

The Study on the Effect of Different Types of Blades / Tine on Wheat Plant Height Using Riding Type Power Tiller

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Abstract:

In the Present study was presented with six treatments C, L, T, and their combinations C+T, L+T, Untilled were taken with single, double and triple passes of power tiller at the research farm of Faculty of Agricultural Engineering, IGKV, Raipur, Chhattisgarh, India during 2009-10 and 2010-2011. The soil of experimental site is represented as a silty clay soil mixed with sand. It is locally called 'Dorsa'. The Plant height of wheat (*Kanchan*) was observed and data are given in Table 1 and Table 2 for the years 2009-10 and 2010-11, respectively. the plant height of wheat Variety *Kanchan* at 15 days after sowing was found maximum for tine (shovel) (18.27 cm) followed by Rotary blade L (17.97 cm). The difference of plant height was found non-significant at the level of 5% of significance (CD=0.63). The minimum plant height was found with untilled (17.17 cm) Followed by Rotary blade C (17.57 cm). The difference of plant height was found non-significant at the level of 5% of significance. For the combinations, the maximum plant height was found with L+T (20.21 cm) followed by C+T (19.42 cm). The difference of plant height was found significant at the level of 5% of significance. the plant height of wheat Variety *Kanchan* at 15 days after sowing was found maximum for tine (shovel) (19.54 cm) followed by Rotary blade L (18.38 cm). The difference of plant height was found significant at the level of 5% of significance (CD=1.10). The minimum plant height was found with untilled (17.50 cm) followed by Rotary blade C (18.29 cm). The difference of plant height was found significant at the level of 5% of significance. For the combinations, the maximum plant height was found with L+T (19.41 cm) followed by C+T (19.20 cm). The difference of plant height was found non-significant at the level of 5% of significance. the plant height of wheat Variety *Kanchan* at harvesting was found maximum for L (81.81 cm) followed by Rotary blade C (81.63 cm). The difference of plant height was found non-significant at the level of 5% of significance (CD=0.78). The minimum plant height was found with untilled (79.40 cm) followed by tine T (81.47 cm). The difference of plant height was found significant at the level of 5% of significance. For the combinations, the maximum plant height was found with L+T (82.78 cm) followed by C+T (82.40 cm). The difference of plant height was found non-significant at the level of 5% of significance. The plant height of wheat Variety *Kanchan* at harvesting was found maximum for tine T (81.83 cm) followed by Rotary blade L (81.76 cm). The difference of plant height was found non-significant at the level of 5% of significance (CD=0.47). The minimum plant height was found with untilled (78.60 cm) followed by rotary blade C (81.37 cm). The difference of plant height was found significant at the level of 5% of significance. For the combinations, the maximum plant height was found with L+T (82.68 cm) followed by C+T (82.36 cm). The difference of plant height was found non-significant at the level of 5% of significance.

Key words: Combinations of blades and tine, Plant height of wheat, Power tiller

Introduction

Our Indian society is mostly dependent on farming. Most of the cultivation pattern of India from Rigveda period to modern period was dependent on the energy of bullocks. It was integrative part of the farming society to associate with animal husbandry which was a high source of nutrition for the population and energy for farming activity (Kumar Shailendra and Singh Neelam Kumar, 2019). A power tiller is a versatile agricultural machine designed to make soil preparation tasks easier and more efficient. It's a motorized implement used for tilling, plowing, and preparing the soil for sowing crops. It consists of an engine that powers the rotating blades or tines, which break up the soil. The machine is generally smaller than a tractor, making it ideal for operations in narrow fields, orchards, gardens, and other small agricultural areas. By providing mechanical power to till the soil, it replaces the labor-intensive manual labor of traditional farming, enhancing productivity and reducing physical strain. Power tillers are commonly used for a variety of soil cultivation tasks, making them indispensable on farms, particularly for small to medium-scale operations. (<https://www.mahindractor.com/blog/power-tiller-uses-benefits>).

For many small and marginal farmers in India, buying a power tiller outright can be expensive. That's why the Government of India and state agriculture departments provide subsidies on power tillers. These schemes lower the purchase cost and encourage mechanization, making farming more efficient and reducing dependence on manual labor. This guide explains subsidy percentages, eligibility, application process, and provides a state-wise breakdown for 2025 and given Table A.

Ellis and Howse (1980) reported that direct drilling resulted in increased concentration of P and K within the surface 0-5 cm of soil compared with mould ploughing.

Sial et al. (1981) conducted that draft requirements of sweep cultivator and narrow tine cultivator were equal. Approach angle, overlap and zone of soil disturbance were found suitable parameters which contribute to reducing drafts of the sweep cultivator.

Table A State-wise Subsidy (2025)

State	Subsidy Percentage	Key Notes
Maharashtra	40% for general, up to 50% for SC/ST & small farmers	Applications via Mahapariksha & state agriculture portal
Tamil Nadu	35%–50% depending on farmer category	Managed through the Agri Engineering Department
Uttar Pradesh	25%–40% (50% for SC/ST, women)	Apply through the UP Agriculture Mechanisation portal
Karnataka	Up to 50% for SC/ST and women farmers	Department of Agriculture accepts online applications
Bihar	40%–50%	Focus on small farmers with land below 2 hectares
West Bengal	35%–50%	Available through the Matir Katha portal

State	Subsidy Percentage	Key Notes
Andhra Pradesh & Telangana	40% subsidy standard, higher for SC/ST	Managed through Rythu Bharosa Kendras & state agri dept.

Sources: <https://agrianic.com/guides/power-tiller-subsidy-india/>

Methods and materials

The machine was developed with the riding type SHRACHI power tiller. The machine was designed using CAD software and was fabricated in workshop of the Faculty of Agricultural Engineering, IGKV, Raipur. Basically, two types of rotary blades (C&L) for power tiller are available in the market. Their effect on Plant height of wheat was needed to be observed. Therefore, suitable arrangement in the machine was made to operate the tillers with different type of blades and with and without tractive tines. The developed machine consisted a seed cum fertilizer box; four fluted feed rollers, four rigid tines mounted on toolbar with reversible shovels, ground wheel and adjusting devices. The field experiment was carried out during *Rabi* seasons in the years 2009-10 and 2010-11 at the research farm of Faculty of Agricultural Engineering, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh (CG) on conservation tillage equipments. Height of plants was taken at 15 days after sowing and at the time of harvesting with standard methods (Shailendra Kumar, 2012).

Results

In the year 2009-10, the data are given in Table 1. Data revealed that the plant height of wheat Variety *Kanchan* at 15 days after sowing was found maximum for tine (shovel) (18.27 cm) followed by Rotary blade L (17.97 cm). The difference of plant height was found non-significant at the level of 5% of significance (CD=0.63). The minimum plant height was found with untilled (17.17 cm) Followed by Rotary blade C (17.57 cm). The difference of plant height was found non-significant at the level of 5% of significance. For the combinations, the maximum plant height was found with L+T (20.21 cm) followed by C+T (19.42 cm). The difference of plant height was found significant at the level of 5% of significance.

In the year 2010-11, the data are given in Table 2. Data revealed that the plant height of wheat Variety *Kanchan* at 15 days after sowing was found maximum for tine (shovel) (19.54 cm) followed by Rotary blade L (18.38 cm). The difference of plant height was found significant at the level of 5% of significance (CD=1.10). The minimum plant height was found with untilled (17.50 cm) followed by Rotary blade C (18.29 cm). The difference of plant height was found significant at the level of 5% of significance. For the combinations, the maximum plant height was found with L+T (19.41 cm) followed by C+T (19.20 cm). The difference of plant height was found non-significant at the level of 5% of significance.

In the year 2009-10, the data are given in Table 3. Data revealed that the plant height of wheat Variety *Kanchan* at harvesting was found maximum for L (81.81 cm) followed by Rotary blade C (81.63 cm). The difference of plant height was found non-significant at the level of 5% of significance (CD=0.78). The minimum plant height was found with untilled (79.40 cm) followed by tine T (81.47 cm). The difference of plant height was found significant at the level of 5% of significance. For the combinations, the maximum plant height was found with L+T (82.78 cm) followed by C+T (82.40 cm). The difference of plant height was found non-significant at the level of 5% of significance.

In the year 2010-11, the data are given in Table 4. Data revealed that the plant height of wheat Variety *Kanchan* at harvesting was found maximum for tine T (81.83 cm) followed by Rotary blade L (81.76 cm). The difference of plant height was found non-significant at the level of 5% of significance (CD=0.47). The minimum plant height was found with untilled (78.60 cm) followed by rotary blade C (81.37 cm). The difference of plant height was found significant at the level of 5% of significance. For the combinations, the maximum plant height was found with L+T (82.68 cm) followed by C+T (82.36 cm). The difference of plant height was found non-significant at the level of 5% of significance.

Table 1 Wheat (*Kanchan*) plant height (cm), under different treatments and level of passes das-15 during 2009-10

Treatments	Level of passes				
Shape of blade/ tine	P ₁	P ₂	P ₃	Total	Mean
1.Rotary "C"	17.37	17.50	17.83	52.70	17.57
2.Rotary "L"	17.67	17.73	18.50	53.90	17.97
3.Tra, "T" Tyne shovel	17.63	17.97	19.20	54.80	18.27
4. "C+T"	18.87	19.77	19.63	58.27	19.42
5. "L+ T	19.53	20.27	20.83	60.63	20.21
6.Untilled	17.17	17.17	17.17	51.50	17.17
Total	108.23	110.40	113.17	331.80	18.43
CD	0.63				
CV	1.87				

Table 2 Wheat (*Kanchan*) plant height (cm), under different treatments and level of passes das-15 during 2010-11

Treatments	Level of passes				
Shape of blade/ tine	P ₁	P ₂	P ₃	Total	Mean
1.Rotary "C"	18.20	18.50	18.17	54.87	18.29
2.Rotary "L"	17.70	18.27	19.17	55.13	18.38
3.Tra, "T" Tyne Shovel	18.53	20.80	19.30	58.63	19.54
4. "C+T"	18.50	19.27	19.83	57.60	19.20
5. "L+ T	19.67	19.57	19.00	58.23	19.41
6.Untilled	17.50	17.50	17.50	52.50	17.50
Total	110.10	113.90	112.97	336.97	18.72
Ave.	18.35	18.98	18.83		
CD	1.10				
CV	3.23				

Table 3 Wheat (*Kanchan*) height (cm), under different treatments and level of passes at harvesting during 2009-10

Treatments	Level of passes				
Shape of blade/ tine	P ₁	P ₂	P ₃	Total	Mean
1.Rotary "C"	80.90	82.00	82.00	244.90	81.63
2.Rotary "L"	81.10	82.33	82.00	245.43	81.81
3.Tra, "T" Tyne Shovel	80.83	81.07	82.50	244.40	81.47
4. "C+T"	81.60	82.83	82.77	247.20	82.40

5. "L+ T	82.60	82.80	82.93	248.33	82.78
6.Untilled	79.40	79.40	79.40	238.20	79.40
Total	486.43	490.43	491.60	1468.47	81.58
Ave.	81.07	81.74	81.93		
CD	0.78				
CV	0.52				

Table 4 Wheat (*Kanchan*) hieght (cm), under different treatments and level of passes at harvesting during 2010-11

Treatments	Level of passes				
Shape of blade/ tine	P ₁	P ₂	P ₃	Total	Mean
1.Rotary "C"	80.93	81.40	81.77	244.10	81.37
2.Rotary "L"	81.17	82.10	82.00	245.27	81.76
3.Tra, "T" Tyne Shovel	81.10	81.97	82.43	245.50	81.83
4. "C+T"	81.67	82.50	82.90	247.07	82.36
5. "L+ T	82.30	82.77	82.97	248.03	82.68
6.Untilled	78.60	78.60	78.60	235.80	78.60
Total	485.77	489.33	490.67	1465.77	81.43
Ave.	80.96	81.56	81.78		
CD	0.47				
CV	0.32				

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