EFFECT OF ALTERNATE FURROW IRRIGATION AND DIFFERENT FERTILIZER MANAGEMENT ON THE YIELD PERFORMANCE OF BABY CORN

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CERTIFICATE

This is to certify that the thesis entitled **“EFFECT OF ALTERNATE FURROW IRRIGATION AND DIFFERENT FERTILIZER MANAGEMENT ON THE YIELD PERFORMANCE OF BABY CORN”** submitted to the Department of Agronomy, Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTERS OF SCIENCE (M.S.)** in **AGRONOMY**, embodies the result of a piece of bonafide research work carried out by **MOST. SAKIARA ISLAM**, Registration No. **12-05082** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information, received during the course of this investigation has been duly acknowledged.

June, 2018
Dhaka, Bangladesh

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Dedicated to

My

Beloved Parents &

Husband

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EFFECT OF ALTERNATE FURROW IRRIGATION AND DIFFERENT FERTILIZER MANAGEMENT ON THE YIELD PERFORMANCE OF BABY CORN

By

ABSTRACT

The present investigation was conducted at Sher-e-Bangla Agricultural University, Dhaka during the period from January to March, 2018 to study the effect of alternate furrow irrigation and varying fertilizer management on the yield performance of baby corn. Two irrigation treatments *viz*. I_C (Conventional irrigation) and I_A (Alternate furrow irrigation); and six fertilizer managements *viz*. F_0 (No fertilizer application; control), F_1 (Recommended doses of fertilizer), F_2 (125% of recommended doses of fertilizer), F_3 (75% of the recommended doses of fertilizer), F_4 (50% of the recommended doses of fertilizer) and F_5 (25% of recommended doses of fertilizer) were considered for treatments of the study. Both the irrigation and fertilizer treatments showed significant variation on most of the studied parameters. In respect of combined effect of irrigation and fertilizer, the highest cob diameter (7.03 cm), cob length (18.00 cm), fresh single cob weight with husk at harvest (46.07 g), total fresh weight plant^{-1} at harvest (795.3 g), fresh weight plant^{-1} at harvest (145.5 g), dry weight plant^{-1} without husk at harvest (95.67 g), dry weight of 5 cobs with husk (78.05 g), dry weight of single cob without husk (7.74 g), fresh 5 cob weight without husk at harvest (96.01) and fresh cob yield without husk (2.40 t ha^{-1}) were observed from the combination treatment I_AF_1 whereas, the respective lowest values were found from treatment combination of I_CF_0.

LIST OF CONTENTS

LIST OF CONTENTS (Cont'd)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS AND ACRONYMS

AEZ	=	Agro-Ecological Zone
BBS	=	Bangladesh Bureau of Statistics
cm	=	Centimeter
CV %	=	Percent Coefficient of Variation
DAS	=	Days After Sowing
et al.,	=	And others
e.g.	=	exempli gratia (L), for example
etc.	=	Etcetera
FAO	=	Food and Agricultural Organization
g	=	Gram (s)
i.e.	=	id est (L), that is
kg	=	Kilogram (s)
LSD	=	Least Significant Difference
m^2	=	Meter squares
ml	=	Mili Litre
M.S.	=	Master of Science
No.	=	Number
SAU	=	Sher-e-Bangla Agricultural University
var.	=	Variety
^oC	=	Degree Celceous
%	=	Percentage
NaOH	=	Sodium hydroxide
GM	=	Geometric mean
mg	=	Miligram
P	=	Phosphorus
K	=	Potassium
Ca	=	Calcium
L	=	Litre
µg	=	Microgram
USA	=	United States of America
WHO	=	World Health Organization

CHAPTER I

INTRODUCTION

Maize or baby corn (*Zea mays* L.) belongs to family Poaceae is one of the most widely distributed crops of the world (Kaul *et al*., 2011). This crop being the highest yielding cereal crop in the world has become an emerging crop in Bangladesh, where rapidly increasing population has already out stripped the available food supplies.

Maize is the third most important cereal crop in the world after wheat and rice (Bukhsh *et al*., 2011). Maize crop has been included as a major enterprise in the crop diversification and intensive cropping programs (Kaul and Rahman, 1983). It is the most efficient crops which can give high biological yield as well as grain yield in a relatively short period of time due to its unique photosynthetic mechanism as C4 plant. The cultivation of maize is increasing day by day due to its diversified use, where the total area coverage was 132,000 ha with a production of 9.20 lakh metric tons during 2014-15 (BBS, 2016).

The production of maize is likely to grow up by 19% to touch 20 million tons in 2010-2011 crop years on higher acreage and improved yield. Its grain has high nutritive value containing 66.2% starch, 11.1% protein, 7.12% oil and 1.5% minerals. Moreover, 100 g maize grains contain 90 mg carotene, 1.8 mg niacin, 0.8 mg thiamin and 0.1 mg riboflavin (Chowdhury and Islam, 1993). Green parts of the plant and grain are used as the feed of livestock and poultry. Stover and dry leaves are used as good fuel (Ahmed, 1994). The important industrial use of maize includes in the manufacture of starch and other products such as glucose, high fructose, maize oil, alcohols, baby foods and breakfast cereals (Kaul, 1985). This crop has much higher grain protein content than rice.

Bangladesh facing problem of malnutrition due to her high population growth and low productivity of crops. The traditional crop including rice and wheat seems quite unable to meet the nutritional requirement. Maize can be a potential crop for nutritional support and may offer a partial solution to the food shortage if its present yield level and total production can further be raised. Among the agronomic traits that influence growth and yield fertilizer management is the prominent one.

To increase maize/baby corn yield, irrigation and nutrient management are the most important factor which help to optimize the growth and development.

Irrigation management is a crucial issue for successful crop production. Crops need a continuously and right amount of water from sowing to maturity. The rate of use of water is not the same for all crops. The rate of use of water varies with the kind of crop grown, time taken by the crop to mature, and the weather conditions like, rainfall, temperature, wind, solar radiation and relative humidity (Tan, 1980). Moreover, the design of irrigation schemes does not address the situation of moisture availability for crop and the competition between different sectors. The, main issue for both irrigated as well as rainfed areas is to improve water use efficiency (Baye, 2011). Water use efficiency and agriculture production can be improved by improving soil and water management practices (Baye, 2011). Considering this fact, alternate furrow irrigation (AFI) is considered to be one of the most effective tools compared to traditional irrigation or every furrow irrigation (EFI) to minimize water application and irrigation costs and produce a higher crop yield. The AFI method is a way to save irrigation water, improve irrigation efficiency, and increase corn yield (Shayannejad and Moharreri, 2009; Nasri *et al*., 2010; Rafiee and Shakarami, 2010; Kashiani *et al*., 2011). Sepaskhah and Khajehabdollahi (2005) found that corn grain yield in a fine-textured soil with a deep water table and AFI at 7-days intervals was statistically lower than EFI at 10-d intervals. Shorter irrigation intervals (4-days) in AFI can ease over water stress and not reduce yield as compared with EFI at 7-days intervals even though water application was reduced. In general, when water was insufficient for full irrigation relative corn grain yield (yield per unit water applied) under

AFI was higher than EFI. In addition, Li *et al*. (2007) found that alternate partial root-zone and fixed partial root-zone irrigation techniques led to a higher reduction of transpiration than photosynthesis and thus increased corn leaf water use efficiency (WUE).

It is also an established fact that proper nutrient management is essential to get higher yield in any crop. Chemical fertilizer application and/or organic manure may leads to get maximum production of baby corn (Ranjan *et al*., 2013). Baby corn is quite popular worldwide but good agricultural management practices particularly nutrient management to maximize the production is the need of the day (Sobhana *et al*., 2012). Fertilizer management plays the most crucial role on growth and productivity of corn. Most of the works on fertility management are on corn production where the crop requires high doses of fertilizers application (Rakesh *et al*., 2015). Kotch *et al*. (1995) suggested that high doses of fertilizer application may not be essential as baby corn is harvested before ear maturation. Poor management of fertilizer has key role to play in obtaining low yield productivity, so in order to achieve optimum crop productivity management of nutrients through judicious application of plant nutrients through fertilizer management are required (Ghaffari *et al*., 2011). Furthermore, the fertilizer management is one of the most important factors that influence the growth and yield of maize crop.

Maize is considered as most exhaustive crop after sugar cane and requires both micro and macro nutrients to obtain high growth and yield potentials. Nutrient management is a judicious use of sources of nutrients to crop fields for sustaining and maintaining soil productivity. Judicious application of these combinations can sustain the soil fertility and productivity. Management in irrigation and fertilizer application may be critical in having greater yields in baby corn. In view of the above the present study was conducted to find out the influence of fertilizer and irrigation on the yield performance of baby corn with the following objectives:

1. To determine the effect of alternate furrow irrigation on yield performance of baby corn
2. To optimize the fertilizer under the application of furrow irrigation in baby corn
3. To evaluate the combination effect of furrow irrigation and fertilizer management on the performance of baby corn

CHAPTER II

REVIEW OF LITERATURE

Irrigation and fertilizer management are considered to be the most important factors in baby corn cultivation. A number of research works have been done in different parts of the world to study the influence of irrigation and fertilizer management on the yield performance of baby corn. Some of the important and informative works and research findings related to the irrigation and fertilizer management of baby corn/maize done at home and abroad have been reviewed under the following sub headings:

2.1 Effect of irrigation

Conventional furrow irrigation (CFI) or traditional irrigation means irrigating all furrows during consecutive watering. The significant quantities of irrigation water losses by infiltration and surface runoff (about 40% of total water supply) reduced water supply to the irrigated lands and decreased the efficiency of agricultural production as well as the reliability of drainage systems. This irrigation system has speed up the processes of decomposition and removal of organic elements and mobile forms of nutrients in the root zone that eventually, brought to soil fertility losses (Karajeh *et al.,* 2000).

Moldden *et al.* (2010) made a comparative study that has been undertaken between the traditional furrow irrigation management and scheduling; and alternative water management options (furrows-scientific scheduling and every furrow-scientific scheduling) on maize plots in northern Ethiopia. Results were compared on the basis of yield, water productivity and economic productivity concepts. Yield-based comparison has shown that every furrow-scientific scheduling generates the highest yield levels followed by alternate furrows-scientific scheduling. The yield increase by every furrow-scientific scheduling over the traditional management was found to be 54%. Water productivity based comparison has shown that alternate furrows- scientific scheduling generates the highest water productivity values followed by every furrow-scientific 11 scheduling. The increase by alternate furrow irrigation, scientific scheduling over the traditional irrigation management was 58%. Economic productivity-based comparison has shown that the highest economic return was obtained from every furrow- scientific scheduling followed by alternate furrows-scientific scheduling. The increase in income by every furrow scientific scheduling over the traditional irrigation management was 54%.

Fixed furrow irrigation (FFI) means that irrigation is fixed to one of the two neighboring furrows. Benefit of irrigating every other furrow is the ability to store rainfall in a recently irrigated soil. FFI should not be used on steep slopes or on soils with low intake rates. Research indicates that every other furrow irrigation results in yields comparable to those achieved when every furrow is irrigated. Irrigation water application may be reduced 20 to 30 percent by implementing every other furrow irrigation (FFI). Because of increased lateral infiltration, infiltration is not reduced by one half compared to watering every furrow (Yonts *et al.,* 2003).

Many ways of conserving agricultural water have been investigated. Researchers fixed some furrows for irrigation, while adjacent furrows were not irrigated for the whole season. Water was saved mainly by reduced evaporation from the soil surface, as in the case of drip- irrigation and also used wide spaced furrow irrigation or skipped crop rows as a means to improve WUE (Kang *et al.,* 2000).

Alternate furrow irrigation (AFI) means one of the two neighboring furrows alternately irrigated during consecutive watering. It offers opportunity for reducing size of irrigation and permits irrigating a field in a shorter time with a given water supply. The reduced size of irrigation may not reduce yields appreciably and thus increase irrigation-water use efficiency (Musick and Dusek, 1982). AFI saves quite a good amount of water and is very useful and crucial in areas of water scarcity and salt problems (Majumdar, 2002).

Alternate furrow irrigation system may supply water in a manner that greatly reduces the amount of surface wetted leading to less evapotranspiration and less deep percolation. As a result, water use efficiency for irrigated water was substantially increased. Kang *et al.,* (2000) concluded that alternate furrow irrigation was an effective water-saving irrigation method in arid areas where maize production could depend heavily on repeated irrigation.

According to Zhang *et al.* (2005), alternate furrow irrigation method uses less irrigation water but can maintain the same grain yield production as that of conventional furrow Irrigation with high irrigation amounts. This is believed to be because of continuous regulation by root drying signal on stomata opening.

Woldesenbet (2005) made evaluation on alternate furrow irrigation for potato production in sub-humid area of east Gojam. He reported that irrigating every other furrow during consecutive irrigations left the field with higher potential that enhanced water infiltration in alternate furrow irrigation method. Consequently, most of the irrigation water went into the soil (about 90 % of irrigated water was infiltrated) but the maximum infiltrated water in every furrow treatments was found as 86 %. However, on selected irrigations at full irrigation application, there was no significant difference in application efficiency between the two methods.

Shayannejad and Moharrery (2009) conducted experiment to evaluate effect of AFI on water use efficiency, starch and protein contents of potato. The average water use efficiencies (WUE) were 621, 772 and 710 grams dry mass per cubic meter and 2870, 3510 and 3230 grams wet mass per cubic meter for CFI, FFI and AFI treatments respectively. According to the result, there was significant difference between CFI and AFI on their WUE. But there was no difference in WUE between AFI and FFI. However, the authors concluded that every-other furrow irrigation with normal water irrigation had a significant effect on WUE.

Furrow irrigation method is one of surface irrigation methods in which small regular channels direct water across the field. Furrow irrigation method is best suited to deep, moderately permeable soils with uniform relatively flat slopes and for crops that are cultivated in rows (vegetables, maize, cotton and potatoes, etc.). Furrows are particularly well adapted for irrigating crops, which are susceptible to fungal root rot since water ponding and contact with plant parts can be avoided (Michael, 2008).

Furrow irrigation may be adapted on a wide range of natural slopes without causing erosion by designing the furrows across the slope rather than down the slope. The method reduces labor requirements in the land preparation and irrigation. Compared to check basin method, there is no wastage of land in field ditches. Most crops can be irrigated by furrow method except those grown in ponded water such as rice. The furrow method is particularly suitable for irrigating crops subject to injury if water covers the crown or stem of the plants, as the crops may be planted on beds between furrows (Michael, 2008).

Moderate to high application efficiency can be obtained if good water management practices are followed and the land is properly prepared. Many different kinds of crops can be grown in sequence without major changes in design layout or operating procedures. The initial capital investment is relatively low on lands not requiring extensive land forming as the furrow are constructed by common farm implements (FAO, 2002). Soils, which form surface crusts when flooded, can readily be irrigated, because water moves laterally under the surface. This irrigation method is best suited to medium and moderately fine textured soils with relatively high available water holding capacity and hydraulic conductivity, which allow significant water movement in both the horizontal and vertical directions. Using furrows for irrigation necessitates, the wetting of only part of the surface (20 % to 50%), thus reducing evaporation losses, lessening the puddling of soils, and making it possible to cultivate the soil sooner after irrigation. Nearly all row crops are irrigated using furrow method rather than flooding. Furrow irrigation is advantageous when the available irrigation streams are small, and for land of uneven topography (Michael, 2008).

Kashiani *et al.* (2019) conducted a field study to investigate sweet corn variety KCS 403 performance for yield and yield components under treatments of every furrow irrigation (EFI), semi-alternate furrow irrigation (SAFI) and alternate furrow irrigation (AFI), with different planting densities in shallow and deep groundwater regimes. Plots under SAFI were irrigated every other furrow from sowing till six weeks, followed by full irrigation on every furrow till the end of growing season. Plots under EFI were irrigated every furrow throughout the growth period, while those under AFI were irrigated every other furrow throughout growth period. Results showed significant effects of the three irrigation regimes for fresh ear yield, 1000-kernel weight, ear diameter, cob diameter, number of kernel rows per ear, number of kernels per row, number of kernels per ear (all at p 0.01), and fresh ear weight (p 0.05). However, there was no significant difference on the effects between EFI and SAFI for all the traits measured in the study. This indicates that yield and yield components of sweet corn under SAFI treatment were comparable with those under EFI. Unexpectedly, fresh ear yield and number of kernels per ear were found to be significantly higher under SAFI at the density of eight plants per m^2 than the other irrigation treatment combinations. The results also revealed significant effects of planting densities for all the traits measured except fresh ear weight. Plants at lower density produced ears with higher quality, however the overall performance was found to be higher while the number of plants per unit area was higher. This might be due to the level of competition among the individual plants for water, sunlight and nutrients at the different planting densities. In general, sweet corn yield under SAFI at the density of eight plants per square meter was found to be same as those under EFI, with 30% less water supplied. It can be concluded that SAFI is a way to save water in arid and semi-arid areas where corn production relies heavily on repeated irrigation.

El-Halim (2013) conducted two field experiments during the 2010 and 2011 seasons to investigate the impact of alternate furrow irrigation with 7-d (AFI7) and 14-d intervals (AFI14) on yield, crop water use efficiency, irrigation water productivity, and economic return of corn (*Zea ma*ys L.) as compared with every-furrow irrigation (EFI, conventional method with 14-d interval). Results indicated that grain yield increased under the AFI7 treatment, whereas it tended to decrease under AFI14 as compared with EFI. Irrigation water saving in the AFI7 and AFI14 treatments was approximately 7 and 17%, respectively, as compared to the EFI treatment. The AFI14 and AFI7 treatments improved both crop water use efficiency and irrigation water productivity as compared with EFI. Results also indicated that the AFI7 treatment did not only increase grain yield, but also increased the benefit-cost ratio, net return, and irrigation water saving. Therefore, if low cost water is available and excess water delivery to the field does not require any additional expense, then the AFI7 treatment will essentially be the best choice under the study area conditions. As a result, the study revealed that alternate furrow irrigation with proper irrigation intervals could save irrigation water and result in high grain yield with low irrigation costs in arid areas.

Nasri *et al.* (2010) conducted a study with irrigation treatments which was applied through furrows in three ways as the main plots: alternate furrow irrigation (AFI), fixed furrow irrigation (FFI), and conventional furrow irrigation (CFI). AFI means that one of the two neighboring furrows was alternately irrigated during consecutive watering. FFI means that irrigation was fixed to one of the two neighboring furrows. CFI was the conventional way where every furrow was irrigated during each watering. Each irrigation method was further divided into five sub-treatments with different fertilizer combinations: (1) P+N (control) (2) P+N+K (3) P+N+K+Zn (4) P+N+K+Zn+B (5) P+N+K+Zn+B+Fe. The results indicate that water stress effects caused by furrow irrigation on yield may be alleviated by more frequent irrigation intervals. They concluded that AFI is a way to save water in arid areas where maize production relies heavily on repeated irrigation. Fertilized combinations influenced dry matter partitioning to seed filling. Thus, sufficient both macro and micro nutritional elements increased harvest index which was mostly due to more number of seeds per row than higher individual grain weight. Complete fertilizer combination increased total above ground biomass through more radiation use efficiency and by increasing leaf area. In order to utilize the water sources efficiently and increase corn production under limited water supply, we propose the use of circular irrigation care along with instance, K, Zn, B and Fe fertilizer.

Abdullah *et al.* (2015) conducted this research in order to determine grain yield and some morphological traits which affect the silage maize response to different irrigation water amounts. The grains' percentage of crude oil and of crude protein were determined. Field experiments were planned following randomized complete block design with three replications and included six irrigation treatments. Irrigation treatments were created as water levels of pan evaporation (Epan) applied via drip irrigation [1.25 × Epan (I125), 1.00 × Epan (I100), 0.75 × Epan (I75), 0.50 × Epan (I50), 0.25 × Epan (I25) and 0 × Epan (I0)]. The highest value of grain yield was found to be 18,268 kg ha^{-1} in the I125 treatment, which represents excessive water. A quadratic relationship between grain yield and irrigation water applied was obtained. Deficit irrigation decreased grain yield and yield components except the percentage of crude oil and crude protein of grain, but improved the efficient use of irrigation water. Relationships between the grain yield and each yield component were positively significant. The highest correlation coefficient in the research gave the relationship between grain yield and plant height. The results revealed that 1.25 × Epan and 1.00 × Epan treatments are preferable for higher yield. The results of this study also suggest that if water is limited, the application of 0.75 × Epan can be recommended as optimal treatment, because the best compromise among yield, yield components, quality and irrigation water use efficiency for maize was achieved with this application.

Akbar *et al.* (2015) conducted an investigation to study the effect of deficit irrigation by method of furrow irrigation grain yield and yield components of sweet corn, in 4 treatments with four replications, including: 1- an alternative furrow irrigation (AFI) 2- a fixed furrow irrigation (FFI) 3- double furrow irrigation in 14 time duration (DFI) 4- a critical furrow irrigation of all tracks treatment control (CFI) time constant irrigation to 7 time duration were considered. AFI means that one of the two neighboring furrows was alternately irrigated. FFI means that irrigation was fixed to one of the two neighboring furrows. CFI was the conventional method where every furrow was irrigated during each irrigation. The time for irrigation is calculated from the infiltration equation of Kostiakov Lewis and other treatments of deficit irrigation are planned on this basis. In this test, crop yield and 15 effective treats was analyzed are analyzed. The results of variance analysis showed a significant difference at the 1% level different irrigation types irrigation in measured treats . Alternative furrow irrigation treatment was a better solution for water saving in arid and semi-arid region with 50% saving compare to control treat only with 6.5% reduction on yield.

2.2 Effect of fertilizer management

Fertilizer management is one of the most important factors that influence the growth and yield of maize crop. Maize is considered as most exhaustive crop after sugarcane and requires both micro and macro nutrients to obtain high growth and yield.

Grazia *et al.* (2003) conducted a field trial on sweet corn opined that total leaf number, height, leaf width and length, leaf area, plant height, stem diameter and shoot dry matter content were significantly higher under the combination of 200 kg N ha^{-1} along with 80 kg P_2O_5 ha^{-1} than rest of the treatment combinations.

Gosavi *et al*. (2006) conducted a field trial during *rabi* on medium black soil in sweet corn and reported that mean plant height at all the stages, number of functional leaves at 60 DAS and harvest and dry matter production at all the growth stages were influenced significantly due to application of recommended dose of fertilizer than control treatment.

Chillar and Kumar (2006) found that increasing levels of nitrogen from 0-120 kg ha^{1} significantly increased plant height, LAI and dry weight $plant^{-1}$ of sweet corn. At Udaipur, maximum plant height and leaf area index of maize were recorded with the application of 150 per cent NPK (Verma *et al.,* 2006).

Zende (2006) observed that the plant height, number of functional leaves and dry matter of sweet corn increased significantly with the increase in the fertilizer levels at all crop growth stages during both the years and in the mean of two years. Therefore, 150% RDF was significantly superior over the lower fertilizer levels in respect of all the above referred observations.

Arun Kumar *et al.* (2007) conducted an experiment during *kharif,* 2002 at Main Agricultural Research Station, Agriculture College, Dharwad on vertisols of zone- 8 of Karnataka and found the growth parameters of sweet corn *viz.,* LAI and total dry matter production were influenced favourably with increasing levels of fertilizers (100%, 75% and 75% RDN and 100%, 75% RDP and 75%, 100% and 125% RDK) application.

Pinjari (2007) undertaken the field experiment during 2055-06 and 2006-07 to find out the effect integrated nutrient management on sweet corn and revealed that the plant height increased significantly with the application of 75 % RDN + 25 % N through PM as compared to all the remaining nutrient sources during 2005-06, 2006-07 and in the mean of two years at all the crop growth stages. The number of leaves was significantly superior with 100% RDN over rest of the nutrient sources except 75 % RDN + 25 % N as PM at all the crop growth stages during both the years and in the mean of two years. The total dry matter accumulation ($plant^{-1}$) at 30 DAS, the dry matter accumulation ($plant^{-1}$) in leaves, stem and total dry matter at 60 DAS, in the leaves, stem, cob and total dry matter ($plant^{-1}$) at 90 DAS and in the leaves, stem, grains, cob sheath, cob axis and total dry matter ($plant^{-1}$) at harvest were significantly higher with the application of 75 % RDN + 25 % N as PM during both the years of study and in the mean of two years than the remaining nutrient sources.

Bindhani *et al.* (2007) observed that application of 120 N ha^{-1} resulted in tallest plants with maximum dry matter and leaf area index of baby corn which were significantly higher than those at remaining N levels (40 and 80 N ha^{-1}). Successive increase in nitrogen levels from 0 to 120 kg ha^{-1} significantly improved leaf area index and dry weight $plant^{-1}$ at 40 to 60 days after planting and maturity stages of baby corn over other treatments.

Shobhana *et al.* (2012) noticed that increasing NPK level from control to $N_{187\cdot5}$ $P_{26\cdot2}$ $K_{62\cdot5}$ recorded taller plants and dry weight $plant^{-1}$ from a field experiment conducted at the Indian Agricultural Research Institute, New Delhi.

Keerthi *et al*. (2013) conducted a field experiment with different fertility levels of 180-75-60 kg N P K ha^{-1} + vermiwash at 20, 35 and 50 DAS recorded the highest growth parameters, and highest plant height, number of leaves $plant^{-1}$, and dry weight $plant^{-1}$ was found from 180-75-60 kg N P K ha^{-1} + vermicompost.

Kaur *et al*. (2016) conducted a field experiment to study Integrated Nutrient Management for increasing growth with sustainability of baby Corn. Significant increase in all growth parameters of baby corn was observed with integrated nutrient management over control. Moreover, among nutrient management treatments, the integration of 5 tonne of FYM with 100 kg of inorganic N ha^{-1} came out to be the best for all growth characters *viz*. plant height, number of leaves per plant, leaf area index and dry matter accumulation.

Auwal and Amit (2017) conducted a field experiment during the winter season to study the influence of integrated nutrient management on growth and yield parameters of maize (*Zea mays* L.). The growth parameters (plant height and leaf area) were found to be highest under poultry manure (PM) or farm yard manure (FYM) + recommended dose of fertilizers (RDF) which are statistically on par but comparatively higher than T_1 (100% RDF

Arya and Singh (2001) observed that application of phosphorus @ 39.6 kg P ha^{-1} gave significantly higher grain (5.84 and 4.24 t ha^{-1}) and stover (6.95 and 5.74 t ha^{-1}) yields of maize compared with the other levels of phosphorus (0,13.2 and 26.4 kg P ha^{1}) during 1994 and 1995, respectively. It was noticed from a field experiment conducted at Hyderabad that successive increase in nitrogen levels (0-120 kg N ha^{-1}) significantly increased the number of primes, yield attributes, green ear and kernel yield of super sweet corn (Raja, 2001).

Sahoo and Panda (2001) reported that increasing P levels from 8.7 to 35 kg P_2O_5 ha^{1} increased number of baby corns $plant^{-1}$ from 2.1 to 2.6 during 1997-1998 and from 2.2 to 2.7 during 1998-1999. The treatment comprising 210:90:150 kg NPK ha^{1}resulted in higher grain yields of maize with an additional increase of 33.0 percent over the state recommendations of 100:60:40 kg NPK ha^{1}.

Gaur (2002) from Udaipur (Rajasthan) reported that application of 150 kg N ha^{1} significantly enhanced baby corn and green fodder yield by 16.22 and 52.31 per cent over 120 kg N ha^{1} and 36.39 and 61.71 per cent over 90 kg N ha^{1}, respectively.

Raja (2001) reported that all the yield attributing characters like ear weight and yield of green kernel of super sweet corn were significantly superior with 120 kg N ha^{-1} over 80, 40 kg N ha^{-1} and control.

Grazia *et al.* (2003) reported after conducting a field trial at Catede Horticulture and Agriculture Institute, Argentina on sweet corn that cob diameter, weight of cob with or without husk were significantly higher under combination of 200 kg N ha^{-1} along with 80 kg P_2O_5 ha^{-1} than rest of the treatment combinations. Yield with and without husk, total biomass production, stover yield and harvest index were also significantly higher under the combination of 200 kg N ha^{-1} along with 80 kg P_2O5 ha^{-1} than rest of the treatment combinations.

Kalpana and Anbumani (2003) observed that application of 50 kg K ha^{-1} applied in 3 splits (basal, 15 and 30 DAS) to baby corn significantly improved the cobs $plant^1$, cob length, cob width, cob and stover yields as compared to rest of the treatments.

Kunjir (2004) had conducted a field trial at College of Agriculture, Dapolion sweet corn and opined that weight of cob, number of grains per cob and weight of grains per cob were significantly higher under 225 kg N ha^{-1} than rest of the nitrogen treatments.

Paradkar (2004) reported that application of 180 kg N ha^1 significantly increased baby corn dry weight $plant^{-1}$ and baby corn yield by 6.09 and 19.03 per cent over 120 kg N ha^1 and 19.12 and 44.13 per cent over 60 kg N ha^{-1}, respectively.

Gosavi *et al*. (2006) after conducting a field trial at ASPEE foundation, Thane in *rabi,* 2005-06 on medium black soil in sweet corn and revealed that weight of cob with and without husk, length of cob, number of kernel rows per cob, number of kernels per cob, number of cobs per plant, kernels weight per cob, green cobs number and yield per ha, stover yield and total biomass yield of sweet corn were significantly higher under application of 225 N, 60 P_2O_5 and 60 K_2O kg ha^{-1} (RDF) than control.

Kar *et al.* (2006) reported that application of 80 kg N ha^{-1} significantly increased number of prime cobs, length and girth of green cobs and green fodder yields. Consequently the highest green cob yield was obtained which was 220, 160, 48 and 21 per cent higher than that of the control, 20, 40 and 60 kg N ha^{-1}.

Rajanna *et al.* (2006) carried out a field experiment and showed that application of 150:75:40 kg NPK ha^{1} resulted in significant improvement in husked (10.56 t ha^{-1}), dehusked (2.58 t ha^{1}) and green fodder yields (21.18 t ha^{1}) compared to 100:50:27 kg NPK ha^{-1} treatment in baby corn. Verma *et al.* *(*2006) also observed similar results and found that application of 150 per cent NPK resulted in highest grain and straw yields in maize.

Zende, (2006) carried out two years experiment during 2004-05 and found that different yield attributes *viz.*, cob length, cob girth, number of grains per cob, weight of grains per cob and number of cobs per plant in the mean of two years significantly superior with 150% RDF over rest of the fertilizer levels. Number of cobs per hectare, straw yield, harvest index, cob yield and biological yield were also significantly superior with 150% RDF over rest of the fertilizer levels including control.

Khadtare *et al*. (2006) carried out a research during rabi season of 2005-06 and reported that significantly higher values were recorded in respect of cob girth, cob length and green cob weight in treatment T_{10} (RDF 150:50:0 NPKha^{-1}) followed by T_4 (75 % RDN + 25 % N through VC) and T_6 (21.7 %) (75 % RDN + 25 % N through VC). Significantly higher values were also recorded in respect of green cob yield and green fodder yield in treatment T_{10} (112.5 qha^{-1} and 246.3 qha^{-1}, respectively) (RDF 150:50:0 NPKha^{-1}) followed by T_4 (108.1 and 235.6 qha^{-1}, respectively) and T_6 (107.3 and 229.6 qha^{-1}, respectively).

Bindhani *et al.* (2007) conducted a field experiment and revealed that application of 120 kg ha^{-1} significantly increased baby corn length, girth, baby corn yield and green fodder yields over lower levels. The improvement in baby corn yield due to 120 kg ha^{-1} was 28.6, 52.2 and 178.7 per cent over 80, 40 kg N ha $^{-1}$ and control, respectively.

Sahoo and Mahapatra (2007) conducted a field experiment and observed that number of cobs ha^{1}, cobs plant^{1}, cob weight, grains cob^{1}, kernel weight, green cob yield, green fodder yield and fresh kernel yield of sweet corn were significantly higher under 120:26.5:50 N, P_2O_5 and K_2O kg ha^{-1} than control and rest of fertilizer levels from a field experiment conducted at Orissa University of Agriculture and Technology, Jashinpur in red sandy loam soil.

Arun Kumar *et al.* (2007) conducted experiment on sweet corn at Main Agricultural Research Station, Agriculture College, Dharwad, in vertisols and found that number of cobs plant^{-1}, cob length, number of grains cob^{-1} and fresh cob weight were highest with 100% RDN, 100% RDP and 125% RDK compared to different fertilizer levels.

Pinjari (2007) undertaken the field experiment during 2005-06 and 2006-07 to find out the effect of integrated nutrient management on sweet corn and observed that the cob length, cob girth, number of grain rows per cob, number of grain per cob were significantly superior with the application of 75 % RDN + 25 % N as PM over rest of the nutrient sources during both the years of study and in the mean of two years. The number of cobs per hectare, cob yield, straw yield and biological yield during both the years were also significantly superior with the application of 75 % RDN + 25 % N as PM over rest of the nutrient sources. While harvest index was higher with the application of 50 % RDN + 50 % N as PM over rest of the nutrient sources.

Thakur *et al.* (2010) conducted a field experiment during *kharif* season and observed that application of 100:50:50 kg NPK ha^{-1} (T_3) recorded significantly more length of cob, diameter of cob than FYM alone and FYM+ *Azospirillium* application.

Aravinth *et al*. (2011) found that application of recommended dose of fertilizer (150:60:40 kg of N, P_2O_5 and K_2O ha^{-1}) + vermicompsot @ 5 tons ha^{-1} on baby corn in kharif and summer seasons recorded the highest number of cobs plant^{-1} (2.60 and 2.39), higher cob length (23.18 and 22.04 cm), highest cob width (2.69 and 2.57 cm), cob weight (33.31 and 28.69 g) and higher baby corn yield (7195 and 5477 kg ha^{-1}) than recommended dose of fertilizer alone.

Singh *et al.* (2012) found that application of 120 kg N ha^{-1} being on par with

250 kg N ha^{-1} significantly improved all yield attributes, *viz.* number of cobs ha^{-1}, weight of green cob, number of kernel cob^{-1} and 1,000 kernel fresh weight over preceded levels from experiment at Wadura, Sapore, Jammu and Kashmir on well drained silty clay loam.

Sunitha and Reddy (2012) conducted an experiment during *rabi* season of 2005 and 2006 on sandy loam soils and revealed that the highest green cob (15.91 t ha^{-1}) and fodder yield (20.34 t ha^{-1}) of sweet corn with good quality of produce could be realized with the supply of NPK @ 150:70:50 kg ha^{-1}

Keerthi *et al*. (2013) conducted a field experiment on sandy loam soil during rabi, 2012-13. Among the fertility levels tried, application of 180-75-60 kg N P K ha^{-1} + vermicompost 20, 35 and 50 DAS recorded the highest yield attributes and cob yield which was however, found parity with 180-75-60 kg N P K ha^{-1} + vermicompost. Integrated nutrient management treatments exhibited their superiority at the highest levels of fertilization over the same levels under chemical sources in enhancing green cob yield. The lowest cob yield was associated with non-supply of fertilizers.

Ajaz *et al*. (2013) conducted an experiment and found that the application of farm yard manure (FYM) at 6 Tha^{-1} in combination with 150% recommended dose of fertilizer (225 N: 90 P_2O_5: 60 K_2O kgha^{-1}) reveled maximum cob yield (without husk) of 20.60 qha^{-1} associated with maximum number of cobs/plot (326). However application of FYM at 6 tha^{-1} in combination with state recommended dose of Nitrogen: Phosphorus: Pottasium (N:P:K) at 90: 60: 40 kgha^{-1} was statistically at par with the best treatment and gave a cob yield of 19.85 qha^{-1}. Application of 150% of Recommended Dose of Fertilizer (RDF) without FYM reveled increased cob length (10.90 cm), whereas, 125% of RDF resulted in maximum cob girth without husk (18.30 mm). Similar trend of enhanced green fodder yield (26.39 Tha^{-1}) was observed with application of 6 Tha^{-1} FYM + 150% of RDF).

Mathukia *et al*. (2014) conducted a field experiment During *rabi,* 2010 and observed that significantly enhanced yield attributes *viz.*, number of cobs/plant, cob length, cob girth , fresh weight of cob, number of kernels/cob and fresh weight of 100-kernels was recorded from application of 120-60 kg N- P_2O_5 ha^{-1} over application of 90-30 kg N-P_2O_5 ha^{-1} and control. The highest green cob yield (80 q ha^{-1}) and green fodder yield (366.6 q ha^{-1}) was also recorded on application of 120-60 kg N-P_2O_5 ha^{-1}.

Priyanka *et al.* (2014) conducted an experiment in clay loam soils during *kharif season 2013 to investigate the yield of baby corn with different fertilizer management. Results* revealed that application of 90 kg N+40 kg P_2O_5 ha^{-1} gave significantly higher green cob and fodder yield when compared to other treatments.

Roy *et al.* (2015) conducted a field experiment to study the effect of irrigation and nutrient management on growth, yield attributes, yield, quality and WUE of baby corn (cv. Super 36) during summer. Integrated nutrient management markedly influenced growth and yield components and yield and these were (both corn as well as fodder) produced maximum with the application of N_3 treatment (75% RDF along with FYM - 6.0 t ha^{-1}). N_3 treatment produced maximum plant height and dry weight per plant, cobs $plant^{-1}$, Cob length (cm) and number of rows cob^{-1}. Among the treatment variables, least performance exhibited under rain-fed situation, which received 75% RDF alone.

Kaur *et al*. (2016) conducted a field experiment to study Integrated Nutrient Management for increasing Growth with Sustainability of Baby Corn. The experiment having seven treatments i.e. T_1= Control, T_2= 100 percent recommended dose of N, T_3 = 5 tons of FYM + 100 kg inorganic N ha^{-1}, T_4= 10 tons of FYM + 75 kg inorganic N ha^{-1}, T_5= 15 ton of FYM + 50 kg inorganic N ha^{-1}, T_6= 20 ton of FYM + 25 kg inorganic N ha^{-1}, T_7= 25 ton of FYM ha^{-1}. Significant increase in yield parameters of baby corn was observed with 5 ton of FYM with 100 kg of inorganic N ha^{-1} over control.

Jinjala *et al*. (2016) conducted a field experiment during rabi season to study the effect of integrated nutrient management on growth and yield of baby corn. The cob and fodder yields significantly differed with different integrated nutrient management treatment. Significantly the higher growth and yield attributes yield and fodder yield were recorded with the application of 100% RDF from chemical fertilizer with bio-fertilizer. Application of 100% RDN from chemical fertilizer with biofertilizer was recorded higher net returns over 100% RDN from vermicompost (Rs. 220775 ha^{-1}) and BCR (2.54).

Auwal *et al*. (2017) conducted a field experiment during the winter season to study the influence of integrated nutrient management on growth and yield parameters of maize (*Zea mays* L.). The yield parameters (number of grains per cob, cobs weight per plant, Test weight and stover yield) were significantly higher under INM compared to T_1 (100% RDF). Therefore, the integration of 50% RDF along with either 5 tha^{-1} FYM or PM or both resulted in maximum maize productivity on par compared with sole used of 100% RDF. It was also observed that 100% RDF with additional nutrient supply resulted higher yield contributing parameters (cobs $plant^{-1}$, cob length and diameter, cob number for unit area and harvest index) of maize.

Kumar *et al*. (2017) found that for gaining higher productivity of maize, it requires very high quantities of nitrogen during the period of efficient utilization. Application of 120 kg N ha^{-1} reduced the days to corn initiation but prolonged the harvesting period over 80 kg N ha^{-1}. Application of 30 kg P ha^{-1} is reported to beneficial and economical for baby corn production under the normal management. Potassium regulates the osmotic potential of cells and imparts resistance to biotic and abiotic stresses. Application of S and Zn has resulted in significant improvement for crude protein, Ca, ash in baby corn. Application of 125% RDF (187.5-93.7-75 kg ha^{-1}) and 50 kg S ha^{-1} along with 10 kg Zn ha^{-1} has great impact on corn production in maximizing corn yield, fodder yield, nutrient content and monetary returns to the growers.

Kumar *et al*. (2018) conducted a field experiment on baby corn (*Zea mays* L.) in sandy loam soil to assess the effect of balanced fertilization (NPKS and Zn) on productivity, quality, energetics and soil health of baby corn. Results revealed that application of 125% RDF (187.5, 93.75, 75.0 kg NPK ha^{-1}) produced significantly higher yields of total baby cob yield with husk (9.55 tons ha^{-1}) and total baby corn yield without husk (2.15 tons ha^{-1}). Among different levels of S and Zn, application of 50 kg S and 10 kg Zn ha^{-1} produced significantly higher yields of total baby cob with husk (9.38 and 9.24 tons ha^{-1}) and total baby corn without husk (2.15 and 2.10 tons ha^{-1}), respectively.

Subedi *et al*. (2018) conducted a field experiment on baby corn to identify effect of different combination of organic and inorganic fertilizers on yield and yield attributes of baby corn during kharif season of 2017. The treatments are different combination of vermicompost, farm yard manure and chemical fertilizers. Result revealed that yield and yield attributes are statistically different among treatments. Growth, yield and yield attributing character *viz*. the highest plant height, number of leaves per plant, dry weight per plant and root length, length and weight of baby corn with and without husk in first three harvest of baby corn were found significantly superior in treatment with 75% vermi-compost and 25% inorganic fertilizers.

CHAPTER III

MATERIALS AND METHODS

The experiment was conducted at the Agronomy research field of Sher-e-Bangla Agricultural University, Dhaka-1207 during period from January to March, 2018 to study the effect of alternate furrow irrigation and different fertilizer management on the yield performance of baby corn. The materials used and methodology followed in the investigation have been presented details in this chapter.

3.1 Geographical location

The experimental area was situated at $23^0$77' N latitude and $90^0$33' E longitude at an altitude of 9 meter above the sea level.

3.1.2 Agro-ecological region

The experimental field belongs to the Agro-ecological zone of "The Modhupur Tract", AEZ-28. This was a region of complex relief and soils developed over the Modhupur clay, where floodplain sediments buried the dissected edges of the Modhupur Tract leaving small hillocks of red soils as 'islands' surrounded by floodplain (UNDP, 1988). The experimental site was shown in the map of AEZ of Bangladesh in Appendix I.

3.1.3 Soil

The soil of the experimental site belongs to the general soil type, shallow red brown terrace Soils under Tejgaon Series. Top soils were clay loam in texture, olive-gray with common fine to medium distinct dark yellowish brown mottles. Soil pH ranged from 5.6-6.5 and had organic matter 1.10-1.99%. The experimental area was flat having available irrigation and drainage system and above flood level. The physico-chemical properties of soil is presented in Appendix II.

3.1.4 Climate

The area has subtropical climate, characterized by high temperature, high relative humidity and heavy rainfall with occasional gusty winds in Kharif season (April- September) and scanty rainfall associated with moderately low temperature during the Rabi season (October-March). Climatic parameters of the experimental site is presented in Appendix III.

3.2 Experimental details

3.2.1 Treatments

Factor A: Irrigation– Two levels

1. I_C = Conventional irrigation
2. I_A = Alternate furrow irrigation

Factor B: Fertilizer – Six levels

1) F_0 = No fertilizer application (control)
2) F_1 = Recommended doses of fertilizer
3) F_2 =125% of recommended doses of fertilizer
4) F_3 = 75% of the recommended doses of fertilizer
5) F_4 = 50% of the recommended doses of fertilizer
6) F_5 = 25% of recommended doses of fertilizer

As such there were 12 treatment combinations as follows:

I_CF_0, I_CF_1, I_CF_2, I_CF_3, I_CF_4, I_CF_5, I_AF_0, I_AF_1, I_AF_2, I_AF_3, I_AF_4, I_AF_5

3.2.2 Layout of the experiment

The experiment was laid out into Split-plot design with three replications having irrigation levels in the main plot considered as Factor-A and fertilizer levels in the sub-plot considered as Factor-B. Each replication had 12 unit plots to which the treatment combinations were assigned randomly. The total numbers of unit plots were 36. The size of unit plot was 3.36 m^2 (2.4 m × 1.4 m). The distances between replication to replication and plot to plot were 1 m and 0.5 m, respectively. The layout of the experiment is presented in Appendix IV.

3.2.3 Planting materials

In this research work, Hybrid baby corn “Baby Star” variety was used as plant materials and the seeds were collected from Kustia seed store, Mirpur, Dhaka.

3.3 Preparation of the experimental field

The land was opened with the help of a tractor drawn disc harrow on January 3, 2018, and then ploughed with rotary plough twice followed by laddering to achieve a medium tilth required for the crop under consideration. All weeds and other plant residues of previous crop were removed from the field. Immediately after final land preparation, the field layout was made on January 5, 2018 according to experimental specification. Individual plots were cleaned and finally prepared the plot.

3.4 Fertilizer application

During final land preparation, the land was fertilized as per treatment. Six levels of fertilizer treatments were used under the present study based on recommended doses of fertilizers. The recommended doses of nutrients through fertilizers were as below:

Name of fertilizer	Fertilizer Rate (ha^{-1})	Nutrients (ha^{-1})
Urea	300 kg	N = 138 kg
TSP	150 kg	P = 67.5 kg
MoP	100kg	K = 60 kg
Gypsum	150 kg	S = 27 kg, Ca = 33 kg
$ZnSO_4$	10 kg	Zn = 4 kg

Source: BARI, 2014 (Krisi Projukti Hat Boi, P. 54)

The total amount of nitrogen in the form of urea was divided into three equal portions; one third was applied during final land preparation. The rest two portions were applied as split doses at 25 DAS and 45 DAS, respectively. Whole amount of P, K, S and Zn through TSP, MoP, Gypsum and $ZnSO_4$, respectively were applied at the time of final land preparation.

3.5 Seed sowing

The baby corn seeds were sown in lines maintaining plant to plant and row to row distance as 40 cm and 20 cm, respectively having 2 seeds hole^{-1} under direct sowing (dibbling) in the well prepared plot on January 5, 2018.

3.6 Intercultural operations

3.6.1 Thinning and gap filling

The plots were thinned out and gap filled on 15 days after sowing having single plant hill^{-1} to maintain a uniform plant stand.

3.6.2 Weeding

The crop field was infested with some weeds during the early stage of crop establishment. Two hand weedings were done; first weeding was done at 25 days after sowing followed by second weeding at 45 days after sowing.

3.6.3 Earthing up

Earthen up is a major intercultural operation for better establishment and anchorage of crown root of baby corn. It was done two times, 1st one at 25 days after sowing, 2nd one at 45 days after sowing.

3.6.4 Irrigation and drainage

Irrigation water was added to each plot as and when necessary. However, in case of alternate furrow irrigation, furrows were prepared between two adjacent plant rows and the alternate furrows were kept unirrigated during irrigation. Furrow irrigation was applied through placing the hose pipe at the end of each alternate furrows. Drainage channels were also properly prepared for easy and quick draining out of excess water.

3.6.5 Plant protection measures

The crops were infested by insects. Ripcord 10 EC @500 ml in 20 L water was sprayed at 46 days after sowing.

3.7 Harvesting and post-harvest operations

At 12 and 16 March, 2018, the cobs of five randomly selected plants of each plot were separately harvested for recording yield attributes and other data. The cobs from all plants of each plot were harvested for recording cob yield and other data.

3.8 Recording of data

Experimental data were collected at different growth stages and also at the time of harvest. Five plants were randomly selected and fixed in each plot from the inner row of the plot for recording data. Dry weight of plants were collected by harvesting five plants at different specific dates from the inner rows leaving border plants and harvest area for cob of baby corn.

The following data were recorded:

3.8.1Growth parameters

1. Plant height (cm)
2. Number of leaves plant^{-1}
3. Base diameter plant^{-1} (cm)
4. Seed moisture content (%)

3.8.2 Yield contributing parameters

1. Cob diameter (cm)
2. Cob length (cm)
3. Fresh single cob weight with husk (g) at harvest
4. Total fresh weight plant^{-1} (g) at harvest
5. Fresh weight without husk plant^{-1} (g) at harvest
6. Dry weight plant^{-1} (g) at harvest
7. Dry weight of 5 cob with husk (g)
8. Dry weight of single cob without husk (g)

3.8.3 Yield parameters

1. Fresh 5 cob weight without husk (g) at harvest
2. Fresh cob yield without husk (t ha^{-1})

3.9 Procedures of recording data

Brief outlines of the data recording procedure are given below:

3.9.1 Plant height (cm)

The height of plant was recorded in centimeter (cm) at harvest. Data were recorded as the average of 5 plants selected from the inner rows of each plot. The height was measured from the ground level to the tip of the plant.

3.9.2 Number of leaves $plant^{-1}$

The number of leaves $plant^{-1}$ was counted at the time of harvest from the top to bottom of the five selected plants from the inner rows of each plot and the average data were recorded. Only the above ground leaves were counted, while the leaves (dead) below the soil surface (due to earthing up and putting soil at the base of the plant to avoid lodging) were excluded from counting.

3.9.3 Base diameter of plant (cm)

The base diameter was measured from randomly selected five plants in each plot and average was recorded in centimeter (cm).

3.9.4 Seed moisture content (%)

Moisture content of seed was measured with a moisture meter (LUTRON) from each replication and was expressed in percentage (%). It was measured at 30 and 50 days after sowing (DAS).

3.9.5 Cob diameter (cm)

The diameter of cob was measured from five randomly selected cobs from the five selected plants in each plot and average value was recorded in centimeter (cm).

3.9.6 Cob length (cm)

Cob length was measured in centimeter from the base to the tip of the ear of 5 baby corn from the five selected plants in each plot with the help of a meter scale. The average value was recorded in centimeter (cm).

3.9.7 Fresh single cob weight with husk (g)

Fresh single cob weight with husk was calculated from five randomly selected cobs of each plot and the average weight was recorded in gram (g).

3.9.8 Total fresh weight plant^{-1} (g)

Fresh weight plant^{-1} with husk was recorded from the randomly selected 5 plants of each plot and average value was recorded in gram (g).

3.9.9 Fresh weight without husk plant^{-1} (g)

Fresh weight plant^{-1} without husk was recorded from the randomly selected 5 plants of each plot and average value was recorded in gram (g).

3.9.10 Dry weight plant^{-1} (g)

Dry weight plant^{-1} without husk was calculated at the time of harvest. Five plants from each plot were collected for recording of data. The plant parts were placed in paper packet and then kept in the oven at 80°C for 72 hours to reach a constant weight. Then the dry weights were taken with an electric balance. The mean values were recorded in gram (g).

3.9.11 Dry weight of 5 cobs with husk

Randomly selected 5 cobs with husk were collected from each plot and then it was placed in the oven at 80°C for 72 hours to reach a constant weight. Then the dry weights were taken with an electric balance and expressed in gram (g).

3.9.12 Dry weight of single cob without husk

Randomly selected 5 cobs without husk were collected from each plot and then it was placed in the oven at 80°C for 72 hours to reach a constant weight. Then the average dry weights were recorded with an electric balance and expressed in gram (g).

3.9.13 Fresh 5 cob weight without husk (g)

Randomly selected 5 cobs without husk were collected from each plot and then it was weighed with an electric balance and data were recorded in gram (g).

3.9.14 Fresh cob yield without husk (t ha^{-1})

Cob weight of 1 m^2 plants in each plot taken from inner rows of the plot were weighed and recorded and finally converted into tone per hectare (t ha^{-1}).

3.10 Statistical analysis

The data obtained for different characters were statistically analyzed using MSTAT-C software to find out yield potential of baby corn as influenced by different levels of fertilizer and plant density. The mean values of all the characters were evaluated and analysis of variance was performing by the 'F' test. The significance of the difference among the treatments means was estimated by the Least Significant Difference Test (LSD) at 5% level of probability (Gomez and Gomez, 1984).

CHAPTER IV

RESULTS AND DISCUSSION

The experiment was conducted to study the effect of alternate furrow irrigation and different fertilizer management on the yield performance of baby corn. Data on different growth, yield contributing characters and yield of baby corn were recorded. The analyses of variance (ANOVA) of the data on different parameters are presented in Appendix V - XV. The results have been presented and discussed with the help of Tables and Graphs and possible interpretations given under the following headings:

4.1 Growth parameters

4.1.1 Plant height (cm)

Effect of irrigation

The irrigation treatment had significant influence on plant height at 60 DAS but at 20 and 40 DAS plant height was not significantly influenced by irrigation treatments (Fig. 1 and Appendix V). However, the highest plant height (14.49, 113.96 and 202.58 cm at 20, 40 and 60 DAS, respectively) was recorded from the treatment I_C (Conventional irrigation) and the lowest plant height (13.67, 114.53, 195.75 cm at 20, 40 and 60 DAS, respectively) was obtained from the treatment I_A (Alternate furrow irrigation). Similar result was also observed by Abdullah *et al*. (2015) which supported the present study.

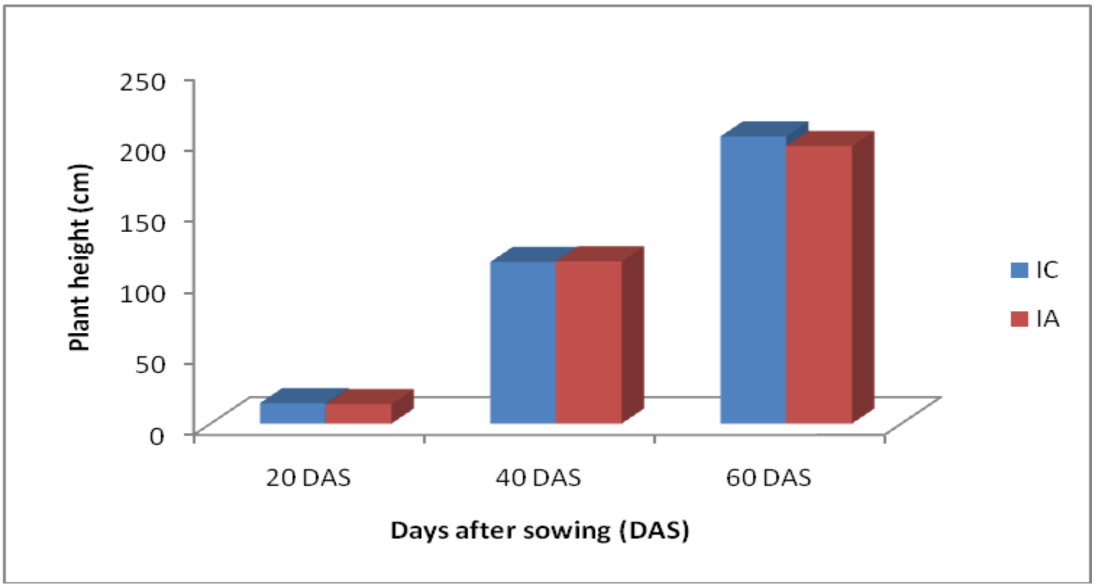

Figure 1. Plant height of baby corn influenced by irrigation levels ($LSD_{0.05}$ = NS, NS and 1.362 at 20, 40 and 60 DAS, respectively)

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

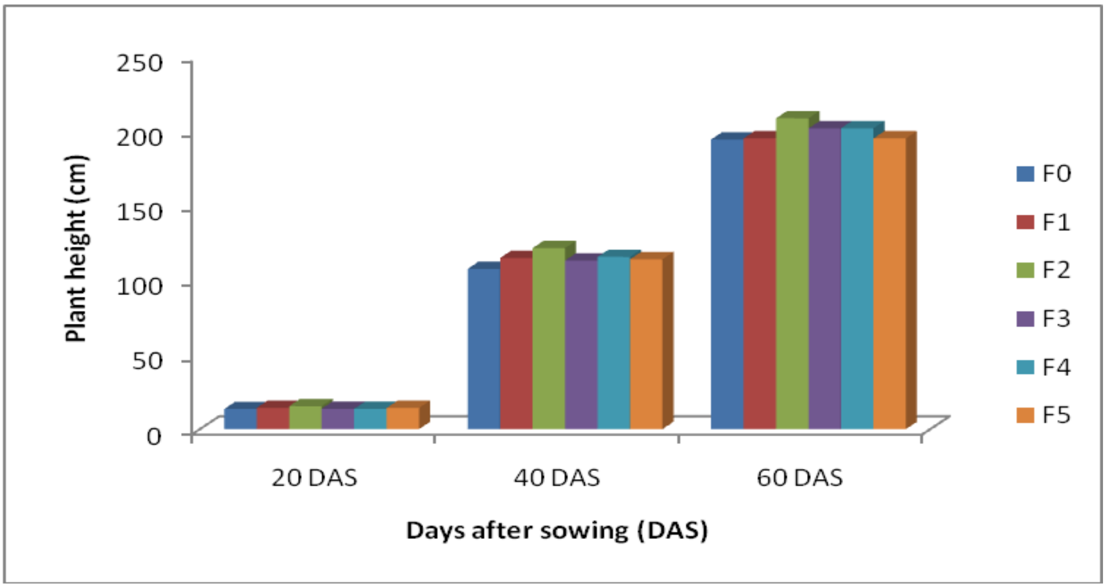

Figure 2. Plant height of baby corn influenced by fertilizer management ($LSD_{0.05}$ = 0.528, 1.752 and 2.51 at 20, 40 and 60 DAS, respectively)

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

Effect of fertilizer

There was a significant variation on plant height influenced by different fertilizer treatments at different growth stages (Fig. 2 and Appendix V). It was found that the highest plant height (15.39, 121.3 and 208.3 cm at 20, 40 and 60 DAS, respectively) was achieved from the treatment F_2 (125% of recommended doses of fertilizer) which was significantly different from all other treatments. The lowest plant height (13.47, 107.4 and 194.1 cm at 20, 40 and 60 DAS, respectively) was found from the control treatment F_0 (No fertilizer application) which was statistically identical with F_1 (Recommended doses of fertilizer) and F_5 (25% of recommended doses of fertilizer) at 65 DAS. The result obtained from the present study was similar with the findings of Grazia *et al.* (2003) and Keerthi *et al*. (2013).

Combined effect of irrigation and fertilizer

Plant height was significantly influenced by combined effect of irrigation and fertilizer treatments at different growth stages (Table 1 and Appendix V). Results showed that the highest plant height (16.37, 129.5 and 222.2 cm at 20, 40 and 60 DAS, respectively) was observed from the treatment combination of I_CF_2 which was statistically identical with I_AF_1 at 40 DAS but significantly different from all other treatment combinations at 60 DAS. The lowest plant height (11.15, 103.2 and 191.8 cm at 20, 40 and 60 DAS, respectively) was found from treatment combination of $I_AF_0$which was statistically identical with the treatment combination of I_CF_1 and significantly similar with I_CF_5, I_AF_3 and I_AF_5 at 60 DAS.

Table 1. Plant height of baby corn influenced by combined effect of irrigation levels and fertilizer management

Treatment	Plant height (cm) at different days after sowing (DAS)		
	20	40	60
I_CF_0	12.40 ef	105.9 fg	197.8 de
I_CF_1	12.83 de	113.0 cd	192.4 f
I_CF_2	16.37 a	129.5 a	222.2 a
I_CF_3	14.92 a-c	110.6 de	205.5 b
I_CF_4	13.18 de	116.9 b	203.1 bc
I_CF_5	14.42 b-d	111.2 de	194.5 ef
I_AF_0	11.15 f	103.2 g	191.8 f
I_AF_1	15.67 ab	126.2 a	197.1 de
I_AF_2	15.65 ab	108.8 ef	197.5 de
I_AF_3	15.97 ab	115.5 bc	194.3 ef
I_AF_4	13.75 c-e	113.8 b-d	200.1 cd
I_AF_5	12.69 ef	116.3 bc	193.7 ef
$LSD_{0.05}$	1.516	3.455	3.937
CV(%)	8.91	12.84	7.33

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

4.1.2 Number of leaves plant^{-1}

Effect of irrigation

Above ground green leaves were counted excluding those under irrigation levels. Significant variation was not found on number of leaves plant^{-1} at different growth stages influenced by different irrigation treatment (Fig. 3 and Appendix VI). However, the highest number of leaves plant^{-1} (6.56, 12.17 and 16.20 at 20, 40 and 60 DAS, respectively) was recorded from the treatment I_C (Conventional irrigation) and the lowest number of leaves plant^{-1} (6.00, 12.15 and 16.17 at 20, 40 and 60 DAS, respectively) was obtained from the treatment I_A (Alternate furrow irrigation). Nasri *et al.* (2010) also found similar result with the present study.

Effect of fertilizer

Number of leaves plant^{-1} was significantly varied due to different fertilizer treatments at different growth stages (Fig. 4 and Appendix VI). The highest number of leaves plant^{-1} (6.52, 12.83 and 16.35 at 20, 40 and 60 DAS, respectively) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was statistically identical with F_3 (75% of the recommended doses of fertilizer) and statistically similar with F_2 (125% of recommended doses of fertilizer) and F_4 (50% of the recommended doses of fertilizer) at 60 DAS. The lowest number of leaves plant^{-1} (5.83, 11.80 and 15.67 at 20, 40 and 60 DAS, respectively) was found from the control treatment F_0 (No fertilizer application) which was significantly different from all other treatments followed by F_5 (25% of recommended doses of fertilizer). The result obtained from the present study was similar with the findings of Grazia *et al.* (2003) and Keerthi *et al*. (2013).

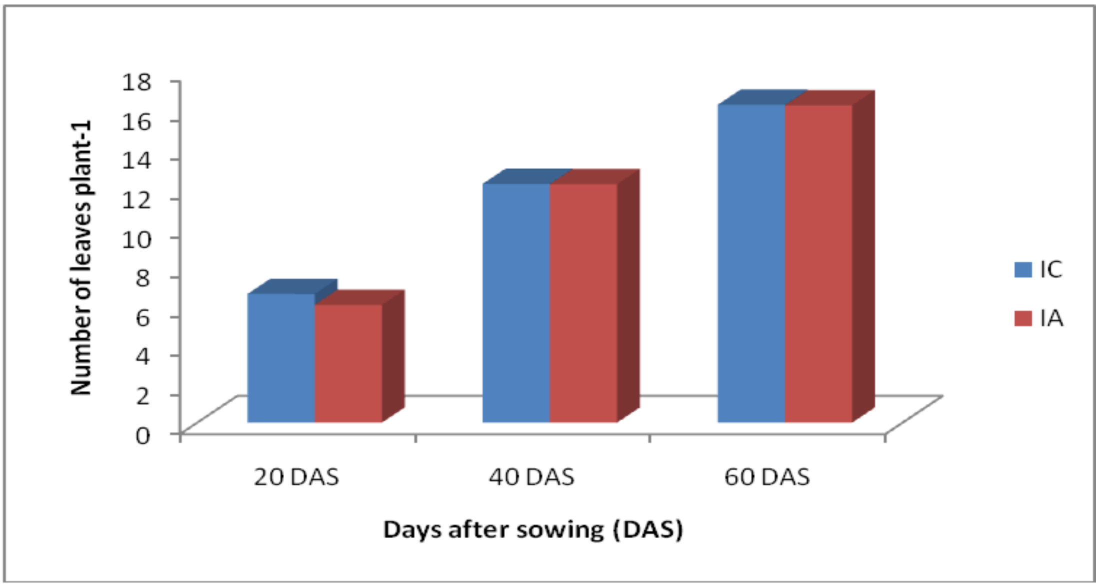

Figure 3. Number of leaves plant^{-1} of baby corn influenced by irrigation levels ($LSD_{0.05}$ = NS, NS and NS at 20, 40 and 60 DAS, respectively)

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

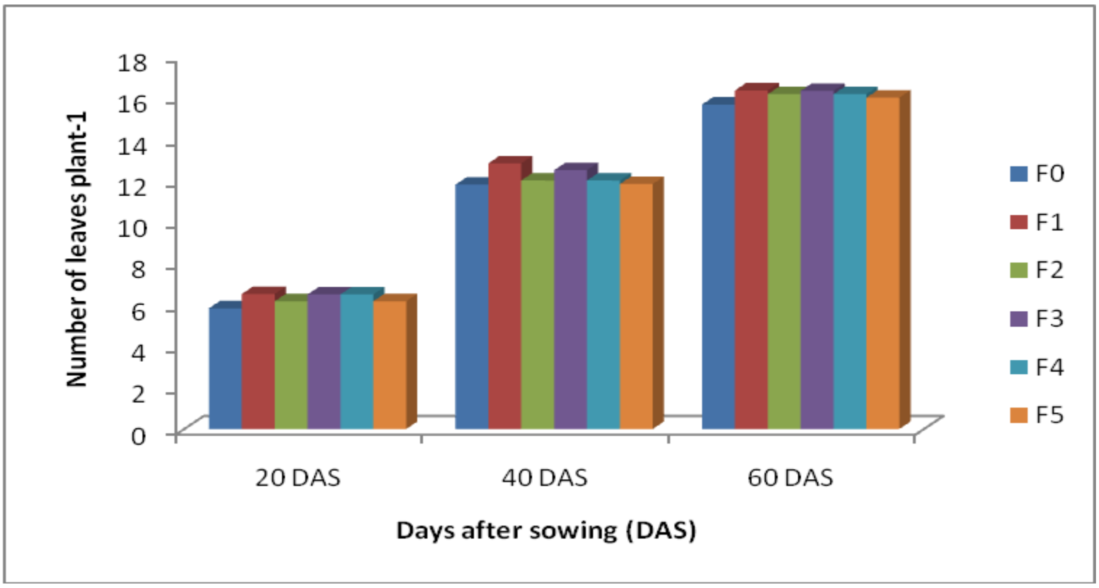

Figure 4. Number of leaves plant^{-1} of baby corn influenced by fertilizer management ($LSD_{0.05}$ = 0.228, 0.232 and 0.222 at 20, 40 and 60 DAS, respectively)

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

Table 2. Number of leaves plant^{-1} of baby corn influenced by combined effect of irrigation levels and fertilizer management

Treatment	Number of leaves plant^{-1} at different days after sowing (DAS)		
	20	40	60
I_CF_0	6.00 de	11.67 c	16.00 b
I_CF_1	7.33 a	13.00 a	16.67 a
I_CF_2	6.00 de	12.33 b	16.00 b
I_CF_3	6.33 cd	11.67 c	16.00 b
I_CF_4	7.00 ab	12.33 b	16.00 b
I_CF_5	7.00 ab	12.33 b	16.00 b
I_AF_0	5.00 f	11.33 c	15.33 c
I_AF_1	6.00 de	12.67 ab	16.33 ab
I_AF_2	6.33 cd	12.67 ab	16.33 ab
I_AF_3	6.67 bc	12.33 b	16.33 ab
I_AF_4	6.00 de	11.67 c	16.33 ab
I_AF_5	5.67 e	12.33 b	16.00 b
$LSD_{0.05}$	0.357	0.3653	0.3490
CV(%)	5.79	6.71	4.98

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

Combined effect of irrigation and fertilizer

Remarkable variation was observed on number of leaves plant^{-1} at different growth stages influenced by combined effect of irrigation and fertilizer treatments (Table 2 and Appendix VI). The highest number of leaves plant^{-1} (7.33, 13.00 and 16.67 at 20, 40 and 60 DAS, respectively) was observed from the treatment combination of $I_CF_1$which was statistically similar with the treatment combination of I_AF_1, I_AF_2, I_AF_3 and I_AF_4. The lowest number of leaves plant^{-1} (5.00, 11.33 and 15.33 at 20, 40 and 60 DAS, respectively) was found from treatment combination of $I_AF_0$which was significantly different from all other treatment combinations.

4.1.3 Base diameter (cm)

Effect of irrigation

There was a significant variation on base diameter influenced by different irrigation treatment at different growth stages except at 20 DAS (Fig. 5 and Appendix VII). However, the highest base diameter (0.70 and 2.25 cm at 20 and 40 DAS, respectively) was recorded from the treatment I_A (Alternate furrow irrigation) and the lowest base diameter (0.61 and 2.11 cm at 20 and 40 DAS, respectively) was obtained from the treatment I_C (Conventional irrigation).

Effect of fertilizer

Base diameter was significantly influenced at 40 DAS by different fertilizer treatments but at 20 DAS it was not significant (Fig. 6 and Appendix VII). At 40 DAS, the highest base diameter (0.71 and 2.45 cm at 20 and 40 DAS, respectively) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was significantly different from all other treatments followed by F_2 (125% of recommended doses of fertilizer) and F_3 (75% of the recommended doses of fertilizer). The lowest base diameter (0.57 and 1.82 cm at 20 and 40 DAS, respectively) was found from the control treatment F_0 (No fertilizer application) which was also significantly different from all other treatments.

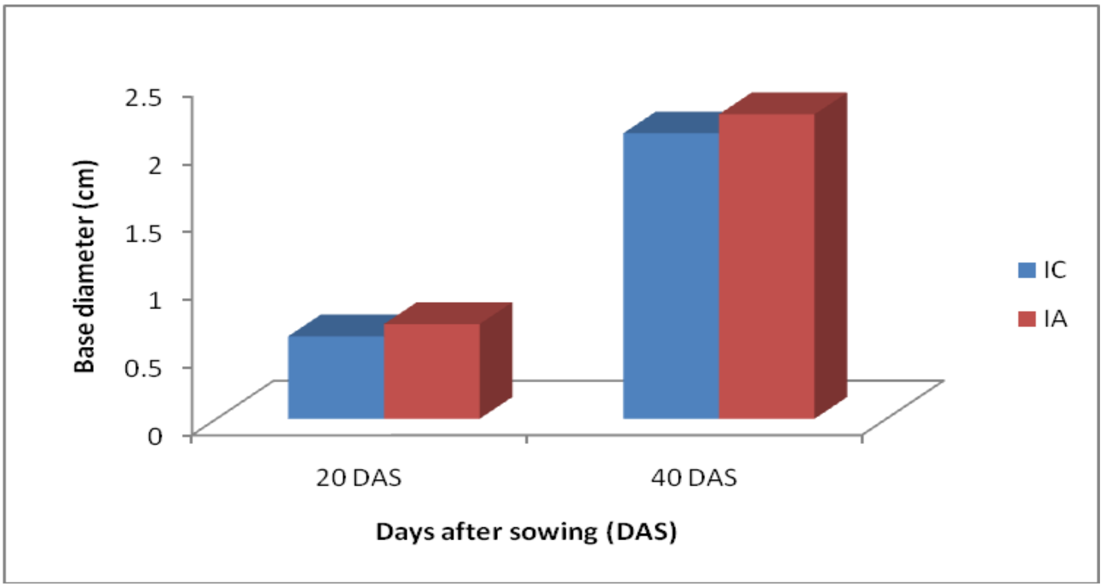

Figure 5. Base diameter of baby corn influenced by irrigation levels ($LSD_{0.05}$ = NS and 0.011 at 20 and 40, respectively)

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

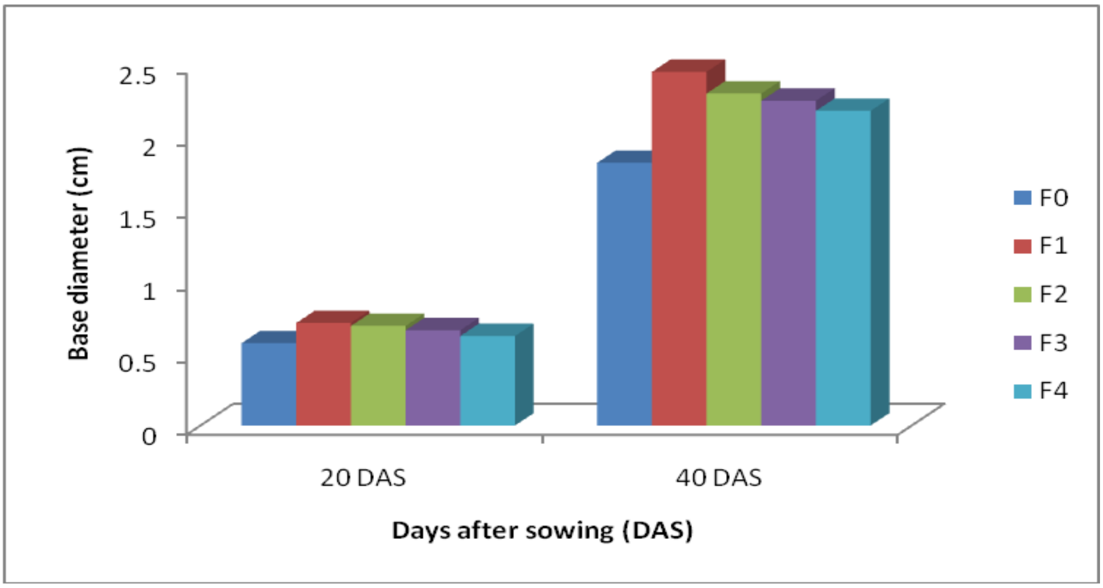

Figure 6. Base diameter of baby corn influenced by fertilizer management ($LSD_{0.05}$ = NS and 0.132 at 20 and 40 DAS, respectively)

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

Combined effect of irrigation and fertilizer

Significant variation was not found on base diameter at 20 DAS but it was significantly influenced at 40 DAS influenced by combined effect of irrigation and fertilizer treatments (Table 3 and Appendix VII). At 40 DAS, the highest base diameter (0.77 and 2.55 cm at 20 and 40 DAS, respectively) was observed from the treatment combination of I_AF_1 which was statistically similar with the treatment combination of I_CF_2 and I_CF_3. The lowest base diameter (0.44 and 1.85 cm at 20 and 40 DAS, respectively) was found from treatment combination of I_CF_0 which was statistically identical with the treatment combination of I_AF_0 and statistically similar with I_AF_5.

Table 3. Base diameter of baby corn influenced by combined effect of irrigation levels and fertilizer management

Treatment	Base diameter (cm) at different days after sowing (DAS)	
	20	40
I_CF_0	0.44	1.85 f
I_CF_1	0.69	2.34 bc
I_CF_2	0.69	2.46 ab
I_CF_3	0.10	2.44 ab
I_CF_4	0.70	2.24 cd
I_CF_5	0.62	2.16 cde
I_AF_0	0.52	1.79 f
I_AF_1	0.77	2.55 a
I_AF_2	0.72	2.13 de
I_AF_3	0.55	2.06 de
I_AF_4	0.72	2.13 de
I_AF_5	0.74	1.97 ef
$LSD_{0.05}$	NS	0.179
CV(%)	4.78	4.06

I_C = Conventional irrigation, I_A = Alternate furrow irrigation
F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

4.1.4 Seed moisture content (%)

Effect of irrigation

Significant variation was observed on seed moisture content at different growth stages influenced by different irrigation treatment (Fig. 7 and Appendix VIII). The highest seed moisture content (26.73 and 29.11% at 30 and 50 DAS, respectively) was recorded from the treatment I_C (Conventional irrigation) and the lowest seed moisture content (24.14 and 26.09% at 30 and 50 DAS, respectively) was obtained from the treatment I_A (Alternate furrow irrigation).

Effect of fertilizer

Moisture content of seed was significantly influenced by different fertilizer treatments at different growth stages (Fig. 8 and Appendix VIII). At 50 DAS, the highest seed moisture content (27.40 and 30.73% at 30 and 50 DAS, respectively) was achieved from the treatment F_2 (125% of recommended doses of fertilizer) which was significantly different from all other treatments where the lowest seed moisture content (22.15 and 25.48% at 30 and 50 DAS, respectively) was recorded from the control treatment F_0 (No fertilizer application).

Combined effect of irrigation and fertilizer

There was a significant variation on seed moisture content influenced by combined effect of irrigation and fertilizer treatments at different growth stages (Table 4 and Appendix VIII). The highest seed moisture content (29.95 and 33.13% at 30 and 50 DAS, respectively) was observed from the treatment combination of I_CF_2 which was statistically identical with the treatment combination of I_CF_4 at all growth stages. The lowest seed moisture content (20.05 and 22.33% at 30 and 50 DAS, respectively) was recorded from the treatment combination of I_AF_0 which was significantly different from all other treatment combinations at all growth stages.

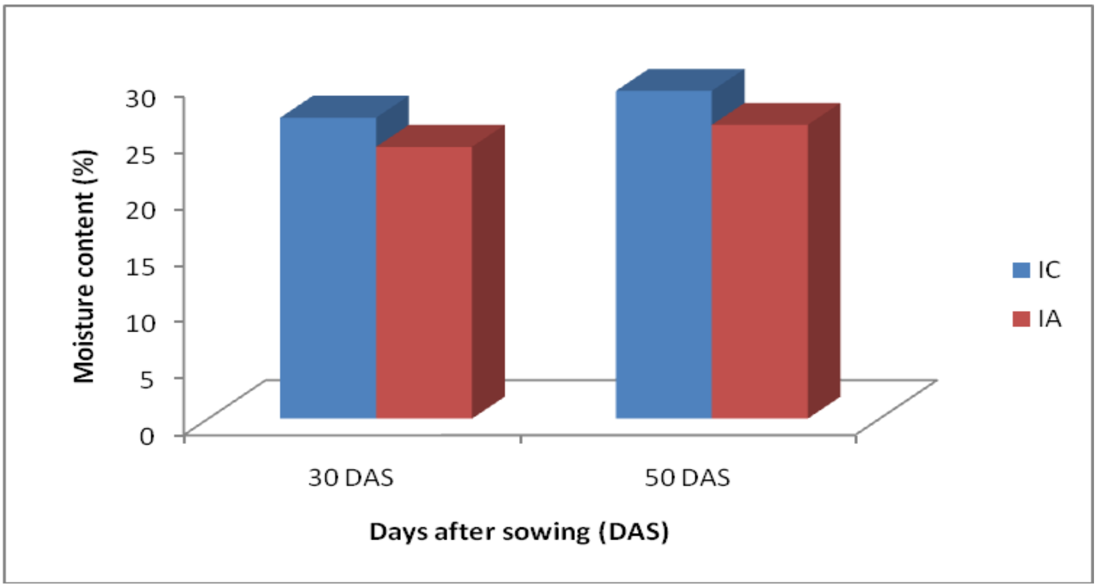

Figure 7. Seed moisture content (%) of baby corn influenced by irrigation levels ($LSD_{0.05}$ = 0.963 and 1.052 at 30 and 50 DAS, respectively)

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

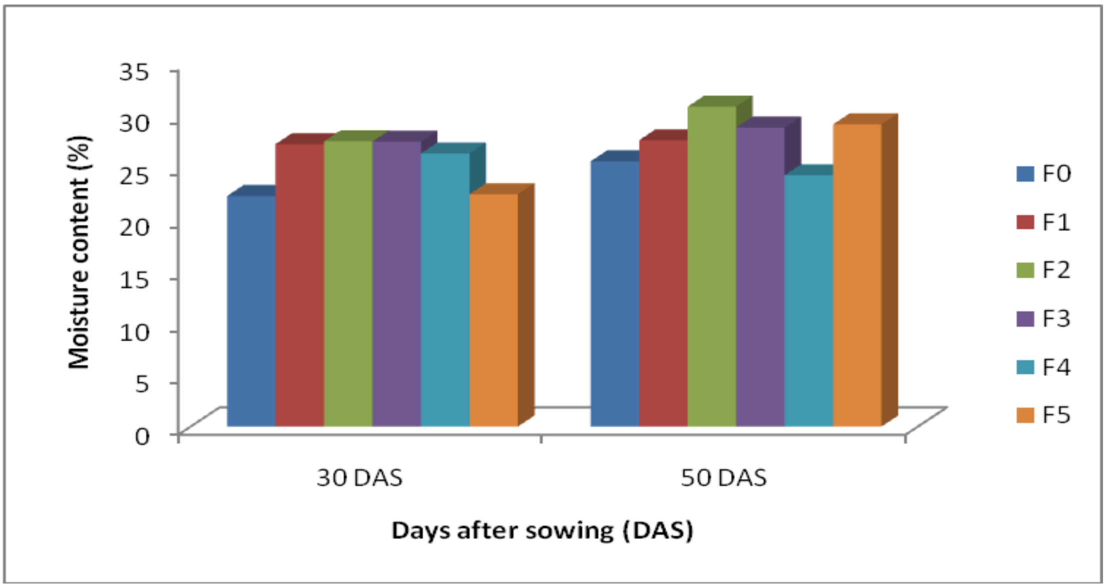

Figure 8. Seed moisture content (%) of baby corn influenced by fertilizer management ($LSD_{0.05}$ = 0.864 and 0.981 at 30 and 50 DAS, respectively)

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

Table 4. Seed moisture content (%) of baby corn influenced by irrigation levels and fertilizer management

Treatment	Seed moisture content (%) at different days after sowing (DAS)	
	30	50
I_CF_0	23.13 d	26.21 cd
I_CF_1	26.97 b	29.51 b
I_CF_2	29.95 a	33.13 a
I_CF_3	26.97 b	25.95 d
I_CF_4	29.12 a	32.31 a
I_CF_5	24.24 c	27.53 c
I_AF_0	20.05 f	22.33 f
I_AF_1	27.82 b	25.51 de
I_AF_2	25.13 c	24.31 e
I_AF_3	27.77 b	29.14 b
I_AF_4	22.54 de	24.74 de
I_AF_5	21.50 e	30.52 b
$LSD_{0.05}$	1.084	1.488
CV(%)	10.87	13.44

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

4.2 Yield contributing parameter

4.2.1 Cob diameter (cm)

Effect of irrigation

Cob diameter was not significantly varied due to different irrigation treatment (Table 5 and Appendix IX). However, the highest cob diameter (6.79 cm) was recorded from the treatment I_A (Alternate furrow irrigation) and the lowest cob diameter (6.18 cm) was obtained from the treatment I_C (Conventional irrigation). Similar result was also observed by Kashiani *et al.* (2019).

Effect of fertilizer

Remarkable variation was observed on cob diameter influenced by different fertilizer treatments (Table 5 and Appendix IX). The highest cob diameter (6.85 cm) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was statistically identical with F_5 (25% of recommended doses of fertilizer) where the lowest cob diameter (6.05 cm) was found from the control treatment F_0 (No fertilizer application). Similar result was also observed by Grazia *et al.* (2003) which supported the present study.

Combined effect of irrigation and fertilizer

Significant influence was noted on cob diameter affected by combined effect of irrigation and fertilizer treatments (Table 5 and Appendix IX). The highest cob diameter (7.03 cm) was observed from the treatment combination of $I_AF_1$which was statistically identical with I_CF_1 and statistically similar with the treatment combination of $I_AF_5$where the lowest cob diameter (5.67 cm) was found from treatment combination of I_CF_0 which was significantly different from all other treatment combinations.

4.2.2 Cob length (cm)

Effect of irrigation

Cob length was not varied significantly due to different irrigation treatment (Table 5 and Appendix IX). However, the highest cob length (16.83 cm) was recorded from the treatment I_A (Alternate furrow irrigation) and the lowest cob length (16.28 cm) was obtained from the treatment I_C (Conventional irrigation).

Effect of fertilizer

Significant variation was remarked on cob length as influenced by different fertilizer treatments (Table 5 and Appendix IX). The highest cob length (17.33 cm) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was significantly different from all other treatments where the lowest cob length (15.83 cm) was found from the control treatment F_0 (No fertilizer application). The result obtained from the present study agrees well with the findings of Kalpana and Anbumani (2003), Gosavi *et al*. (2006) and Aravinth *et al*. (2011).

Combined effect of irrigation and fertilizer

Cob length was found significant affected by the combined effect of irrigation and fertilizer treatments (Table 5 and Appendix IX). The highest cob length (18.00 cm) was observed from the treatment combination of I_AF_1 which was significantly different from all other treatment combinations where the lowest cob length (15.33cm) was found from treatment combination of I_CF_0 which was also significantly different from all other treatment combinations.

4.2.3 Fresh single cob weight with husk at harvest (g)

Effect of irrigation

Fresh single cob weight with husk at harvest was not significantly varied due to different irrigation treatment (Table 5 and Appendix IX). However, the highest fresh single cob weight with husk at harvest (40.47 g) was recorded from the treatment I_A (Alternate furrow irrigation) and the lowest fresh single cob weight with husk at harvest (40.41 g) was obtained from the treatment I_C (Conventional irrigation). Kashiani *et al.* (2019) also found similar result which supported the present study.

Effect of fertilizer

Remarkable variation was observed on fresh single cob weight with husk at harvest influenced by different fertilizer treatments (Table 5 and Appendix IX).The highest fresh single cob weight with husk at harvest (42.47 g) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was statistically identical with F_4 (50% of the recommended doses of fertilizer) and F_5 (25% of recommended doses of fertilizer).The lowest fresh single cob weight with husk at harvest (36.77 g) was found from the control treatment F_0 (No fertilizer application). Kunjir (2004) found similar result which supported the present study.

Combined effect of irrigation and fertilizer

Significant influence was noted on fresh single cob weight with husk at harvest affected by combined effect of irrigation and fertilizer treatments (Table 5 and Appendix IX). The highest fresh single cob weight with husk at harvest (46.07 g) was observed from the treatment combination of I_AF_1 which was statistically identical with $I_CF_1$and statistically similar with I_AF_5. The lowest fresh single cob weight with husk at harvest (34.07 g) was found from treatment combination of $I_CF_0$which was statistically identical with I_AF_0.

4.2.4 Total fresh weight plant^{-1} at harvest (g)

Effect of irrigation

Total fresh weight plant^{-1} at harvest varied significantly due to different irrigation treatment (Table 5 and Appendix IX). The highest total fresh weight plant^{-1} at harvest (536.89 g) was recorded from the treatment I_A (Alternate furrow irrigation) and the lowest total fresh weight plant^{-1} at harvest (523.17 g) was obtained from the treatment I_C (Conventional irrigation). Similar result was also observed by Kashiani *et al.* (2019) which supported the present study.

Effect of fertilizer

Significant variation was remarked on total fresh weight plant^{-1} at harvest as influenced by different fertilizer treatments (Table 5 and Appendix IX).The highest total fresh weight plant^{-1} at harvest (617.3 g) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was significantly different from all other treatments where the lowest total fresh weight plant^{-1} at harvest (411.0 g) was found from the control treatment F_0 (No fertilizer application) which was also significantly different from all other treatments. The result obtained from the present study was similar with the findings of Kunjir (2004).

Combined effect of irrigation and fertilizer

Total fresh weight plant^{-1} at harvest was significantly affected by combined effect of irrigation and fertilizer treatments (Table 5 and Appendix IX). The highest total fresh weight plant^{-1} at harvest (795.3 g) was observed from the treatment combination of I_AF_1 which was significantly different from all other treatment combinations followed by I_CF_1 and I_AF_5. The lowest total fresh weight plant^{-1} at harvest (376.7 g) was found from the treatment combination of $I_CF_0$which was also significantly different from all other treatment combinations followed by I_AF_0.

4.2.5 Dry weight plant^{-1} at harvest (g)

Effect of irrigation

Significant variation was marked on dry weight plant^{-1} at harvest as influenced by different irrigation treatment (Table 5 and Appendix IX). The highest dry weight plant^{-1} at harvest (87.93 g) was recorded from the treatment I_A

(Alternate furrow irrigation) and the lowest dry weight plant^{-1} at harvest (72.68 g) was obtained from the treatment I_C (Conventional irrigation). Nasri *et al.* (2010) also found similar result which supported the present study.

Effect of fertilizer

Dry weight plant^{-1} at harvest was found significant with the application of different fertilizer treatments (Table 5 and Appendix IX).The highest dry weight plant^{-1} at harvest (87.33 g) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was significantly different from all other treatments where the lowest dry weight plant^{-1} at harvest (73.33 g) was found from the control treatment F_0 (No fertilizer application) which was also significantly different from all other treatments. The result obtained from the present study was similar with the findings of Pinjari (2007).

Combined effect of irrigation and fertilizer

Variation on dry weight plant^{-1} at harvest was noted significant influenced by combined effect of irrigation and fertilizer treatments (Table 5 and Appendix IX).The highest dry weight plant^{-1} at harvest (95.67 g) was observed from the treatment combination of I_AF_1 which was significantly different from all other treatment combinations followed by I_CF_1 and I_AF_5.The lowest dry weight plant^{-1} at harvest (61.33 g) was found from treatment combination of I_CF_0 which was statistically identical with I_AF_1.

4.2.6 Dry weight of 5 cobs with husk (g)

Effect of irrigation

The recorded data on dry weight plant^{-1} without husk at harvest was significant with the application of different irrigation treatment (Table 5 and Appendix IX). The highest dry weight of 5 cobs with husk (68.11 g) was recorded from the treatment I_A (Alternate furrow irrigation) where the lowest dry weight of 5 cobs with husk (66.37 g) was obtained from the treatment I_C (Conventional irrigation). The result obtained from the present study was similar with the findings of Shayannejad and Moharrery (2009).

Effect of fertilizer

Considerable influence was observed on dry weight plant^{-1} without husk at harvest persuaded by different fertilizer treatments (Table 5 and Appendix IX). The highest dry weight of 5 cobs with husk (74.84 g) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was significantly different from all other treatments followed by F_5 (25% of recommended doses of fertilizer). The lowest dry weight of 5 cobs with husk (61.23 g) was found from the control treatment F_0 (No fertilizer application) which was also significantly different from all other treatments followed by F_2 (125% of recommended doses of fertilizer) and F_3 (75% of the recommended doses of fertilizer). Pinjari (2007) found similar result which supported the present study.

Combined effect of irrigation and fertilizer

Remarkable variation was identified on dry weight plant^{-1} without husk at harvest due to the combined effect of irrigation and fertilizer treatments (Table 5 and Appendix IX).The highest dry weight of 5 cobs with husk (78.05 g) was observed from the treatment combination of I_AF_1 which was significantly different from all other treatment combinations where the lowest dry weight of 5 cobs with husk (55.65 g) was found from treatment combination of $I_CF_0$which was statistically identical with the treatment combination of I_AF_0.

4.2.7 Dry weight of single cob without husk (g)

Effect of irrigation

Dry weight of single cob without husk was significantly influenced by different irrigation treatment (Table 5 and Appendix IX). The highest dry weight of single cob without husk (5.47 g) was recorded from the treatment I_A (Alternate furrow irrigation) and the lowest dry weight of single cob without husk (5.14 g) was obtained from the treatment I_C (Conventional irrigation). The result obtained from the present study was similar with the findings of Shayannejad and Moharrery (2009) and Nasri *et al.* (2010).

Effect of fertilizer

Dry weight of single cob without husk was significantly influenced by different fertilizer treatments (Table 5 and Appendix IX). The highest dry weight of single cob without husk (6.59 g) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was significantly different from all other treatments followed by F_5 (25% of recommended doses of fertilizer). The lowest dry weight of single cob without husk (4.47 g) was found from the control treatment F_0 (No fertilizer application) which was statistically identical with F_2 (125% of recommended doses of fertilizer). Similar result was also observed by Pinjari (2007) which supported the present study.

Combined effect of irrigation and fertilizer

Dry weight of single cob without husk was significantly influenced by combined effect of irrigation and fertilizer treatments (Table 5 and Appendix IX). The highest dry weight of single cob without husk (7.74 g) was observed from the treatment combination of I_AF_1 which was significantly different from all other treatment combinations followed by I_CF_1. The lowest dry weight of single cob without husk (4.44 g) was found from treatment combination of $I_CF_0$which was statistically identical with I_CF_2 and statistically similar with I_AF_2.

Table 5. Yield contributing parameters of baby corn influenced by irrigation levels and fertilizer management

Treatment	Yield contributing parameter						
	Cob diameter (cm)	Cob length (cm)	Fresh single cob weight with husk (g) at harvest	Total fresh weight $plant^{-1}$ at harvest	Dry weight $plant^{-1}$ (g) at harvest	Dry weight of 5 cob with husk	Dry weight of single cob without husk
Effect of irrigation							
I_C	6.18	16.28	40.41	523.17 b	72.68 b	66.37 b	5.14 b
I_A	6.79	16.83	40.47	536.89 a	87.93 a	68.11 a	5.47 a
$LSD_{0.05}$	NS	NS	NS	3.471	3.876	1.032	0.204
CV(%)	4.13	3.26	7.52	8.37	5.56	5.22	5.87
Effect of fertilizer							
F_0	6.05 c	15.83 d	36.77 c	411.0 f	73.33 c	61.23 e	4.47 e
F_1	6.85 a	17.33 a	42.47 a	617.3 a	87.33 a	74.84 a	6.59 a
F_2	6.35 b	16.83 b	39.17 b	521.8 e	79.17 b	63.67 d	4.52 e
F_3	6.38 b	16.33 c	40.13 b	536.3 d	80.43 b	63.69 d	5.03 d
F_4	6.47 b	16.50 c	41.70 a	543.0 c	80.63 b	67.88 c	5.38 c
F_5	6.82 a	16.50 c	42.40 a	550.7 b	80.93 b	72.13 b	5.84 b
$LSD_{0.05}$	0.114	0.2639	1.231	3.622	1.869	2.051	0.178
CV(%)	5.72	5.33	10.58	13.25	5.90	7.67	6.05
Combined effect of irrigation and fertilizer							
I_CF_0	5.67 e	15.33 d	34.07 f	376.7 i	61.33 f	55.65 g	4.44 g
I_CF_1	7.03 a	17.00 b	45.93 a	656.0 b	90.20 b	73.78 b	5.96 b
I_CF_2	6.00 d	16.67 bc	36.20 e	439.3 g	71.93 d	62.58 f	4.49 g
I_CF_3	6.10 d	16.67 bc	39.00 d	448.0 f	73.73 d	63.75 f	4.75 f
I_CF_4	6.80 bc	16.33 c	39.80 d	470.0 e	85.07 c	70.24 d	5.30 de
I_CF_5	6.83 bc	16.33 c	44.27 bc	616.0 c	87.13 bc	71.62 cd	5.69 c
I_AF_0	5.93 d	16.67 bc	34.20 f	387.7 h	65.60 e	57.09 g	4.45 g
I_AF_1	7.03 a	18.00 a	46.07 a	795.3 a	95.67 a	78.05 a	7.74 a
I_AF_2	6.00 d	16.67 bc	37.33 e	445.3 f	73.27 d	63.62 f	4.59 fg
I_AF_3	6.67 c	16.33 c	39.27 d	469.7 e	84.47 c	66.82 e	5.08 e
I_AF_4	6.83 bc	16.33 c	43.60 c	603.0 d	85.33 c	70.47 d	5.43 d
I_AF_5	6.93 ab	16.33 c	45.53 ab	653.3 b	89.93 b	73.18 bc	5.73 bc
$LSD_{0.05}$	0.178	0.4757	1.565	5.398	3.600	1.787	0.235
CV(%)	5.72	5.33	10.58	13.25	5.90	7.67	6.05

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

4.3 Yield parameter

4.3.1 Fresh 5 cob weight without husk (g)

Effect of irrigation

Significant variation was observed on fresh 5 cob weight without husk at harvest at different growth stages influenced by different irrigation treatment (Table 6 and Appendix X). The highest fresh 5 cob weight without husk at harvest (74.25 g) was recorded from the treatment I_A (Alternate furrow irrigation) and the lowest fresh 5 cob weight without husk at harvest (69.45 g) was obtained from the treatment I_C (Conventional irrigation). Similar result was also observed by Kashiani *et al.* (2019) which supported the present study.

Effect of fertilizer

Significant influence was noted on fresh 5 cob weight without husk at harvest affected by different fertilizer treatments (Table 6 and Appendix X). The highest fresh 5 cob weight without husk at harvest (83.31 g) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was statistically identical with F_5 (25% of recommended doses of fertilizer). The lowest fresh 5 cob weight without husk at harvest (62.49 g) was found from the control treatment F_0 (No fertilizer application) which was significantly different from all other treatments followed by F_2 (125% of recommended doses of fertilizer). The result obtained from the present study was similar with the findings of Arya and Singh (2001) and Auwal and Amit (2017).

Combined effect of irrigation and fertilizer

The recorded data on fresh 5 cob weight without husk at harvest was significantly influence by combined effect of irrigation and fertilizer treatments (Table 6 and Appendix X). The highest fresh 5 cob weight without husk at harvest (96.01) was observed from the treatment combination of I_AF_1 which was significantly different from all other treatment combinations followed by

I_CF_1 and I_AF_5. The lowest fresh 5 cob weight without husk at harvest (59.93) was found from treatment combination of $I_CF_0$which was also significantly different from all other treatment combinations.

4.3.2 Fresh cob yield without husk (t ha^{-1})

Effect of irrigation

Significant variation was observed on fresh baby corn (cob) yield without husk at different growth stages influenced by different irrigation treatment (Table 6 and Appendix X). The highest fresh baby corn (cob) yield without husk (1.86 t ha^{-1}) was recorded from the treatment I_A (Alternate furrow irrigation) and the lowest fresh baby corn (cob) yield without husk (1.74 t ha^{-1}) was obtained from the treatment I_C (Conventional irrigation). The result obtained from the present study was similar with the findings of Moldden *et al*. (2010), Yonts *et al.*, 2003 and Kashiani *et al.* (2019).

Effect of fertilizer

Significant influence was noted on fresh baby corn (cob) yield without husk affected by different fertilizer treatments (Table 6 and Appendix X). The highest fresh baby corn (cob) yield without husk (2.24 t ha^{-1}) was achieved from the treatment F_1 (Recommended doses of fertilizer) which was significantly different from all other treatments followed by F_5 (25% of recommended doses of fertilizer). The lowest fresh baby corn (cob) yield without husk (1.55 t ha^{-1}) was found from the control treatment F_0 (No fertilizer application). Auwal and Amit (2017), Arya and Singh (2001) and Raja (2001) also found similar result which supported the present study.

Table 6. Yield parameters of baby corn influenced by irrigation levels and fertilizer management

.	Yield parameter	
	Fresh 5 cob weight without husk (g) at harvest	Fresh cob yield without husk (t ha^{-1})
Effect of irrigation		
I_C	69.45 b	1.74 b
I_A	74.25 a	1.86 a
$LSD_{0.05}$	1.385	0.107
CV(%)	8.67	5.214
Effect of fertilizer		
F_0	62.49 e	1.55 e
F_1	83.31 a	2.24 a
F_2	64.50 d	1.61 d
F_3	68.29 c	1.64 d
F_4	70.21 b	1.80 c
F_5	82.31 a	1.96 b
$LSD_{0.05}$	1.426	0.136
CV(%)	13.18	7.386
Combined effect of irrigation and fertilizer		
I_CF_0	59.93 f	1.50 e
I_CF_1	82.82 b	2.07 b
I_CF_2	63.63 e	1.59 d
I_CF_3	65.37 e	1.63 d
I_CF_4	70.60 d	1.77 c
I_CF_5	74.43 c	1.86 c
I_AF_0	63.58 e	1.59 d
I_AF_1	96.01 a	2.40 a
I_AF_2	65.04 e	1.63 d
I_AF_3	65.99 e	1.65 d
I_AF_4	73.00 cd	1.83 c
I_AF_5	81.80 b	2.05 b
$LSD_{0.05}$	2.584	0.112
1CV(%)	13.18	7.386

I_C = Conventional irrigation, I_A = Alternate furrow irrigation

F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer

Combined effect of irrigation and fertilizer

The recorded data on fresh baby corn (cob) yield without husk was significantly influence by combined effect of irrigation and fertilizer treatments (Table 6 and Appendix X). The highest fresh baby corn (cob) yield without husk (2.40 t ha^{-1}) was observed from the treatment combination of I_AF_1 which was significantly different from all other treatment combinations followed by I_CF_1 and I_AF_5.The lowest fresh baby corn (cob) yield without husk (1.50 t ha^{-1}) was found from treatment combination of I_CF_0.

CHAPTER V

SUMMARY AND CONCLUSION

The present research work was conducted at the experimental field of Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka during the period from January to March, 2018 to study the effect of alternate furrow irrigation and different fertilizer management on the yield of baby corn. The experiment comprised of 2 different irrigation levels *viz*. I_C = Conventional irrigation, I_A = Alternate furrow irrigation and 6different fertilizer treatments viz., F_0 = No fertilizer application (control), F_1 = Recommended doses of fertilizer, F_2 =125% of recommended doses of fertilizer, F_3 = 75% of the recommended doses of fertilizer, F_4 = 50% of the recommended doses of fertilizer, F_5 = 25% of recommended doses of fertilizer and their combination. Hybrid baby corn “Baby Star” variety was used for the present study. The experiment was laid out in Split Plot Design with three replications. Results showed that a significant influence was observed among the treatments regarding all of the parameters observed. The collected data were statistically analyzed for evaluation of the treatment effect.

Different parameters studied on growth and yield affected by irrigation treatments, significant influence was found except cob diameter, cob length and single cob weight with husk. Results revealed that in terms of growth parameters, the highest plant height (14.49, 113.96 and 202.58 cm at 20, 40 and 60 DAS, respectively), number of leaves plant^{-1} (6.56, 12.17 and 16.20 at 20, 40 and 60 DAS, respectively) and seed moisture content (26.73 and 29.11% at 30 and 50 DAS, respectively) were recorded from the treatment I_C (Conventional irrigation) but the highest base diameter (0.70 and 2.25 cm at 20 and 40 DAS, respectively) was recorded from the treatment I_A (Alternate furrow irrigation) where the lowest plant height (13.67, 114.53, 195.75 cm at 20, 40 and 60 DAS, respectively) lowest number of leaves plant^{-1} (6.00, 12.15 and 16.17 at 20, 40 and 60 DAS, respectively) and lowest seed moisture content (24.14 and 26.09% at 30 and 50 DAS, respectively) were obtained from I_A (Alternate furrow irrigation) but the lowest base diameter (0.61 and 2.11 cm at 20 and 40 DAS, respectively) was obtained from the treatment I_C (Conventional irrigation).Regarding yield contributing parameters and yield, the highest cob diameter (6.79 cm), cob length (16.83 cm), fresh single cob weight at harvest (40.47 g), total fresh weight plant^{-1} at harvest (536.89 g), dry weight plant^{-1} at harvest (87.93 g), dry weight of 5 cobs with husk (68.11 g), dry weight of single cob without husk (5.47 g), fresh 5 cob weight without husk at harvest (74.25 g) and fresh baby corn (cob) yield without husk (1.86 t ha^{-1}) were recorded from the treatment I_A (Alternate furrow irrigation) whereas the lowest cob diameter (6.18 cm), cob length (16.28 cm), fresh single cob weight with husk at harvest (40.41 g), total fresh weight plant^{-1} with husk at harvest (523.17 g), dry weight plant^{-1} without husk at harvest (72.68 g), dry weight of 5 cobs with husk (66.37 g), dry weight of single cob without husk (5.14 g), fresh 5 cob weight without husk at harvest (69.45 g) and fresh baby corn (cob) yield without husk (1.74 t ha^{-1}) were obtained from the treatment I_C (conventional irrigation).

Different nutrient treatments also showed significant variation of different growth and yield parameters. Considering, growth parameters, the highest plant height (15.39, 121.3 and 208.3 cm at 20, 40 and 60 DAS, respectively) was achieved from the treatment F_2 (125% of recommended doses of fertilizer) and seed moisture content (27.40 and 30.73% at 30 and 50 DAS, respectively) were achieved from the treatment F_2 (125% of recommended doses of fertilizer) but the highest number of leaves plant^{-1} (6.52, 12.83 and 16.35 at 20, 40 and 60 DAS, respectively) and highest base diameter (0.71 and 2.45 cm at 20 and 40 DAS, respectively) were achieved from the treatment F_1 (Recommended doses of fertilizer) where the lowest plant height (13.47, 107.4 and 194.1 cm at 20, 40 and 60 DAS, respectively), lowest number of leaves plant^{-1} (5.83, 11.80 and 15.67 at 20, 40 and 60 DAS, respectively), lowest base diameter (0.57 and 1.82 cm at 20 and 40 DAS, respectively) and lowest seed moisture content (22.15

and 25.48% at 30 and 50 DAS, respectively) were found from the control treatment F_0 (No fertilizer application).Regarding, yield contributing parameters and yield, the highest cob diameter (6.85 cm), cob length (17.33 cm), fresh single cob weight with husk at harvest (42.47 g), total fresh weight plant^{-1} with husk at harvest (617.3 g), dry weight plant^{-1} without husk at harvest (87.33 g), dry weight of 5 cobs with husk (74.84 g), dry weight of single cob without husk (6.59 g), fresh 5 cob weight without husk at harvest (83.31 g) and fresh baby corn (cob) yield without husk (2.24 t ha^{-1}) were achieved from the treatment F_1 (Recommended doses of fertilizer) whereas, the lowest cob diameter (6.05 cm), cob length (15.83 cm), fresh single cob weight with husk at harvest (36.77 g), total fresh weight plant^{-1} with husk at harvest (411.0 g), dry weight plant^{-1} without husk at harvest (73.33 g), dry weight of 5 cobs with husk (61.23 g), dry weight of single cob without husk (4.47 g), fresh 5 cob weight without husk at harvest (62.49 g) and fresh baby corn (cob) yield without husk (1.55 t ha^{-1}) were found from the control treatment F_0 (No fertilizer application).

Combination of different irrigation and nutrient showed significant variation on different growth and yield parameters of baby corn. Considering, growth parameters, the highest plant height (16.37, 129.5 and 222.2 cm at 20, 40 and 60 DAS, respectively) and seed moisture content (29.95 and 33.13% at 30 and 50 DAS, respectively) were achieved from the treatment combination of I_CF_2 but the highest number of leaves plant^{-1} (7.33, 13.00 and 16.67 at 20, 40 and 60 DAS, respectively) was observed from the treatment combination of I_CF_1 and the highest base diameter (0.77 and 2.55 cm at 20 and 40 DAS, respectively) was observed from the treatment combination of I_AF_1. Similarly, the lowest plant height (11.15, 103.2 and 191.8 cm at 20, 40 and 60 DAS, respectively), number of leaves plant^{-1} (5.00, 11.33 and 15.33 at 20, 40 and 60 DAS, respectively) and seed moisture content (20.05 and 22.33% at 30 and 50 DAS, respectively) were observed from the treatment combination of I_AF_0 but the lowest base diameter (0.44 and 1.85 cm at 20 and 40 DAS, respectively) was found from the treatment combination of I_CF_0

Regarding, yield contributing parameters and yield, the highest cob diameter (7.03 cm), highest cob length (18.00 cm), highest fresh single cob weight with husk at harvest (46.07 g), highest total fresh weight plant^{-1} with husk at harvest (795.3 g), highest dry weight plant^{-1} without husk at harvest (95.67 g), highest dry weight of 5 cobs with husk (78.05 g), highest dry weight of single cob without husk (7.74 g), highest fresh 5 cob weight without husk at harvest (96.01) and fresh baby corn (cob) yield without husk (2.40 t ha^{-1}) were observed from the treatment combination of I_AF_1 whereas the lowest cob diameter (5.67 cm), cob length (16.67 cm), fresh single cob weight with husk at harvest (34.07 g), total fresh weight plant^{-1} with husk at harvest (376.7 g), dry weight plant^{-1} without husk at harvest (61.33 g), dry weight of 5 cobs with husk (55.65 g), dry weight of single cob without husk (4.44 g), fresh 5 cob weight without husk at harvest (59.93) and fresh baby corn (cob) yield without husk (1.50 t ha^{-1}) was found from the treatment combination of $I_CF_{0.}$

From the above results, it may be concluded that I_A (Alternate furrow irrigation) treatment showed the better performance on growth, yield contributing characters and yield of baby corn. Again, fertilizer treatment at recommended dose (F_1) showed the better performance on growth and yield contributing characters and yield of baby corn. The treatment combination, I_A (Alternate furrow irrigation) with F_1 (Recommended doses of fertilizer) (I_AF_1) performed best results regarding growth, yield contributing parameters and yield of baby corn. On the experimental condition the treatment combination of $I_AF_1$can be considered as the best treatment for maintaining the yield of baby corn.

Recommendations

Considering the above observation of the present experiment, following recommendations may be suggested.

1. Similar experiments on baby corn can be conducted in different agro-ecological zones (AEZ) of Bangladesh to assess the effect of the regional variability for final recommendation.

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APPENDICES

Appendix I. Agro-Ecological Zone of Bangladesh showing the experimental location

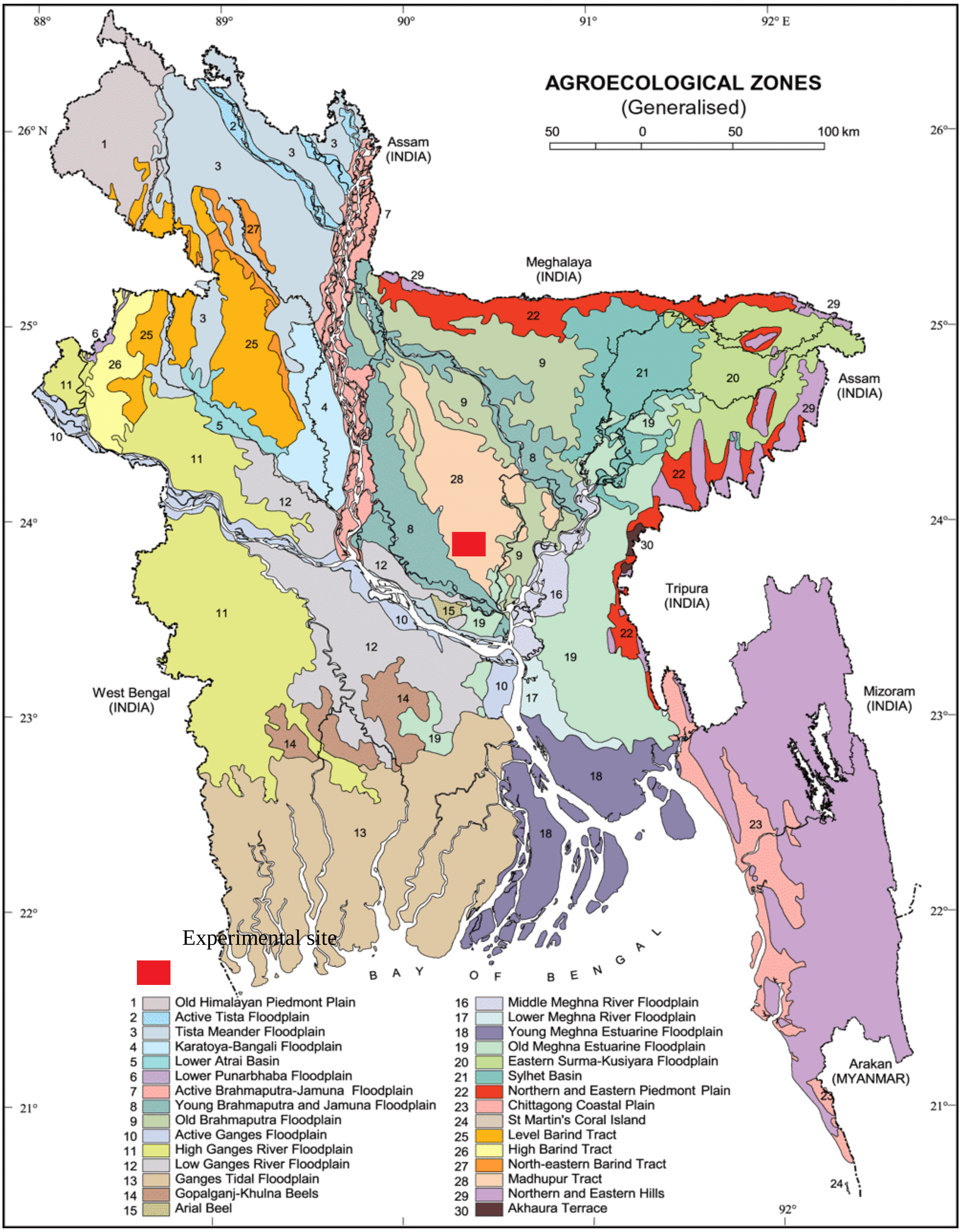

Fig. 9. Experimental site

Appendix II. Monthly records of air temperature, relative humidity and rainfall during the period from January to March 2018.

Year	Month	Air temperature (°C)			Relative humidity (%)	Total rainfall (mm)
		Max	*Min*	*Mean*		
2018	January	23.80	11.70	17.75	46.20	0.0
2018	February	22.75	14.26	18.51	37.90	0.0
2018	March	35.20	21.00	28.10	52.44	20.4

Source: Bangladesh Meteorological Department (Climate division), Agargaon, Dhaka-1212.

Appendix III. Characteristics of experimental soil

A. Morphological characteristics of the experimental field

Morphological features	**Characteristics**
Location	Agronomy Farm, SAU, Dhaka
AEZ	Modhupur Tract (28)
General Soil Type	Shallow red brown terrace soil
Land type	High land
Soil series	Tejgaon
Topography	Fairly leveled
Flood level	Above flood level
Drainage	Well drained
Cropping pattern	Not Applicable

Source: Soil Resource Development Institute (SRDI)

B. Physical and chemical properties of the initial soil

Characteristics	**Value**
Partical size analysis % Sand	27
%Silt	43
% Clay	30
Textural class	Silty Clay Loam (ISSS)
pH	5.6
Organic carbon (%)	0.45
Organic matter (%)	0.78
Total N (%)	0.03
Available P (ppm)	20
Exchangeable K (me/100 g soil)	0.1
Available S (ppm)	45

Source: Soil Resource Development Institute (SRDI)

Appendix IV. Layout of the experiment field

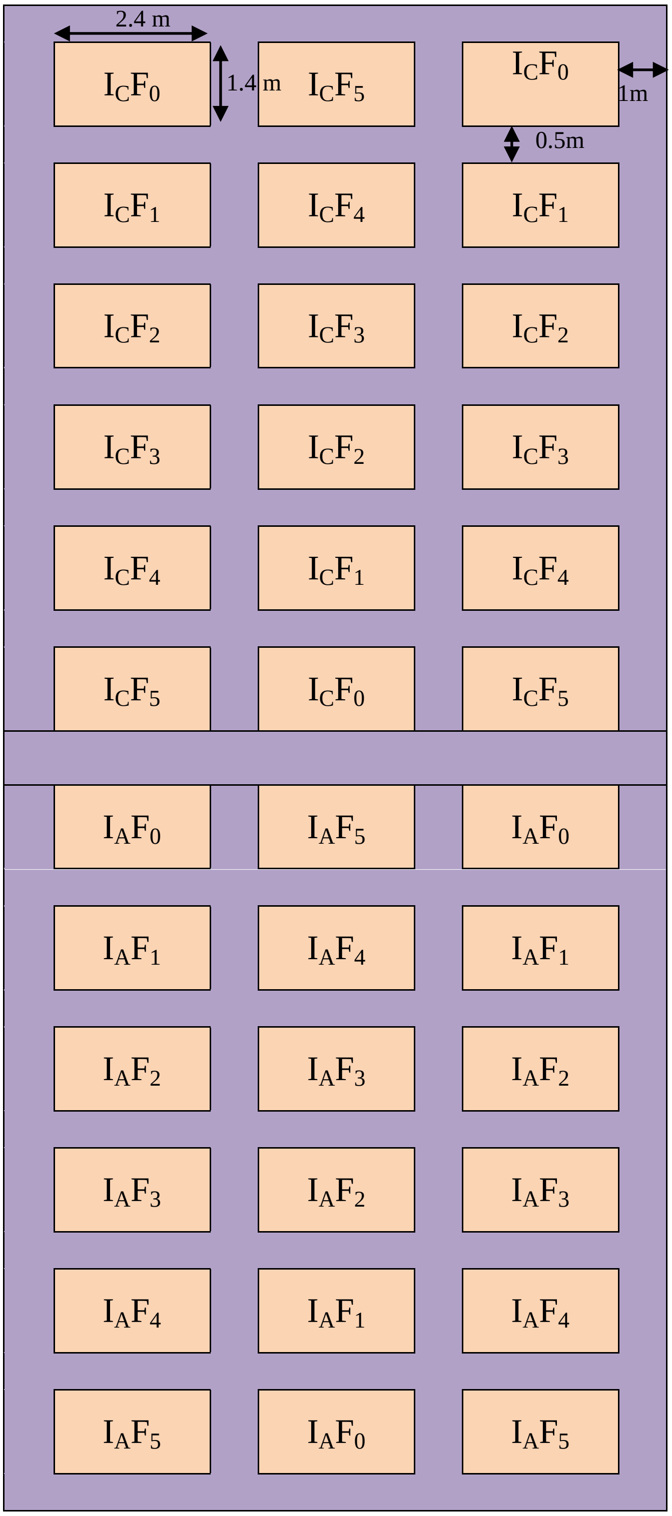

Fig. 10. Layout of the experimental plot

Appendix V. Plant height of baby corn influenced by combined effect of irrigation levels and fertilizer management

Sources of variation	Degrees of freedom	Plant height (cm)		
		20 DAS	40 DAS	60 DAS
Replication	2	3.54	2.134	2.028
Factor A	1	6.10*	2.862*	20.79*
Error	2	36.77	26.443	44.240
Factor B	5	3.10**	119.27*	189.59*
AB	5	13.9*	60.364*	89.748*
Error	20	7.092	5.116	4.342

NS = Non-significant * = Significant at 5% level ** = Significant at 1% level

Appendix VI. Number of leaves plant^{-1} of baby corn influenced by combined effect of irrigation levels and fertilizer management

Sources of variation	Degrees of freedom	Number of leaves plant^{-1}		
		20 DAS	40 DAS	60 DAS
Replication	2	1.861	1.000	1.778
Factor A	1	2.778*	0.001**	0.111*
Error	2	0.361	1.000	1.778
Factor B	5	0.444*	1.024*	0.378*
AB	5	1.778*	0.933*	0.311**
Error	20	0.644	0.667	0.644

NS = Non-significant * = Significant at 5% level ** = Significant at 1% level

Appendix VII. Base diameter of baby corn influenced by combined effect of irrigation levels and fertilizer management

Sources of variation	Degrees of freedom	Base diameter (cm)	
		20 DAS	40 DAS
Replication	2	0.559	0.299
Factor A	1	NS	0.176*
Error	2	0.078	0.151
Factor B	5	NS	0.275*
AB	5	NS	0.067**
Error	20	0.071	0.191

NS = Non-significant * = Significant at 5% level ** = Significant at 1% level

Appendix VIII. Seed moisture content (%) of baby corn influenced by irrigation levels and fertilizer management

Sources of variation	Degrees of freedom	Seed moisture content (%)	
		30 DAS	50 DAS
Replication	2	2.629	2.701
Factor A	1	60.58*	81.752*
Error	2	65.75	48.012
Factor B	5	37.97*	35.447*
AB	5	15.59*	22.064*
Error	20	8.405	13.763

NS = Non-significant * = Significant at 5% level ** = Significant at 1% level

Appendix IX. Yield contributing parameters of baby corn influenced by irrigation levels and fertilizer management

Sources of variation	Degrees of freedom	Yield contributing parameter						
		Cob diameter (cm)	Cob length (cm)	Fresh single cob weight with husk (g)	Total fresh weight plant^{-1} at harvest	Dry weight plant^{-1} (g) at harvest	Dry weight of 5 cob with husk	Dry weight of single cob without husk
Replication	2	1.84	4.11	9.348	95.86	2.306	3.123	1.846
Factor A	1	NS	NS	NS	694.6*	24.37*	27.44*	0.941**
Error	2	0.07	0.44	142.10	426.02	36.072*	32.165	7.415
Factor B	5	0.55**	1.51*	29.69*	989.2*	423.3*	172.16*	3.996
AB	5	0.42**	0.37**	104.37*	873.8*	397.7*	133.1 *	1.642*
Error	20	0.484	0.77	6.244	5.044	8.101	4.101	1.90

NS = Non-significant * = Significant at 5% level ** = Significant at 1% level

Appendix X. Yield parameters of baby corn influenced by irrigation levels and fertilizer management

Sources of variation	Degrees of freedom	Yield parameter	
		Fresh 5 cob weight without husk (g) at harvest	Fresh cob yield without husk (t ha^{-1})
Replication	2	9.350	1.140
Factor A	1	206.64*	16.63*
Error	2	604.630	60.115
Factor B	5	477.25*	45.89*
AB	5	209.51*	26.27*
Error	20	277.302	3.147

NS = Non-significant * = Significant at 5% level ** = Significant at 1% level