use. These results are in confirmation with Naranga *et al.* (1989), Vishwanath *et al.* (2000), Hussaini *et al.* (2002) and Mahdi *et al.* (2003). Similarly, Sundar Singh *et al.* (2001) reported that irrigation scheduled at 0.5 IW/CPE ratio recorded maximum water use efficiency over 0.75 and 1.00 ratio in sandy clay loam soil.

Effect of irrigation schedules on net returns and B:C ratio

Irrigation schedules differed significantly with respect to net returns. Drip irrigation scheduled at 100% PE recorded higher net returns (Rs. 91101 ha⁻¹) over surface irrigation (Rs. 81278 ha⁻¹) (Table 17). This is attributed to higher baby corn and green fodder yield in this treatment. Surface irrigation recorded highest B:C ratio (4.54) over drip irrigation scheduled at 100% PE (4.12) (Table 17). This was mainly due to reduction in cost of cultivation in surface irrigation. This finding corroborate the findings of Vishwanatha *et al.* (2000), who reported that scheduling of weekly surface irrigation recorded higher B:C ratio in sweet corn on red sandy loam soil of Bangalore.

PRACTICAL APPLICATION OF RESULTS

The results of the experiment indicated that;

1. Paired row planting recorded higher husked baby corn (22%) and green fodder yield (22.19%) over normal row planting.
2. Drip irrigation scheduled at 100% PE was beneficial for realizing higher husked baby corn, green fodder yield, net returns and benefit:cost ratio.
3. Drip irrigation saved 26 per cent irrigation water over surface irrigation.
4. Water use efficiency of husked baby and green fodder yield was higher in paired row planting over normal row planting and drip irrigation scheduled at 50% PE over rest of the treatments.

FUTURE LINE OF WORK

1. The response of baby corn to different plant densities may be studied.

VI. SUMMARY

A field experiment was conducted at the Main Agricultural Research Station, Dharwad during the early summer season of 2004-05 to study the " Response of baby corn to planting methods and irrigation schedules under drip". The study includes two planting methods and four irrigation schedules comprising eight treatment combinations.

The experiment was laid out in a randomized complete block design with factorial concept replicated three times. Irrigation were scheduled based on pan evaporation readings in drip system and weekly in surface irrigation with 6 cm depth of irrigation. The observations on growth, yield components and babycorn yield and quality parameters were recorded at different growth stages of the crop. The salient features of the results are summarized in this chapter.

Drip irrigation scheduled at 100% PE registered significantly higher plant height (191.64 cm), number of leaves (18.00), leaf area (6842.48 cm²), LAI (8.37) and LAD (126.72 days) compared to all other irrigation schedules (75% PE, 50% PE and surface irrigation). Paired row planting recorded significantly higher LAI (8.34) and LAD 127.44 days) than normal row planting (8.68 and 103.06 days, respectively).

Total dry matter production per plant its accumulation in different plant parts did not differ significantly by planting methods at all the growth stages (20, 40, 60 DAS and at harvest). Drip irrigation scheduled at 50% PE recorded significantly lower total dry matter production (332.37 g) and its distribution in leaf, stem and husked baby while drip irrigation scheduled at 100% PE registered significantly higher dry matter (422.96 g) and its accumulation in different plant parts at harvest.

CGR differed significantly due to planting methods at all growth stages. Paired row planting recorded significantly higher CGR (0.40 g day⁻¹ dm⁻²) at 60 DAS to harvest over normal planting (0.35 g day⁻¹ dm⁻²). At 60 DAS to harvest, AGR and CGR differed significantly due to irrigation schedules. Drip irrigation scheduled at 100% PE recorded significantly higher AGR and CGR (4.77 g day⁻¹ and 0.58 g day⁻¹ dm⁻², respectively) over other irrigation schedules.

Length of husked babycorn, girth of husked baby, number of babies per plant, husked yield of babycorn per plant, husked babycorn yield (q ha⁻¹) green fodder yield per plant, green fodder yield (q ha⁻¹) differed significantly due to irrigation schedules. These were higher with drip irrigation scheduled at 100% PE (21.77 cm, 11.58 cm, 1.91, 69.93 g plant⁻¹, 85.53 q ha⁻¹, 543.60 g plant⁻¹ and 651.4 q ha⁻¹, respectively) over other irrigation schedules except with respect to number of babies per plant which was on par with surface irrigation.

Paired row planting recorded significantly higher husked babycorn and green fodder yield (86.39 q ha⁻¹ and 56.45 Mg ha⁻¹) as compared to normal row planting plating (71.34 q ha⁻¹ and 46.20 Mg ha⁻¹, respectively). Drip irrigation scheduled at 100% PE produced significantly higher husked baby corn and green fodder yield (85.53 q ha⁻¹ and 65.14 Mg ha⁻¹, respectively) over other irrigation schedules.

Leaf water potential differed significantly due to irrigation schedules. Drip irrigation scheduled at 100% PE recorded significantly higher leaf water potential (7.78, 6.50 and 7.78 bars) at 20, 40 and 60 DAS, respectively), whereas surface irrigation recorded lower leaf water potential (10.93, 9.58, 10.93 bars at 20, 40 and 60 DAS, respectively), except drip irrigation scheduled at 50% PE (9.10 bars) with which it was on par at 40 DAS. Relative water content varied significantly due to irrigation schedules. Drip irrigation scheduled at 100% PE registered significantly higher relative leaf water content (95.31% 90.70%, 88.25% at 20, 40 and 60 DAS, respectively) over other irrigation levels. Drip at 50% PE recorded significantly lower relative water content (76.63, 72.09 and 68.62% at 20, 40, 60 DAS, respectively) over other irrigation schedules.

Drip irrigation scheduled at 100% PE registered higher crude protein content (16.73%) over all other irrigation schedules, whereas drip at 50% PE recorded lower crude protein content (12.52%) over other irrigation schedules. Drip irrigation scheduled at 50% PE recorded higher crude fibre and reducing sugar (3.96% and 70.95 mg/100 g, respectively),

whereas drip irrigation scheduled at 100% PE recorded lower crude fibre and reducing sugar content (3.20% and 47.54 mg/100 g, respectively).

Higher gross (Rs. 108885 ha⁻¹), net returns (Rs. 87727 ha⁻¹) and benefit:cost ratio (4.16) was observed in paired row planting as compared to normal row planting (Rs. 89618 ha⁻¹, Rs. 69127 ha⁻¹ and 3.41, respectively). Drip irrigation scheduled at 100% PE registered maximum total gross returns (Rs. 112967 ha⁻¹) and net returns (Rs. 91101 ha⁻¹) as compared to other irrigation schedules. Maximum benefit:cost ratio was noticed with surface irrigation (4.54) over all other irrigation schedules.

Total water use ranged from 250 mm in drip irrigation scheduled at 50% PE to 597 mm in surface irrigation.

Paired row planting recorded significantly higher WUE (23.05 kg ha-mm⁻¹) as compared to normal row planting (119.90 kg ha-mm⁻¹). Water use efficiency of husked babycorn was higher in drip irrigation scheduled at 50% (28.97 kg ha-mm⁻¹) as compared to other irrigation schedules. Water use efficiency of husked babycorn was significantly lower in surface irrigation (13.23 kg ha-mm⁻¹) as compared to other irrigation schedules.

Significant and positive correlation was obtained between husked babycorn yield and growth and yield components at harvest.

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* *Originals not seen*

Appendix I. Cost of cultivation

Sl. No.	Particulars	Quantity (ha)	Unit price (Rs.)	Amount (Rs.)
1.	Main pipeline 2½" (20 ft)	10 Nos.	200	2000
2.	Sub-main 2" (20 ft)	17 Nos.	165	2805
3.	Ventury assembly	1 set	1350	1350
4.	A-3 screen filter	1 set	2800	2800
5.	Control valve	5 Nos.	508	2540
6.	Fitting charge	-	-	1000
7.	12 mm C-1 laterals	13300 mt	3.55	47215
8.	12 mm start connectors	133 Nos.	2.00	765
9.	12 mm end cap	133 Nos.	1.70	266
10.	4-LPH drippers	22211	1.70	37759
11.	Electricity charge			1500
	Grand total			1,00,000

Grand total cost (Rs./ha) 1,00,000

a. Life (years) 10

b. Depreciation 10,000

c. Interest (12%) 1200

d. Repairs and maintenance (7-9%) 800

Total cost of drip (b+c+d) 12,000

Three crops per year, so total cost of drip irrigation is 4,000 per crop per season

Contd.....

Sl. No.	Particulars	Price (Rs.)
I.	Land preparation	3105
II.	Inputs	
a.	Seeds	150 kg ⁻¹
III.	Inorganic Fertilizers	
a.	Urea	250 bag ⁻¹ (50 kg)
b.	DAP	490 bag ⁻¹ (50 kg)
c.	MOP	230 bag ⁻¹ (50 kg)
IV.	Organic manures	
a.	FYM	300 tonne ⁻¹
V.	Plant protection	
a.	Endosulfan	300 lit ⁻¹
VI.	Labour charges	
a.	Men	50 day ⁻¹
b.	Women	35 day ⁻¹
c.	Bullock pair with men	200 day ⁻¹
d.	Tractor	350 hr ⁻¹
VII.	Irrigations	30 hour ⁻¹
a.	Drip (men labours – 17)	850
b.	Surface (men labours - 10)	500
VIII.	Harvesting (detasseling, picking)	975
a.	Men labour – 11	-
b.	Women labour - 9	-

Appendix II. Daily pan-evaporation (E_0) and precipitation (P) data during crop growth period at Main Agricultural Research Station, Dharwad

December – 2004			January-2005			February-2005			March-2005		
Date	E_0	P	Date	E_0	P	Date	E_0	P	Date	E_0	P
			01/01	5.5	-	01/02	5.3	-	01/03	7.3	-
			02/01	4.5	-	02/02	4.5	-	02/03	7.4	-
			03/01	4.0	-	03/02	5.0	-	03/03	7.0	-
			04/01	4.4	4.8	04/02	4.6	-	04/03	6.7	-
			05/01	5.6	-	05/02	4.9	-			
			06/01	6.0	-	06/02	4.9	-			
			07/01	6.1	-	07/02	5.6	-			
			08/01	5.0	-	08/02	5.0	-			
			09/01	5.2	-	09/02	6.7	-			
			10/01	5.3	-	10/02	7.5	-			
			11/01	5.2	-	11/02	7.8	-			
			12/01	4.9	-	12/02	7.3	-			
			13/01	6.0	-	13/02	6.7	-			
			14/01	5.2	-	14/02	9.4	-			
			15/01	6.2	-	15/02	8.7	-			
			16/01	4.6	-	16/02	6.7	-			
			17/01	6.0	-	17/02	6.2	-			
			18/01	6.2	-	18/02	8.0	-			
			19/01	4.5	-	19/02	7.5	-			
20/12	4.2	-	20/01	5.3	-	20/02	7.7	-			
21/12	4.5	-	21/01	5.6	-	21/02	7.2	-			
22/12	4.5	-	22/01	6.0	-	22/02	6.7	-			
23/12	3.0	-	23/01	4.8	-	23/02	6.0	-			
24/12	5.0	-	24/01	5.5	-	24/02	6.0	-			
25/12	5.7	-	25/01	4.5	-	25/02	6.3	-			
26/12	5.0	-	26/01	6.0	-	26/02	7.3	-			
27/12	5.5	-	27/01	6.1	-	27/02	7.2	-			
28/12	5.5	-	28/01	4.9	-	28/02	7.8	-			
29/12	4.5	-	29/01	4.5	-						
30/12	4.7	-	30/01	4.8	1.8						
31/12	6.0	-	31/01	3.8	-						

E_0 = Daily pan evaporation (mm day^{-1})

P = Precipitation (mm day^{-1})

RESPONSE OF BABY CORN TO PLANTING METHODS AND IRRIGATION SCHEDULES UNDER DRIP

ANIL KUMAR S. MUGALKHOD 2005

Dr. A. D. JANAWADE
Major Advisor

ABSTRACT

A field experiment was conducted at MARS, UAS, Dharwad during early summer 2004 on clay loam soils to evaluate the planting methods and irrigation schedules under drip. The experiment was laid out in a RBD with factorial concept with three replications and comprised two planting methods and four irrigation schedules.

The results indicated that both the planting methods did not influence the growth, yield parameters and quality parameters. However, paired row planting recorded significantly higher husked baby corn (86.39 q) and green fodder yield (56.45 Mg) over normal row planting (71.34 q and 46.20 Mg).

Among the irrigation schedules, drip at 100% PE recorded significantly higher growth and yield parameters like number of leaves, dry matter production, husked baby corn length, girth and number of babies per plant over drip at 75% PE, 50% PE and surface irrigation. Significantly higher husked baby corn yield (85.53 q/ha) and green fodder yield (65.14 Mg/ha) was recorded at 100% PE over rest of the irrigation schedules. The quality parameters, crude protein content (%) was highest in drip irrigation scheduled at 100% PE, but crude fibre and reducing sugars were significantly higher in drip at 50% PE over other irrigation schedules. Significantly higher leaf water potential and relative leaf water content was found in irrigation scheduled at 100% PE. It (100% PE) also recorded higher gross returns (Rs. 112967/ha) and net returns (Rs. 91101/ha) over other irrigation schedules.

The interaction effects were not significant for all growth, yield and quality parameters.

For the Northern Transitional Tract, the baby corn can be planted in paired row system and irrigation scheduled at 100% PE. Drip irrigation realizing higher husked baby corn, green fodder yield, net returns and benefit:cost ratio. The drip was saved 26 per cent irrigation water over surface irrigation on clay loam soil.