Data in Brief 54 (2024) 110410

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

The effects of seedling transplanting on growth and yield performance of maize (*Zea mays* L.) for climate change resilience in Burie District, Northwestern Ethiopia: Dataset Article

Habtamu Yigermal[a,*], Kelemu Nakachew[b], Fenta Assefa[c]

[a] *Department of Horticulture, Burie Campus, Debre Markos University, Ethiopia*
[b] *Department of Plant Science, College of Agriculture and Natural Resources, Debre Markos University, Debre Markos, Ethiopia*
[c] *Department of Plant Sciences, College of Agriculture and Environmental Sciences, University of Gondar, Gondar Ethiopia*

ARTICLE INFO

Article history:
Received 9 February 2024
Revised 1 April 2024
Accepted 8 April 2024
Available online 12 April 2024

Dataset link: Seedling transplanting on growth and yield performance of Maize (Zea mays L.) for climate change resilience (Original data)

Keywords:
Bare root
Growth stage
Polybagged
Seedling
Transplanting

ABSTRACT

Maize is produced throughout the world and it is also a primary staple food crop in many developing countries. The field experiment was conducted during the main rainy season of 2018 in Burie district to study the effects of types and growth stages of seedlings on the growth and yield of transplanted maize (Zea mays L.). Factorial combinations of two types of seedlings (bare rooted and poly bagged); five levels of seedling's growth stages (seedlings of 1, 2, 3, 4, and 5 true leaf/ves) and one control (direct seeded) were laid down in randomized complete block design with three replications. Data on phenological, vegetative growth and yield-related parameters were collected following standard methods and procedures. All data were subjected to analysis of variance using SAS software, and mean separation for significant treatments was done by LSD. Both main effects affected the number of grains cob^{-1}, grain, and stover yield highly significantly and days to 50% silking very highly signif-

* Corresponding author.
E-mail addresses: habtamu_yigermal@dmu.edu.et (H. Yigermal), kelemu_nakachew@dmu.edu.et (K. Nakachew), fentaassefa21@gmail.com (F. Assefa).

https://doi.org/10.1016/j.dib.2024.110410
2352-3409/

icantly. Types of seedlings affected days to 50% tasselling significantly; and days to 90% physiological maturity and plant height highly significantly. In addition, types of seedlings affected the number of cobs plant^{-1}, cob length, number of grains row^{-1}and biomass yield, very highly significantly. Seedlings' growth stages had a very highly significant effect on days to 50% tasseling and days to 90% physiological maturity. The number of cobs plant^{-1}, cob length, number of grains row^{-1}and biomass yield were also highly significantly affected by seedlings' growth stages. The interaction effect was highly significant on the number of cobs plant^{-1}, grain, and stover yield and very highly significant on the harvest index. The highest (10.7t ha^{-1}) grain yield of maize was found from the transplantation of polybagged seedlings at four true leaf stages. Although it is difficult to conclude based on one season and one location research trial, transplanting of polybagged seedlings at four true leaf stages gave superior grain yield. This treatment combination also gave the highest net benefit with an acceptable range of marginal rate of return. Therefore, transplanting polybagged seedlings at four true leaf stages is economically feasible and can be recommended tentatively for Burie District. However; it's also advised to repeat the study in areas having terminal moisture stress for maize production.

Specifications Table

Subject	Agriculture
Specific subject area	Agronomy
Type of data	Table Analyzed mean data and raw data
Data Collection	Data of maize related to phenological, growth, yield, and yield component parameters were collected by using measurement under field conditions at plant and plot basis based on the nature of the parameters collected.
Description of data collection	Days to 50% tasselling, days to 50% silking, days to 90% physiological maturity, filed survival rate, number of leaves per plant, plant height, number of cobs per plant, cob length, cob diameter, number of grain rows per cob, number of grains per row, number of grains per cob, thousands grain weight, biomass yield, grain yield, stover yield, and harvest index were obtained as described in this article.
Data source location	Debre Markos University, Burie campus, West Gojjiam, Ethiopia, is the owner of the data presented in this article. The experimental site is located at 10°42′43′′N latitude and 37°4′45′′E longitude with an altitude of 2103 m above sea level.
Data accessibility	Repository name: Mendeley Data The article and the raw data are deposited in the Mendeley dataset repository available at: https://data.mendeley.com/datasets/mfnf6v5ssn/1 doi.10.17632/mfnf6v5ssn.1
Related research Article	Effects of Seedling Type and Age on The Yield and Yield-Related Traits of Transplanted Maize (Zea mays L.) in Burie District, Northwestern Ethiopia [1]

1. Value of the Data

- Maize could also be established much earlier through transplanting [2]. The use of transplanting can shorten the growth period in the field and therefore late-maturing and high-yielding cultivars can be made to fit into the available growing season as dictated by either rainfall or temperature [3]. Depending on the age of seedlings during transplanting, the time to harvest maize was reduced by one to three weeks in the USA and 10 to 12 days in France [4]. Badran [5] stated that under late planting conditions, transplanting of maize may be a possible alternative to direct sowing.
- Besides, in Burie District, the onset of rainfall is becoming less predictable and delayed from time to time. As a result, terminal moisture stress and grain yield loss become common challenges in maize production in the study area. Hence, farmers of the study area were forced to shift their crop cultivation to short-period crops. Therefore, transplanting of seedlings may be an important area of study in Burie District for maize cultivation considering the field duration and early plant establishment. The information presented in this dataset can assist maize-producing farmers in producing during the delayed onset of rainfall for high productivity in their districts and in areas with similar agroecology and soil fertility profiles. Agronomists can utilize this dataset to conduct trials on different crops or the same crop in various soil types and seasons, potentially leading to increased crop output at moisture stress areas for farmers and enhancing research efficiency among scholars.
- Based on the data analysis, researchers can provide practical recommendations for maize production in Burie District and similar agroecological zones in Ethiopia having problems of delayed onset and early offset of rain failure. These recommendations may include tailored seedling transplanting as a strategy to optimize crop yields, conserve soil fertility, and promote food security in the region.
- Despite the data collection being done in 2018, the findings remain highly relevant due to the persistent issue of delayed and unpredictable rainfall patterns observed in the Burie District and similar agroecological zones. For instance, the research done by [6] in northern Ethiopia showed that there is a tendency for late-onset, early cessation, and short length of growing period at all of the stations under future climate change scenarios. By elucidating the effects of seedling transplanting on maize growth and yield under such conditions, this dataset offers actionable recommendations for enhancing resilience against moisture stress, optimizing crop yields, and ensuring food security. Moreover, the provided information equips agronomists with essential data to conduct further trials and develop tailored strategies for mitigating the adverse effects of rainfall variability on maize production, thereby fostering sustainable crop production practices in the region. Thus, while the data may originate from 2018, its applicability and significance in addressing contemporary challenges underscore its enduring value to the research community and agricultural stakeholders alike.

2. Background

The popularity of maize in Ethiopia is partly because of its high value as a food crop as well as the growing demand for the stover as animal fodder and a source of fuel for rural families [7]. It is used as human food, as a source of cash income, as fuel, as feed for livestock, and for industrial purposes [8]. In Ethiopia, maize is a staple food and one of the main sources of calories in the major maize-producing regions [9]. Farmers consume maize by preparing different dishes, including bread, *injera*, thick porridge, boiled maize, roasted maize, and local beer. Green cobs are also sold in big cities and towns [10].

Agronomic research on maize has largely focused on maximizing grain yield by investigating plant nutrients and other agronomic practices [11]. Sowing of maize is a traditional practice whereas transplanting of maize is a recent technique. Transplanting is an alternative strategy to direct seeding that is commonly used to establish crops when conditions are less favorable for direct seeding. Late sowing of maize leads to delayed germination and then reduced plant growth. Hence, grain yield is reduced due to late sowing as the crop experiences terminal drought with the advancement of growth which reduces the duration for grain filling and dry matter accumulation resulting in small grain size [12].

However, the age of seedlings is one of the factors that affect plant growth and grain yield; but it is ignored to be considered by the farmers during transplanting. The optimum seedling age to be used depends on the edaphic factors, climatic (temperature, moisture), location, and cultural practices [13]. Hence, knowledge of the optimum age of seedlings will help in understanding the relationship between the physiological state of the transplant, its survival rate in the field, and its growth responses under various cultural systems and environmental factors [14].

Overall, this dataset contributes to the existing knowledge base on maize cultivation in Ethiopia and provides valuable information that can guide future research efforts, extension services, and agricultural policies aimed at enhancing food security and sustainable crop production in the country.

3. Data Description

This dataset was collected in a field experiment conducted during the main cropping during the 2018 main rainy season at Kebele 03 of Burie District, Northwestern Ethiopia (Fig. 1). Table 1 illustrates the main effects of types of seedlings and their growth stages on phenological (i.e. Days to 50% tasselling, 50% silking, and 90% physiological maturity) parameters of maize in Burie District of Northwestern Ethiopia. Table 2 highlights the main effects of the type of seedling and its growth stage on field survival rate, number of leaves per plant, and plant height of maize. Table 3 shows the main effects of types of seedlings and their growth stages on yield-related (i.e. number of cobs per plant, cob length, and cob diameter) parameters of maize. The

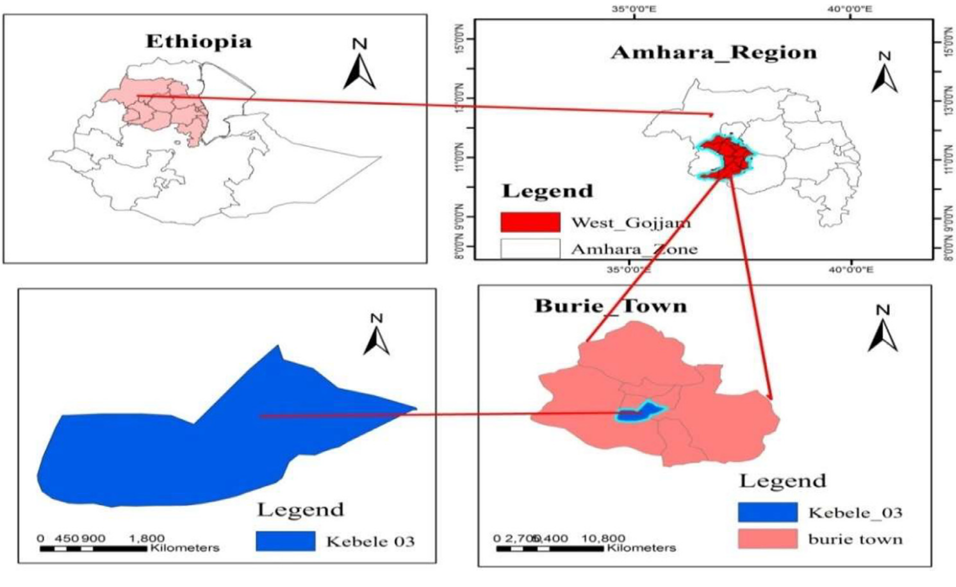

Fig. 1. Map of the study area.

Table 1
Phenological parameters of maize as affected by the main effect of types of seedlings and their growth stages.

Main effects	DFT	DFS	DPM
Type of Seedling			
Bare Rooted	93.0b	97.1b	170.1b
Poly Bagged	90.8c	93.9c	167.5c
Control	102.0a	105.0a	179.0a
Sig. difference	*	***	**
Growth Stage			
1 True Leaf	97.7b	101.0b	174.7b
2 True Leaf	95.2b	99.2c	172.2c
3 True Leaf	90.7c	94.5d	168.2d
4 True Leaf	90.8c	94.7d	167.7d
5 True Leaf	85.2d	88.3e	161.5e
Control	102.0a	105.0a	179.0a
Sig. difference	***	***	***
LSD ($p < 0.05$)	3.6433	2.3251	3.353
CV (%)	2.31	1.45	1.21

Note: *, ** and *** = significant, highly significant and very highly significant respectively; DFT, days to 50% tasseling; DFS, days to 50% silking; DNPM, days to 90% physiological maturity; LSD, least significant difference; CV, coefficient of variation.

Table 2
Vegetative growth parameters of maize as affected by the main effect of the type of seedling and its growth stage.

Main effects	FSR	NL (per plant)	PH (cm)
Type of Seedling			
Bare Rooted (BR)	97.2	13.9	302.5b
Poly Bagged (PB)	98.5	13.9	317.1a
Control	97.1	14.9	321.4a
Sig. difference	ns	ns	**
Growth Stage			
1 True Leaf (1TL)	96.3	14.5	303.7
2 True Leaf (2TL)	98.0	13.9	310.0
3 True Leaf (3TL)	97.3	14.0	314.5
4 True Leaf (4TL)	99.0	13.5	308.9
5 True Leaf (5TL)	98.7	13.8	311.9
Control	97.1	14.9	321.4
Sig. difference	ns	ns	ns
LSD ($p < 0.05$)	3.8475	0.9321	19.976
CV (%)	2.33	3.90	3.97

Note: ns and ** = not significant and highly significant respectively; FSR, field survival rate; PH, plant height; NL, number of leaves; LSD, least significant difference; CV, coefficient of variation.

main effects of types of seedlings and their growth stages on the number of rows per cob, number of grains per row, number of grains per cob, and thousand grains weight are presented in Table 4. As shown below in Table 5, biomass yield, grain yield stover yield, and harvest index were affected by the main effects of types of seedlings and their growth stages. Table 6 of the data also shows the interaction effects of seedlings and their growth stages on the number of cobs per plant and grain yield of maize. Stover yield and harvest index of maize were affected by

Table 3
Yield-related parameters of maize as affected by the main effect of types of seedlings and their growth stages.

Main effects	NCpP	CL (cm)	CD (cm)
Type of Seedling			
Bare Rooted (BR)	1.15b	20.85c	5.17
Poly Bagged (PB)	1.45a	24.81a	5.12
Control	1.46a	23.53b	5.03
Sig. difference	***	***	ns
Growth Stage			
1 True Leaf (1TL)	1.27bc	21.87bc	5.18
2 True Leaf (2TL)	1.30b	21.67c	5.18
3 True Leaf (3TL)	1.17c	21.70bc	5.10
4 True Leaf (4TL)	1.47a	25.47a	5.13
5 True Leaf (5TL)	1.30b	23.47b	5.17
Control	1.46a	23.53b	5.03
Sig. difference	**	**	ns
LDS ($p < 0.05$)	0.1749	2.4455	0.2844
CV (%)	7.66	6.44	3.28

Note: ***, ** and ns , very highly significant, highly significant, and nonsignificatn respectively; NCpP, number of cobs per plant; CL, cob length; CD, cob diameter; LSD, least significant difference; CV, coefficient of variation.

Table 4
Maize number of row per cob, number of grain per row, number of grain per cob, and thousand grains weight as influenced by the main effect of types of seedlings and their growth stages.

Main effects	NRpC	NGpR	NGpC	TGW (g)
Type of Seedling				
Bare Rooted (BR)	12.33	43.44b	551.74b	455.89
Poly Bagged (PB)	12.32	47.19a	581.64a	461.21
Control	12.40	46.40a	565.20ab	452.33
Sig. difference	ns	***	**	ns
Growth Stage				
1 True Leaf (1TL)	12.27	44.33bc	545.60c	466.28
2 True Leaf (2TL)	12.40	44.32bc	544.92c	459.32
3 True Leaf (3TL)	12.27	44.10c	559.12bc	463.95
4 True Leaf (4TL)	12.87	47.87a	602.52a	441.72
5 True Leaf (5TL)	11.84	45.97b	581.30ab	461.50
Control	12.40	46.40ab	565.20bc	452.33
Sig. difference	ns	**	**	ns
LSD ($p < 0.05$)	1.1369	2.9868	51.534	36.662
CV (%)	5.42	3.18	5.00	4.80

Note: ns, *** and ** = nonsignificant, very highly significant, highly significant respectively; NRC, number of rows per cob; NGpR, number of grains row^{-1}; NGpC, number of grains cob^{-1}; TGW, thousands grains weight LSD, least significant difference; CV, coefficient of variation.

the interaction effect of types of seedlings and their growth stages as indicated in the analyzed mean data in Table 7. The dataset presented in this article shows that the grain yield of maize was strongly and positively correlated with some of its agronomic parameters as shown in Pearson's correlation Table 8. The partial budget analyzed dataset for maize production as influenced

Table 5
Biomass yield, grain yield, stover yield, and harvest index of maize as affected by the main effect of types of seedlings and their growth stages.

Main effects	BMY(t ha^{1})	GY (t ha^{-1})	SY (t ha^{-1})	HI (%)
Type of Seedling				
Bare Rooted (BR)	23.21b	6.99b	16.22b	30.01
Poly Bagged (PB)	28.77a	8.46a	20.31a	30.41
Control	29.70a	8.60a	20.26a	29.60
Sig. difference	***	**	**	ns
Growth Stage				
1 True Leaf (1TL)	21.98b	6.98c	15.00b	31.75
2 True Leaf (2TL)	24.10b	7.27c	16.82b	30.23
3 True Leaf (3TL)	23.99b	7.11c	16.87b	30.27
4 True Leaf (4TL)	31.30a	9.70a	21.60a	32.42
5 True Leaf (5TL)	28.60a	7.55bc	21.05a	26.40
Control	29.70a	8.60b	20.26a	29.60
Sig. difference	**	**	**	ns
LSD ($p < 0.05$)	4.694	1.4487	4.4485	6.748
CV (%)	11.03	11.34	14.59	13.20

Note: ***, ** and ns = very highly significant, highly significant and nonsignificatn respectively; BMY, biomass yield; GY, grain yield; SY, Stover yield; HI, harvest index; LSD, least significant difference; CV, coefficient of variation.

Table 6
Interaction effect of types of seedlings and their growth stages on the number of cobs per plant and grain yield of maize.

Types of Seedling	Seedling growth stage	NCpP	GY(t ha^{-1})
Bare Rooted	1	1.20de	5.5d
	2	1.07e	5.7d
	3	1.13e	6.6dc
	4	1.20de	8.7b
	5	1.13e	6.5dc
Poly Bagged	1	1.33cd	8.5b
	2	1.53b	8.9b
	3	1.20de	7.6bc
	4	1.73a	10.7a
	5	1.47bc	8.6b
Control		1.46bc	8.6b
Sig. difference		**	**
LSD ($p < 0.05$)		0.1749	1.4487
CV (%)		3.62	9.07

Note: **= highly significant; NCpP, number of cobs per plant; GY, grain yield; LSD, least significant difference; CV, coefficient of variation.

by of types of seedlings and their growth stages is also presented in Table 9. This dataset article provides the raw data for parameters collected in the field experiment and thus, the raw data is deposited in the Mendeley dataset library (https://data.mendeley.com/datasets/mfnf6v5ssn/1).

Table 7
Interaction effect of types of seedlings and their growth stages on stover yield and harvest index of maize.

Types of Seedling	Seedling growth stage	SY (t ha^{-1})	HI (%)
Bare Rooted	1	15.77bc	26.10de
	2	16.87bc	25.40de
	3	14.81bc	31.30cdb
	4	15.43bc 18.23bc	40.97a
	5		26.30de
Poly Bagged	1	14.23c	37.40ab
	2	16.77bc	35.07cab
	3	18.93b	29.23cde
	4	27.77a	23.87e
	5	23.87ab	26.50de
Control		20.26b	29.60cdb
Sig. difference		**	***
LSD ($p < 0.05$)		4.4485	6.748
CV (%)		3.62	9.07

Note: ** and *** = highly significant and very highly significant respectively; SY, Stover yield; HI, harvest index; LSD, least significant difference; CV, coefficient of variation.

Table 8
Simple correlation analysis among maize agronomic parameters.

	DFT	DFS	DPM	PH	NCpP	CL	NGpR	NGpC	GY	BY	SY	HI
DFT	1											
DFS	0.88***	1										
DNPM	0.88***	0.98***	1									
PH	−0.21ns	−0.31ns	−0.31ns	1								
NCpP	−0.19ns	−0.28ns	−0.18ns	0.31ns	1							
CL	−0.43*	−0.49**	−0.41ns	0.21ns	0.78***	1						
NGpR	−0.37*	−0.45*	−0.36*	0.45*	0.80***	0.71***	1					
NGpC	−0.42*	−0.52**	−0.47**	0.47**	0.56**	0.54**	0.84***	1				
GY	−0.33ns	−0.21ns	−0.17ns	0.19ns	0.42*	0.56**	0.41*	0.27 ns	1			
BY	−0.45*	−0.58**	−0.48**	0.22ns	0.70***	0.80***	0.79***	0.67***	0.46*	1		
SY	−0.38*	−0.56**	−0.47**	0.17 ns	0.63**	0.68***	0.73***	0.64**	0.14 ns	0.94***	1	
HI	0.04ns	0.25 ns	0.21 ns	0.05 ns	−0.14 ns	−0.06ns	−0.23 ns	−0.25 ns	0.65***	−0.37*	−0.65***	1

Note: DFT, days to 50% tassiling; DFS, days to 50% silking; DPM, days to 90% physiological maturity; PH , plant height; NCpP , number of cobs per plant; CL, cob length; NGpR, number of grains row^{-1}; NGpC, number of grains cob^{-1}; GY, grain yield; BY, biomass yield; SY, Stover yield; ns, not significant; * , significant; **, highly significant; ***, very highly significant.

4. Experimental Design, Materials, and Methods

The two factors namely the type of seedlings; seedlings growth stage and one control (direct seeded) were involved in the study. Factorial combinations of two types of seedlings (bare root and poly bag) and five levels of seedling growth stages (seedlings of 1, 2, 3, 4, and 5 true leaves) and with one standard check (direct seeded) having (11) treatments were laid out in randomized complete block design (RCBD) with three replications.

The experimental field was plowed by a tractor, oxen-driven local plow (*Maresha*), and human labor (fork hoe). The first plowing was done by a tractor on the first of April with a disk plow; the second plow was done by oxen-driven local plow *Maresha* on the last of May; and the third plow was done by human labor (fork hoe) when sowing and transplanting was conducted as per the treatments.

As per the design and treatments, the experimental field was subdivided into blocks and plots manually. The gross plot size was 3.75 m x 3 m (11.25 m^2). A 1.0 m wide-open path separated the adjacent blocks and plots within a block were separated from one to another adjacent

Table 9
Yield adjustment, total variable cost, gross and net benefits calculation.

Treatments	AYBA (t ha^{-1})	AYAA (t ha^{-1})		Unit price (Birr t ha^{-1})		Total sale price (Birr ha^{-1})		GB (Birr ha^{-1})	TVC (Birr ha^{-1})	NB (Birr ha^{-1})
	SY	GY	SY	GY	SY	GY	SY			
BR1TL(T1)	15.77	5.5	14.19	8000	200	44,000	2838	46,838	4400.00	42,438
BR2TL(T2)	16.87	5.7	15.18	8000	200	45,600	3036	48,636	4500.00	44,136
BR3TL (T3)	14.81	6.6	13.33	8000	200	52,800	2666	55,466	4600.00	50,866
BR4TL(T4)	15.43	8.7	13.89	8000	200	69,600	2778	72,378	4700.00	67,678
BR5TL(T5)	18.23	6.5	16.41	8000	200	52,000	3282	55,282	4800.00	50,482
PB1TL(T6)	14.23	8.5	12.81	8000	200	68,000	2562	70,562	5650.00	64,912
PB2TL(T7)	16.77	8.9	15.09	8000	200	71,200	3018	74,218	5750.00	68,468
PB3TL(T8)	18.93	7.6	17.04	8000	200	60,800	3408	64,208	5850.00	58,356
PB4TL(T9)	27.77	10.7	24.99	8000	200	85,600	4998	90,598	5950.00	84,648
PB5TL(T10)	23.87	8.6	21.48	8000	200	68,800	4296	73,096	6050.00	67,046
DS (T11)	20.26	8.6	18.23	8000	200	68,800	3646	72,446	1400	71,046

Note: AYBA, average yield before adjusting; AYAA, average yield after adjusting; GY, grain yield; SY, Stover yield; GB, gross benefit; TVC, total variable cost; NB, net benefit; BR1TL, bare rooted one true leaf; BR2TL, bare rooted two true leaf; BR3TL, bare rooted three true leaf; BR4TL, bare rooted four true leaf; BR5TL, bare rooted five true leaf; PB1TL, poly bagged one true leaf; PB2TL, poly bagged two true leaf; PB3TL, poly bagged three true leaf;PB4TL, poly bagged four true leaf; PB5TL, poly bagged five true leaf; DS, direct seeded (control).
Note: The cost of labor, compost, sand, polyethylene bag per roll, maize grain, and maize stove per 100 kg was 50–80, 100, 100, 500, 800, and 20 Birr based on the local market respectively.

one with 0.5 m wide paths. Experimental treatments were allocated to the experimental plots of each block randomly using the lottery method.

The seedlings were raised in the nursery through two methods of raising seedlings, which are bare root and poly bag nursery. The bare root seedlings were raised on a bed that had 1 m width with 10 m length. The composted nursery was prepared by removing layers of weeds and stubble above the soil surface; and the soil was plowed, pulverized, and mounded. A mixture of sand, compost, and topsoil with the proportion of 1:2:3, respectively; and a thick layer of about 10 cm of this mixed growing media were spread all over the bed. The maize seeds were sown in line, maintaining a spacing of 20 cm x 5 cm, and covered with a thin layer of pulverized topsoil. Proper watering was done after seeding as necessary to ensure the germination of seeds and growth of seedlings.

The second method of seedling production was poly bag nursery, in this method, poly bags having sizes of 12 cm in length and 8 cm in width were used to raise seedlings. Each polybag was filled up with a mixture of sand, compost, and topsoil with the proportion of 1:2:3, respectively and the poly bag was laid on the flatbed maintaining 1 m width, and a single seed was placed in each bag at 1-1.5 cm depth. Proper watering was done when necessary for proper germination and growth of the seedlings.

Sowing at the nursery for raising seedlings was done on May 22/2018 and the control was allocated randomly to each block and directly sown on one plot in each block on May 27/2018 by maintaining a spacing of 75 cm x 30 cm; and one seed per hill. The bare-rooted seedlings were uprooted carefully with the help of a fork to reduce root injury from the composted nursery while, in poly bagged seedlings, each poly bag was turned to remove the plastic from the seedlings, while keeping the soil volume intact and the long roots were slashed and transplanting was conducted immediately. Transplanting of one and two true leaf seedlings was done on June 3 and 4 of 2018 G.C, which were after staying 11 and 12 days in the nursery respectively. While transplanting of three, four, and five true leaf seedlings was done on June 8, 11, and 19 of 2018 G.C, which were also after staying 16, 19, and 27 days in the nursery respectively. The transplantation for each seedling growth stage was done by maintaining the spacing of 75 cm x 30 cm and one seedling per hill as the control was done. Thus, there were a total of 5 rows having a length of 3 m; 10 plants per row and 50 plants per plot. The net plot size (harvestable area) was 2.25 m x 1 m (2.25m^2) (*i.e.* the middle 3 rows from each plot) by excluding 1 outermost row on both sides of each plot vertically and 1 m row segment from both ends of the plot horizontally to avoid possible border effects.

The blanket recommendation of 200 kg ha^{-1} for both urea (46% N) and Diammonium phosphate (DAP) (18% N and 46% P_2O_5) fertilizers were used as sources of N and P, respectively. The full dose of phosphorous and 1/3rd of nitrogen fertilizer was applied as band placement at the time of sowing and transplanting of the control and seedling transplanting treatments, respectively. The remaining 2/3rd of nitrogen fertilizer was applied as top-dressing at knee height of maize (50 cm) following the second hoeing and weeding. Experimental plots were kept free from weeds by hand weeding as necessary. All other remaining agronomic practices were applied as per their recommendations for maize in the study area. Harvesting was done carefully from the net plot areas by hand on about 14% moisture content of grains.

4.1. Crop data collected

4.1.1. Phenological parameters

Days to 50% tasselling were taken when 50% of the plants produced tassels from each net plot area by visual observation and counting. Days to 50% silking were taken when 50% of the plants produced silks from each net plot area by visual observation and counting. Days to 90% physiological maturity were recorded as the number of days from sowing and transplanting to the date on which about 90% of the plants in the net plot area were matured (90% of plants showed browning or drying of cob's husk).

4.1.2. Vegetative growth parameters

The field survival rate was recorded by counting the total number of plants in each plot at 30 days after transplanting was conducted. The number of leaves per plant was counted from five plants which were randomly selected from three central rows of each net plot, their leaves were counted at the stage of tasselling and the average was taken. Plant height was recorded by taking the average height of five randomly selected plants from the net plot area of each plot was measured in centimeters from the ground to the height of the first tassel branch and the average height was measured and taken at the time of dough stage.

4.1.3. Yield and yield component parameters

The number of cobs per plant was recorded by randomly selecting five plants from the net plot and then the total numbers of cobs were counted and the average cob number was calculated. Cob length was recorded by randomly selecting five cobs from each net plot and the length of the cob from the tip to the bottom was measured and the average was taken. To record Cob diameter five cobs were selected randomly from each net plot and the circumference of the cob at the center of the cob was measured and the diameter was calculated by using the following formula, $d = C/\pi$ where, d= diameter, C= circumference, π= pi. The average cob diameter was calculated. The number of grain rows per cob was recorded by randomly selecting five cobs from each net plot and grain rows of each cob were counted and the average was taken. The number of grains per row was recorded by randomly selecting five cobs from each net plot and then the numbers of grains in each row of each cob were counted and the average was recorded. The number of grains per cob was recorded by randomly selecting five cobs, then the numbers of grains in each cob were counted and the average was taken. To record thousands of grain weight two samples of thousand grains were taken at random from each treatment then weighed by digital balance and the average was recorded. The biomass yield (t ha^{-1}) was recorded by taking the sundried total above-ground plant biomass (stover + grain) from the net plot area of each plot at the time of harvesting and was measured by spring balance and the result was converted into a hectare basis. The grain yield (t ha^{-1}): was recorded by taking the weight of the grains was measured by spring balance from the net plot area of each plot and converted into kilograms per hectare basis after adjusting the grain moisture content to 12.5%. The grain yield of each treatment was adjusted to the standard moisture level by computing the conversion factor for each treatment to get the adjusted yield using the following formula [15]

$$\text{Adjusted yield} = C.F \times \text{plot yield}$$

where CF is the conversion factor and calculated as $C.F = \frac{100-Y}{100-X}$

Whereas Y is the actual moisture content and X is the standard moisture content to which the yield is to be adjusted (for cereals the standard moisture content is 12.5%).

Stover yield (t ha^{-1}) was determined by deducting the value of grain yield from the value of the total above-ground biomass yield. The Harvest index of each treatment was calculated as the percent ratio of grain yield to the total above-ground biomass by using the formula of [16] as; Harvest index (%) = (Grain yield ÷ biological yield) x 100

4.2. Statistical data analysis

The collected data were subjected to analysis of variance (ANOVA) and the analysis was carried out using the SAS version 9.4 software computer program's General Linear Model (GLM) procedure [17]. As described in Montgomery [18], the residuals were examined to verify the normal distribution and homogeneous variance model assumptions on the error terms for each response variable. Because the ten treatment combinations and one control were randomized within each block, the independence assumption is valid. When a treatment effect was significant, multiple means comparison was performed at a 5% level of significance using the least significant difference (Fisher's LSD) method to generate letter groupings, and correlation analysis was performed using the Pearson correlation procedure found in SAS.

4.3. Partial budget analysis

Partial budget analysis was performed following the CIMMYT partial budget methodology (CIMMYT, 1988). The gross benefit (GB) was calculated by multiplying yields (the grain yield and stover yield) by the corresponding price for each treatment. The total variable cost (TVC) (poly bag, compost, sand, and labor) for each treatment was calculated and added. Net benefit (NB) per hectare was calculated by deducting TVC from GB. Then, treatments were ranked in order of ascending by total variable cost (TVC), and dominance analysis was done to exclude dominated treatments from further analysis; those treatments costing more but producing a lower net benefit than the next lowest cost treatment are considered to be dominated. The marginal rate of return in percent (MRR%) was calculated by dividing the change in NB by to change in TVC and multiplying by 100. MRR was used to ensure an acceptable range of [19] standards.

A partial budget was calculated to compare the total variable cost incurred and the net benefit gained from each treatment. To decide which treatment will be recommended for the study area, it is necessary to identify treatments with the highest net benefit and acceptable level of marginal rate of return. It considers the analysis of gross benefit (GB), total variable cost (TVC), net benefit (NB), and finally the analysis of marginal rate of return (MRR). The cost of applied compost, sand, polyethylene bag, and labor which varies across the same treatments was considered a variable cost considering other costs as constant for each treatment.

The gross benefit was calculated from the sum of the grain and stover yield in a hectare base.

$$GB = (GY \times PGY) + (SY \times PSY)$$

TVC= the sum of all costs which vary between treatments (cost of compost, sand, polyethylene bag, and labor)

$$NB = GB - TVC$$

$$MRR\ (\%) = (\Delta NB/\Delta TVC) \times 100$$

Where: GY= grain yield, PGY= price of grain yield, SY= Stover yield, PSY= price of stover yield

The value of grain and stover yield was adjusted down by 10% to narrow the yield gap between experimental plots and farmers' fields.

Limitations

The data presented in the article "Effects of Seedling Transplanting on Growth and Yield Performance of Maize (*Zea mays* L.) for Climate Change Resilience in Burie District, Northwestern Ethiopia: Dataset Article" may have several limitations that should be considered. Firstly, the study's sample size may have been relatively small, which could restrict the generalizability of the findings to a larger population or different agricultural settings. Additionally, the duration of the study may have been limited, potentially overlooking the long-term effects of the various treatments on maize growth and yield. Furthermore, the results may be specific to the conditions in Burie District, Northwestern Ethiopia, and may not be easily extrapolated to other regions with distinct soil types, climate conditions, or farming practices.

Ethical Statements

The dataset collected in this study did not involve animals and humans.

Data Availability

Seedling transplanting on growth and yield performance of Maize (Zea mays L.) for climate change resilience (Original data) (Mendeley Data).

CRediT Author Statement

Habtamu Yigermal: Conceptualization, Methodology, Software, Writing – original draft, Investigation, Formal analysis; **Kelemu Nakachew:** Conceptualization, Methodology, Writing – original draft, Investigation, Formal analysis, Writing – review & editing; **Fenta Assefa:** Supervision, Writing – review & editing.

Acknowledgments

The authors greatly acknowledge Burie Campus, Debre Markos University for providing an unreserved plot of land for this field trial to collect the dataset described in this article.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary Materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2024.110410.

References

[1] H. Yigermal, et al., Effects of seedling type and age on the yield and yield-related traits of transplanted maize (Zea mays L.) in Burie District, Northwestern Ethiopia, Ethiopian J. Agric. Sci. 31 (3) (2021) 115–133.
[2] P.S. Andonova, J. Rattin, A.D. Benedetto, Yield increase as influenced by transplanting of sweet maize (Zea mays L. saccharata), Am. J. Exp. Agric. 4 (11) (2014) 1314–1329.
[3] A. Dale, D. Drennan, Transplanted maize (Zea mays) for grain production in southern England. I. Effects of planting date, transplant age at planting and cultivar on grain yield, J Agric. Sci. 128 (1) (1997) 27–35.
[4] L. Waters, et al., Seed moisture and transplant management techniques influence sweet corn stand establishment, growth, development, and yield, J. Am. Soc. Hortic. Sci. 115 (6) (1990) 888–892.
[5] M. Badran, Effect of transplanting and seedling ages on grain yield and its components of some maize cultivars, Alex. J. Agric. Res. (2002).
[6] A.G. Berhe, et al., Impacts of climate change on crop growing season characteristics in Northern Ethiopia, J. Water Clim. Change 14 (6) (2023) 1977–1990.
[7] T. Abate, et al., Factors that transformed maize productivity in Ethiopia, Food Secur. 7 (2015) 965–981.
[8] Worku, M., et al., Maize Production Trends and Research in Ethiopia. Mandefro, N. Tanner, DG, Twumasi-Afriyie, S. (eds.), 2002: p. 10–14.
[9] K. Mulatu, et al., Maize Production Trends and Research in Ethiopia, 1993.
[10] B. Gebremedhin, et al., Maize and livestock: their inter-linked roles in meeting human needs in Ethiopia, ILRI (aka ILCA and ILRAD, 2007.
[11] W. Van Averbeke, Best Management Practices For Small-scale Subsistence Farming on Selected Irrigation Schemes and Surrounding Area Through Participatory Adaptive Research in Limpopo Province, Water Research Commission, 2008.
[12] M. Biswas, et al., Seedling raising method for production of transplanted maize, Int. J. Sustain. Crop Prod. 4 (2) (2009) 6–13.
[13] L. Weston, Effect of flat cell size, transplant age, and production site on growth and yield of pepper transplants, HortScience (1988).

[14] Y. Shukla, T. Chhopal, R. Sharma, Effect of age of transplants on growth and yield of capsicum, Int. J. Farm Sci. 1 (2) (2011) 56–62.
[15] A. Biru, Agronomy Research Manual, 1978.
[16] C. Donald, J. Hamblin, The biological yield and harvest index of cereals as agronomic and plant breeding criteria, Adv. Agron. 28 (1976) 361–405.
[17] SASSAS 9.4 Output Delivery System: User's guide, SAS Institute, 2014.
[18] D.C. Montgomery, Introduction to Statistical Quality Control, John Wiley & Sons, 2020.
[19] C.E. Program, From Agronomic Data to Farmer Recommendations: An Economics Workbook, CIMMYT, 1988.