Development and evaluation of a seed drill for bed planting of wheat

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ABSTRACT

A field experiment was conducted at the Gezira Research Station, Wad Medani, Sudan for two seasons (2006/07 and 2007/08). It was laid out in a randomized complete block design with three replications. The objectives were to develop and evaluate a seed drill for bed planting of wheat that performs beds of 80 cm and sowing of wheat in three rows at spacing of 15 cm apart in a single pass. The machine was developed to replace the traditional seeding machine, enhance wheat seeding method in the short winter season, reduce the cost of crop establishment and improve crop growth. It was tested with the seed rates of 72, 107 and 143 kg/ha and compared with the traditional sowing methods (the conventional seed drill on flat and seed broadcasting + 80 cm ridges). No significant differences between treatments were evident in the soil bulk density and its corresponding soil moisture content for the two seasons. Results showed that the bed planting seed drill reduced the time for wheat seeding operation by about 42%. The developed bed planting seed drill with 72 and 107 kg/ha seed rates resulted in highly significant (P = 0.01) spike length in the first season only, whereas in the second season, it gave significantly (P = 0.05) lower crop emergence/m^2 and significantly (P = 0.05) higher plant height. No significant differences between treatments were detected in crop yield for the two seasons. Therefore, the lower seed rate of 72 kg/ha could be used with developed bed planting seed drill, which means the saving of about 50% of the recommended seed rate of 143 kg/ha. The developed seed drill for bed planting of wheat could be used successfully and with 50% of the recommended seed rate for wheat crop establishment in the Vertisol irrigated schemes of Sudan.

INTRODUCTION

Wheat is a major contributor to food grain production in the Sudan. It has been introduced in the central clay plain in irrigated governmental schemes of Gezira, New Halfa, and Rahad for self-sufficiency. The soil is Vertisols and the climate is semi-arid.

The problem of wheat crop establishment in irrigated schemes arises from the uneven distribution of the first irrigation water in conjunction with the low infiltration rate in heavy clay soils, especially under uneven leveling conditions. Therefore, water stands for a long period of time causing germination failure as a result of aeration impairment (El-Awad, 2002). This necessitates a suitable system for seedbed preparation.

All summer crops in irrigated schemes are grown on the top of ridges to facilitate field irrigation, mitigate water logging, reduce the adverse effects of crust formation on seedling emergence and to drain excess water after heavy rains. However, in the winter season, there are two methods for wheat crop sowing in irrigated schemes after land preparation, which are on ridges and on flat. Performing ridging after seed broadcasting (manually or mechanically) results in variable seed depths; so that, some seeds could not germinate as a result of deep sowing and others as a result of improper seed-soil contact and coverage. On the other hand, the flat sowing system is characterized by the formation of soil crust and cracks as a result of irrigation flooding. The crust resists seedling emergence, and the cracks cause root system damage. Due to the adverse effects of these sowing methods, the recommended wheat seed rate for all irrigated schemes is 143 kg/ha, which is considered to be very high (El-Awad, 2002).

In the irrigated schemes of Sudan, 80-cm raised beds are similar to 80-cm ridges. Therefore, the raised bed system may integrate well with other crops in the rotation, which encourages the experimentation on permanent ridges practice for all field crops.

Although some machines are available for field crop sowing on the top of ridges, no machine is available in Sudan to perform wheat sowing operation on ridges or beds. Sowing on ridge system improves irrigation water management, requires lower seed rate, facilitates pre-seeding irrigation and reduces crop lodging (El-Awad, 2002).

Wheat bed-planting was tried in the irrigated Vertisols of Sudan (Abdelhadi *et al.,* 2006). Their results indicated that this system could be adopted with reduced seed rate and more efficient irrigation water utilization if the suitable seeding machine is made available. Therefore, for adoption of wheat planting on 80-cm raised beds and permanent ridges practice for all field crops under irrigation, a wheat bed planting seed drill should be provided.

The objectives of this research work were to develop a combined operations wheat bed-planting machine for making 80 cm beds and sowing the wheat crop in three rows 15 cm apart on beds in a single pass, in order to reduce machinery requirement and to evaluate the effects of bed planting with different seed rates on wheat growth in comparison with the traditional methods of wheat sowing.

MATERIALS AND METHODS

Machine development

To satisfy the objective of constructing 80 cm beds to sow the wheat crop in three rows at 15 cm apart on each bed in a single pass, a bed planting seed drill was assembled as a fully mounted seeding machine. The features and specifications of the main parts of the developed seed drill (front, rear and side view) are shown in Fig. 1. The serial number represents each part location in all figures, which were as follows:

1. Seeder box: A box was provided from scraped Oztarim planter. It was 320 cm in length and 25 cm in width, with a height of 40 cm. The box consisted of 12 seed openings at its base. The seed openings were divided into four sets. Each set was composed of three openings and each opening was at a distance of 15 cm apart.
2. Two strength angled metal pieces, with cross sectional area of 4.5×4.5 cm and 65 cm in length were fixed to the front side. Moreover, three strengthening metal pieces with cross sectional area of 1×3 cm and 40 cm in length were fixed to the rear side of the seeder box. The purpose of these pieces was to anchor the seeder box to the carrying frame.
3. Tractor hitches: Three point hitches were provided on the tool bar.
4. Two grain index levers were used to regulate the seed rate.
5. Twelve seed tubes: Each with 45 cm in length were used to facilitate the proper falling of seeds in the furrow.
6. Ridger bodies: Five ridger bodies of a Nardi ridger were attached to the tool bar at spacing of 80 cm apart. The distance between the ends of the two wings of each body was reduced to 30 cm to open the furrow and to form the required bed.
7. A ridger tool bar was provided from a Nardi ridger. Its length was 330 cm to facilitate the attachment of the five ridger bodies at a distance of 80 cm apart.
8. A carrying frame: It carries the seeder box and the seed furrow openers and their components. The front part was fixed to the ridger tool bar with two angled metal of 5.2×5 cm cross sectional area. The front part was 290 cm in length and the rear one was 270 cm in length.
9. Five chains, each of 65 cm in length, were attached between the adjacent ridger bodies to flatten the bed surface.
10. Fluted-wheel feed devices were used for metering the seeds and forcing them to come out over the gate and fall into the seed tube. They were taken from a scraped Oztarim planter.
11. Two ground wheels with the size of 700 ×16 LT and 220 cm in diameter were used to drive the seed metering devices. The two wheels were placed on each side of the planter. They were assembled with end rods and bearings.
12. Twelve furrow-openers, each with a diameter of 33 cm, were taken from a scraped Oztarim planter. They were fixed at a height of 7 cm from the base of the land wheel to secure proper dropping of seeds and their coverage with soil.
13. Two pressure shafts were taken from a scraped Oztarim planter with a cross sectional area of 2.1×2.1 cm and a length of 135 cm. They were made for pressure arms fixation.

14. A connecting bar, having a cross-sectional area of 7.5 × 8.8 cm and a length of 40 cm, was used to connect the ridger body to the tool bar.
15. A double-roller drive chain was used to transmit the power from the ground wheels to the shafts driving the seed metering devices. It was taken from a scraped Oztarim planter.
16. A feed countershaft was used to transmit the power from land wheel to fluted-wheel feed by sprockets.
17. Sprockets: A 17-tooth driven sprocket and an 11-tooth drive sprocket, from a scraped Oztarim planter, were connected with the double-roller chain to rotate the seed counter shaft operating the fluted-wheel feed devices.
18. Pressure springs, 40 cm in length, were fixed to prevent furrow openers from the shock of soil clods, and were taken from a scraped Oztarim planter.
19. Connecting bars, made available from a scraped Oztarim planter, with a cross sectional area of 1×4 cm and 65 cm in length were used to fix the furrow openers frame with the ridger tool bar.

Field test

After the assembly of all machine parts, the wheat bed planting seed drill was tested in the field.

Comparative evaluation of the bed planting seed drill

Experimental site

The experimental work for the intended comparative evaluation was carried out during 2006/2007 and 2007/2008 winter seasons at the Gezira Research Station Farm (latitude 14.23º N, longitude 33.29º E, altitude 405 m asl), Wad Medani, Sudan. The soil is heavy cracking Vertisols, with 58-66% clay content and very low water permeability, with a pH of 8.5. The soil is low in organic matter (0.05%), deficient in nitrogen (300-400 ppm), and low in available phosphorus (2-4 ppm). The climate of the experimental area is classified as arid and semi-arid.

Variety Debeira was sown at the optimum sowing date (mid Nov.) and provided with all the cultural practices recommended by the Agricultural Research Corporation of the Sudan for wheat production.

Treatments

The developed seed drill performance with different wheat seed rates in comparison with traditional sowing methods was evaluated. The treatments were explained in Table 1.

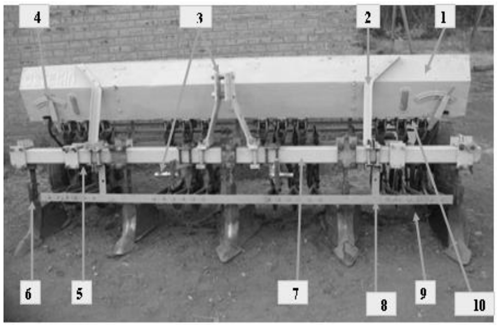
The experiment was laid in a randomized complete block design, with three replications. Plot size was 10 × 20 m and the harvestable area was 16 m^2, which was 3.2 × 5 m for 80 cm ridges and 4 × 4 m for flat treatments.

Collected data

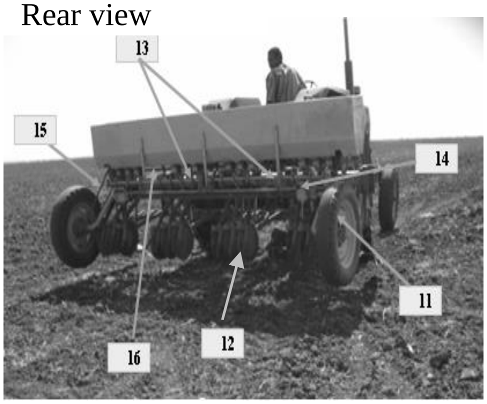
Tractor working speed

The average tractor working speed with each seeding machine, in addition to ridges setting of 80 cm apart, was determined using a stopwatch and allowing the tractor to travel a distance of 280 m ten times. The turning time at headlands was determined also.

Front view



Rear view



Side view

Legend

1. Seeder box
2. Two strength angled metal
3. Tractor hitches
4. Twelve seed tubes
5. Two grain index levers
6. Ridger bodies
7. Ridger tool bar
8. Carrying frame
9. Chain for flattening the top of ridge
10. Fluted-wheel feed
11. Land wheels
12. Twelve furrow-openers
13. Two pressure shafts
14. Connecting bar
15. Double-roller drive chain
16. Feed countershaft
17. Sprockets
18. Pressure springs
19. Connecting bars

Fig .1. The developed wheat bed planting seed drill.

Table 1. Treatments.

Treatment	Explanation
A1	Bed planting seed drill with a seed rate of 72 kg/ha
A2	Bed planting seed drill with a seed rate of 107 kg /ha
A3	Bed planting seed drill with the recommended wheat seed rate of 143 kg/ha
	Conventional seed drill with the recommended seed rate of 143 kg/ha and sowing on flat
B	Mechanical broadcasting with the recommended seed rate of 143 kg/ha plus 80 cm ridges
C	

Field capacity

The theoretical field capacity, field efficiency and effective field capacity were calculated. The calculations were made according to the following formulae (Roth *et al.*, 1982):

$$C_T = \frac{S \times W}{10} \quad \text{........} \quad (1)$$

where:

C_T = Theoretical field capacity (ha/hr).

S = Average speed of machine (km/hr).

W = Rated width of machine (m).

10 = Constant, = $\frac{10000\ m^2/ha}{1000\ m/km}$

$$E_f = \frac{\text{Actual working time}}{\text{Total time (actual working time + turning time at headlands)}} \quad \text{........} \quad (2)$$

where:

E_f = Field efficiency as a decimal.

$$C_E = \frac{S \times W \times E_f}{10} \quad \text{........} \quad (3)$$

where:

C_E = Effective field capacity (ha/hr).

Then from C_E, the time taken for sowing of 1 ha was determined for comparison of treatments as follows:

Sowing time = $1/C_E$ (hr/ha)……………………………………………. (4)

Work rate

The working width of the available conventional seed drill was 3.6m, which was wider than the developed bed planting and operated by a 145 hp John Deere tractor model 7800, 4WD. Moreover, this conventional seed drill was also used for wheat broadcasting after the removal of the seed tubes, and the broadcasting operation was followed by the construction of 80 cm ridges to cover the seeds. The developed bed planting seed drill was operated by a 75 hp Massy Ferguson tractor model 290, 2WD.

The work rate was determined according to the following formula (Culpin, 1975):

$$\text{Work rate (ha/hr)} = \frac{As \times W \times E_f \times 3600}{10000} \quad \ldots\ldots (5)$$

where:

As = Actual speed (m/s).

W = Working width (m).

3600 = Sec/hour.

10000 = m^2/ha.

E_f = Field efficiency (decimal).

Soil bulk density and soil moisture content

To test the effects of final seed bed preparation on some soil physical properties, the soil bulk density and its corresponding soil moisture content was determined.

For the soil bulk density, the core method (Blake, 1965) was used three times at depths of 0-10, 10-20 and 20-30 cm. The core was driven vertically and very carefully by means of a hammer to its full depth, and then carefully removed by a shovel. With the use of a flat edged knife, the soil on the core wall was removed, weighed, oven dried at 105°C for 24 hours and then reweighed. The oven-dry weight was divided by the initial volume of the sample to give the soil bulk density in gm cm^{-3}. The gravimetric moisture on dry weight basis was determined by the following formula (Skaggs *et al.*, 1980):

$$Qw = \frac{\text{weight of moist soil} - \text{weight of oven-dry soil}}{\text{Weight of oven dry soil}} \times 100 \quad \ldots\ldots (6)$$

where:

Qw = Moisture content on dry weight basis (%).

Yield and yield components

Ten random readings per plot were taken after the second irrigation using a 25 × 40 cm metal frame for determining crop emergence/m^2, while plant population was determined at maturity by the same method. For plant height, spike length and number of seeds/head, ten plants per plot were chosen randomly. One thousand seed weight was determined by taking randomly a sub-sample from each harvested grain per plot.

RESULTS AND DISCUSSION

Performance of different seeding machines

Table 2 represents the working width of each seeding machine, actual speed, time taken in sowing operation, efficiency and work rate. The bed planting seed drill was developed to result in a 3.2 m working width with 80 cm bed to match the conventional 80 cm ridges practice for all field crops in irrigated schemes. Although it was shorter in working width and lower in actual speed compared to the trailed conventional seed drill, it resulted in higher efficiency (82%). This was due to the shorter time lost in turning at headlands as it was fully mounted compared to the trailed conventional seed drill.

Table 2. Machine performance data.

Machine type	Working width (m)	Actual speed (km/hr)	Time taken (min/ha)	Efficiency (%)	Work rate (ha/hr)
DBP	3.2	7.7	30	82	2.0
FSD	3.6	11.2	20	70	3.0
MB / R	3.6 / 1.6	11.2 / 11.5	20+32=52	70 / 78	3.0 / 1.4

DBP = Developed bed planting seed drill.
FSD = Flat sowing with the conventional seed drill.
MB / R = Mechanical broadcasting + 80 cm ridges.

The lower actual speed of the developed bed planting seed drill was mainly due to the soil draught, which is associated with the construction of 80 cm beds, while the conventional seed drill was dragged by a powerful tractor with 145 hp. Hence, the time taken with the developed bed planting seed drill was counted to be 42% higher and the work rate was about 33% lower in comparison with the flat sowing using the conventional seed drill.

Both treatments (developed bed planting seed drill and flat sowing with the conventional seed drill) were found to be far better for all measured traits compared to mechanical wheat broadcasting plus 80 cm ridges (Table 2).

Soil bulk density and corresponding soil moisture content

For each depth and stage of crop development, no significant differences in soil bulk density and its corresponding soil moisture content between treatments were detected for the two seasons (Tables 3 and 4). This was probably due to the nature of soil type, which is characterized by swelling when wet and shrinking when dry. This phenomenon brings the soil physical properties to equality. These results agreed with those reported by El-Awad (2005: 2009).

Table 3. Effects of sowing method on soil bulk density and its corresponding soil moisture content for the first season (2006/07).

Treatment	0 – 10 cm depth		10 – 20 cm depth		20 – 30 cm depth	
	SBD	SMC (%)	SBD	SMC (%)	SBD	SMC (%)
			At crop emergence			
A1	1.12	26.4	1.14	27.3	1.20	27.0
A2	1.06	28.6	1.14	25.6	1.17	27.0
A3	1.08	28.1	1.16	26.0	1.23	26.4
B	1.10	26.5	1.11	24.5	1.22	25.0
C	1.09	28.7	1.16	28.3	1.11	27.0
Mean	1.09	27.7	1.14	26.3	1.18	26.6
SE±	0.02 (ns)	0.39 (ns)	0.03 (ns)	0.73 (ns)	0.03 (ns)	0.36 (ns)
CV (%)	6.90	5.00	7.70	12.10	8.40	3.40
			At flowering stage			
A1	1.13	26.7	1.20	26.9	1.23	26.9
A2	1.03	26.5	1.17	26.9	1.20	23.0
A3	1.03	25.3	1.20	26.2	1.27	25.4
B	1.17	27.2	1.13	27.3	1.20	25.6
C	1.17	24.8	1.17	25.5	1.17	24.4
Mean	1.07	26.1	1.17	26.6	1.21	25.1
SE±	0.03 (ns)	0.60 (ns)	0.02 (ns)	0.67 (ns)	0.03 (ns)	0.74 (ns)
CV (%)	10.50	9.20	8.30	10.00	9.90	13.00
			At maturity			
A1	1.13	23.7	1.13	22.3	1.23	26.0
A2	1.10	21.4	1.23	22.6	1.03	25.0
A3	1.07	23.6	1.07	22.5	1.27	23.3
B	1.07	23.7	1.17	23.0	1.27	23.3
C	1.13	22.4	1.20	24.8	1.03	22.7
Mean	1.10	23.8	1.16	23.0	1.17	24.0
SE±	0.02 (ns)	0.93 (ns)	0.03 (ns)	0.41 (ns)	0.0 4 (ns)	0.79 (ns)
CV (%)	9.00	12.40	9.20	7.20	9.10	14.10

ns = Not significantly different at the 5% significance level.

SBD = Soil bulk density (g/cm^3). SMC (%) = Soil moisture content.

Table 4. Effects of sowing method on soil bulk density and its corresponding soil moisture content for the second season (2007/08).

Treatment	0 – 10 cm depth		10 – 20 cm depth		20 – 30 cm depth	
	SBD	SMC (%)	SBD	SMC (%)	SBD	SMC (%)
			At crop emergence			
A1	1.07	28.4	1.07	28.2	1.10	31.1
A2	1.03	29.5	1.13	28.2	1.20	30.0
A3	1.10	27.5	1.10	28.2	1.10	29.9
B	1.10	27.3	1.10	27.4	1.07	26.7
C	1.03	28.1	1.17	28.2	1.07	27.0
Mean	1.07	28.1	1.11	28.1	1.11	29.0
SE±	0.02 (ns)	0.50 (ns)	0.02 (ns)	0.54 (ns)	0.02 (ns)	0.66 (ns)
CV (%)	6.80	7.40	9.60	8.60	4.50	7.00
			At flowering stage			
A1	1.17	22.4	1.17	24.3	1.17	26.9
A2	1.10	21.6	1.13	24.4	1.30	23.0
A3	1.13	21.6	1.10	23.9	1.13	25.4
B	1.13	24.5	1.20	24.7	1.20	25.6
C	1.07	21.9	1.10	26.1	1.23	24.4
Mean	1.20	22.4	1.14	24.7	1.20	25.1
SE±	0.03(ns)	0.73 (ns)	0.03 (ns)	0.82 (ns)	0.03 (ns)	0.74 (ns)
CV (%)	11.80	14.10	11.00	15.60	9.90	13.00
			At maturity			
A1	1.07	25.5	1.17	22.3	1.23	25.8
A2	1.17	24.3	1.17	22.6	1.23	24.9
A3	1.07	24.0	1.17	22.5	1.30	23.7
B	1.13	25.3	1.27	23.0	1.17	23.0
C	1.20	26.1	1.20	24.8	1.20	23.3
Mean	1.13	25.0	1.19	23.0	1.23	24.1
SE±	0.02 (ns)	0.52 (ns)	0.02 (ns)	0.41 (ns)	0.03 (ns)	0.48 (ns)
CV (%)	5.40	4.80	8.70	7.20	11.60	4.50

ns = Not significantly different at the 5% significance level.
SBD = Soil bulk density (g/cm^3).
SMC (%) = Soil moisture content.

Crop growth performance and yield

Table 5 shows the results of crop emergence after the second irrigation, plant population, plant height, number of seeds per head, one thousand seed weight and crop grain yield for the two seasons (2006/07 and 2007/08).

In the first season, the significant effect existed only for spike length. The developed bed planting seed drill with seed rates of 72 (A1) and 107kg/ha (A2) resulted in a highly significant (P=0.01) increase in spike length compared to the other treatments with the recommended seed rate (A3, B and C).

Table 5. Effects of sowing methods and seed rate on wheat crop growth performance and yield for the two seasons (2006/07and 2007/08).

Treatment	Crop emergence/m²	Plant population/m²	Plant height (cm)	Spike length (cm)	No. of seeds/head	1000 seed wt.(g)	Grain yield (kg/h)
			1st season (2006/07)				
A1	538	663	75	8.7	41	40	2709
A2	663	680	79	9.0	37	40	2331
A3	690	773	81	8.0	39	39	2856
B	668	710	77	8.0	36	38	2604
C	663	690	78	8.0	37	40	2604
Mean	645	703	78	8.3	38	39	2620
SE$\pm$	22.3	16.5	1.3	0.13	0.9	0.5	77.2
CV (%)	11.9	7.2	7.7	3.10	9.5	4.8	10.1
Sig. level	ns	ns	ns	**	ns	ns	ns
			2nd season (2007/08)				
A1	499	673	78	7.7	43	35	2352
A2	521	670	75	7.3	44	34	2289
A3	657	646	74	7.7	43	35	2268
B	650	639	73	7.3	44	36	2289
C	606	653	74	7.0	42	33	2268
Mean	586	656	75	7.4	43	35	2293
SE$\pm$	23.0	9.9	0.7	0.13	0.73	0.76	68.1
CV (%)	11.0	7.2	2.2	8.00	7.1	9.2	11.0
Sig. level	*	ns	*	Ns	ns	ns	ns

ns = Not significantly different at $P \leq 0.05$.
* = Significantly different at $P \leq 0.05$.
** = Significantly different at $P \leq 0.01$.

In the second season, there were significant differences between treatments in crop emergence/m^2 and plant height. The developed bed planting seed drill with the seed rates of 72 (A1) and 107 kg/ha (A2) resulted in significantly (P = 0.05) lower crop emergence/m^2 and (P = 0.05) higher plant height. However, with the recommended seed rate (143kg/ha), no significant differences were found between treatments C, A1 and A2, while no significant differences were detected between treatments A2 (107kg/ha), A3, B and C with regard to plant height.

In both seasons, no significant differences between the treatments in plant population/m^2, number of seeds/head, one thousand seed weight and crop grain yield. However, It is worth noting that similar yields were obtained with the use of the developed bed planting seed drill with different seed rates compared to the traditional methods of wheat sowing in irrigated schemes. The similarity could be attributed to the tillering capacity of the crop. These results agreed with those reported by El-Awad (2002) who found similar effects on wheat yield with the use of the combined-operations seeding machine for wheat crop establishment in Sudan irrigated schemes. The mean yields obtained with the use of the developed bed planting seed drill for the first and the second season were 2632 and 2303 kg/ha, respectively, and both were higher in comparison with the traditional sowing methods with the recommended seed rate of 143 kg/ha.

CONCLUSION

The results indicated the success of the developed wheat bed planting seed drill for wheat production in Vertisols of irrigated schemes, with the consequences of reduction in the amount of seeds required for sowing, higher field efficiency and time saving when compared to the sowing method of wheat broadcasting plus ridges making.

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تصميم وتقييم بذارة القمح للبذر على مساطب

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برنامج بحوث الهندسة الزراعية، هيئة البحوث الزراعية، صندوق بريد 126، واد مدنى، السودان.

الخلاصة

أجريت هذه التجربة بمحطة بحوث الجزيرة بوادمدنى لموسمي 2007/2006 و2008/2007م. أستخدم فيها تصميم القطاعات العشوائية الكاملة بثلاث تكرارات. وكان الهدف تصميم وتقييم بذارة قمح للزراعة على مساطب 80 سم فى ثلاثة خطوط فوق سطح المسطبة على بعد 15سم في عملية آلية واحدة، بغرض تقليل الزمن المطلوب للزراعة، الإسراع بعملية البذار في موسم الشتاء القصير، تقليل تكلفة تأسيس المحصول وتحسين أطوار نموه. تم اختبار البذارة بكميات بذور مختلفة (72، 107 و143 كجم/هكتار) مقارنة بالطرق التقليدية لزراعة القمح (البذار في سطور على سطح الأرض ونثر البذور + طراد 80سم). لم تكن هناك فروقات معنوية بين المعاملات على الكثافة الظاهرية للتربة ومحتوى الرطوبة. أظهرت النتائج أن البذارة المصممة قللت من الزمن المطلوب لعملية بذار القمح بحوالي 42%. كما أن استخدامها بمعدل 72 و 107 كجم/هكتار أعطى زيادة معنوية كبيرة (P = 0.01) في طول السنبلة للموسم الأول فقط، أما في الموسم الثاني فقد أعطت البذارة المصممة وبمعدل الكميتين من التقاوي فروقات معنوية (P = 0.05) في قلة عدد البادرات للمتر المربع و زيادة فى طول النبات. لم تكن هناك فروق معنوية في الإنتاجية بين المعاملات للموسمين، ولذلك فإن تقليل معدل بذار القمح حتى 72 كيلوجرام للهكتار عند إستخدام البذارة المصممة يعمل على توفير حوالي 50% من معدل التقاوى الموصى بها وهو 143 كيلو جرام للهكتار. و عليه، يمكن استخدام البذارة المصممة بنجاح وبحوالي 50% من كمية التقاوى الموصى بها لتأسيس محصول القمح بالمشاريع المروية في الأراضي الطينية بالسودان.