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### Original Research

## Weed management practices effects on yield performance of wheat

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#### ABSTRACT

The selection of appropriate variety and proper weed management remains the most significant agronomic problem associated with wheat production in Bangladesh. We, therefore, conducted the current experiment to study the effect of weed management on the weed density and yield performance of some wheat varieties. The experiment was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh, from November 2016 to March 2017. The experiment consists of three wheat varieties *viz.* BARI Gom-25, BARI Gom-26 and BARI Gom-29, and four weed managements *viz.* no use of herbicides (farmers manual hand weeding), herbicide pendimethalin at the dose of 2.5 L ha<sup>-1</sup> (pre-emergence), herbicide 2, 4-D at the dose of 2 L ha<sup>-1</sup> (post-emergence), and combine herbicide of pendimethalin + 2, 4-D. The experiment was laid out in a randomized complete block design (RCBD) with three replications. Weed parameter and most of the yield contributing characters and yield were significantly influenced by wheat varieties, weed management practices and their interactions. Among the varieties, the highest grain yield (4.59 t ha<sup>-1</sup>) was recorded in BARI Gom-29, whereas for weed management practices, the highest grain yield (4.76 t ha<sup>-1</sup>) was obtained in pendimethalin + 2, 4-D treatment. In interactions, BARI Gom-29 with pendimethalin + 2, 4-D treatment produced the highest grain yield (5.10 t ha<sup>-1</sup>). Therefore, BARI Gom-29 along with combine herbicide of pendimethalin @ 2.5 L ha<sup>-1</sup> (pre-emergence) + 2, 4-D @ 2 L ha<sup>-1</sup> (post-emergence) might be taken in consideration for obtaining higher yield in wheat.

#### Introduction

Wheat played a pivotal role as a source of human staple food around the world and it is the second important staple food crop next to rice. It grows as a winter cereal crop in Bangladesh. In Bangladesh, per capita intake of wheat stands at 28-30 g day<sup>-1</sup> which further indicates its approximate demand of 4 million tons per annum (Karim et al. 2010). To meet the demand, the country has to import, on an average, 1.4 million tons of wheat every year (Islam et al. 2018).

Therefore, to be self-sufficient and meeting the demand of the ever-increasing population in Bangladesh wheat production has been given the highest priority.

The area and production of wheat is about 4,15,339 hectares and 13,11,473 ton, respectively in Bangladesh (BBS, 2018). The decreasing rate of agricultural land and farmer's tendency to cultivate *Boro* rice in November to April limits the yield of wheat. Not only that, wheat is exposed to an unfavorable environment (high temperature) at the vegetative stage in sub-tropical countries like Bangladesh, (Hossain et al. 2011) which ultimately reduced the yield of wheat. The average yield of wheat is lower than other wheat growing countries of the world which is 3.4 t ha<sup>-1</sup> (BBS, 2018). Therefore, to overcome this situation, increase in wheat yield per unit area is the only alternative to bring self-sufficiency in food production.

Production potential of wheat cultivars yet to be achieved due to the improper management practices of wheat in Bangladesh. Among these management practices, lack of improved variety and selection of proper weed management are the main reasons. Delayed or insufficient weed control is one of the major factors which limit wheat production in the world (Hossain et al. 2009). Weeds can negatively influence wheat yield as weed emerge simultaneously and grow vigorously with wheat. Weed-crop interactions are based on competition for water, nutrients, space and solar radiation which causes 33% reduction in wheat yield (Karim, 1987). A critical weed free period up to 40 days after sowing is needed for proper growth and higher yield (Tariful et al. 1998). Therefore, to avoid yield loss, weed management should be done in such a time so that minimum weed infestation occurs in wheat. The conventional method of weed control is much effective but knowledge about appropriate stage of weeding along with lack of labor availability at those stages makes hand weeding non-effective. Therefore, use of herbicide could be more feasible and efficient to check early weed competition (Hossain et al. 2020). Again, wheat cultivars vary in their competitiveness against weeds (Lemerle et al. 2006) and those with a high degree of competitive ability, especially against aggressive weeds, are highly beneficial because they protect against the build-up of weed infestation and proliferation of the weed seed bank (Feledyn- Szewczyk et al. 2013). So, the best wheat variety and weed management techniques need to be adopted by the farmers to reduce weed infestation and maximizing wheat yield. Keeping this in view, present attempt was made to study varietal response of wheat towards weed management and to identify suitable weed management practice for maximizing wheat yield.

## Materials and Methods

### *Experimental site*

The research work was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University (BAU), Mymensingh. The experimental field belongs to the non-calcareous dark grey floodplain soil under the Agro-ecological Zone of the Old Brahmaputra Floodplain (AEZ-9) (UNDP and FAO, 1988) located at 24.75° N latitude and 90.50°E longitude at an elevation of 18 m above the sea level. The field was a medium high land with flat and well drained condition having pH 6.7.

### *Treatments and design*

The experiment consists of two factors; factor A: wheat varieties *viz.* BARI Gom-25 ( $V_1$ ), BARI Gom-26 ( $V_2$ ) and BARI Gom-29 ( $V_3$ ); factor B: weed managements *viz.* no use of herbicides (farmers manual hand weeding) ( $W_0$ ), herbicide pendimethalin at the dose of 2.5 L ha<sup>-1</sup> (pre-emergence) ( $W_1$ ), herbicide 2, 4-D at the dose of 2 L ha<sup>-1</sup> (post-emergence) ( $W_2$ ), and combine herbicide of pendimethalin + 2, 4-D ( $W_3$ ). The experiment was laid out in randomized complete block design with three replications. Total number of unit plots in the experiment was 36 and the size of the unit plot was 4.0 m × 2.5 m (10 m<sup>2</sup>). The distances between blocks and plots were 1.0 m and 0.5 m, respectively.

### *Plant cultivation*

The main field was prepared by power tiller with three times of ploughing and cross ploughing followed by laddering at 15 days before sowing. The plots were fertilized with urea, triple super phosphate (TSP), muriate of potash (MoP) and gypsum at the rate of 220, 180, 50 and 120 kg ha<sup>-1</sup>, respectively (FRG, 2012). The whole amount of TSP, MoP and gypsum and one-third of urea were applied just before final land preparation. The rest amount of urea was applied in two equal splits at 20 and 40 DAS. Seeds were sown in line on 18 November 2016 maintaining row spacing 25 cm with seeding depth 5 cm. Weeding operation was done according to the treatment specification. The crop was irrigated once at the crown root initiation stage at 20 DAS following flood irrigation. Other intercultural operations were done when it was necessary. The crop was harvested plot-wise at full maturity on 20 March 2017.

### *Data recording and statistical analyses*

To collect data on weed parameters, weed samples were collected from three spots of each plot at 30 DAS, 45 DAS and 60 DAS using a 0.25 m × 0.25 m quadrat as described by Cruz *et al.* (1986). The weeds within the quadrat were counted and converted to number m<sup>-2</sup> multiplying by four. At

harvest, five hills excluding border hills per plot were selected randomly for recording yield contributing data. At full maturity an area of central 1.0 m × 1.0 m was selected from each plot to record the yield of grain and straw. The harvested crop of each unit area was separately bundled, properly tagged and then brought to the threshing floor. Grains were separated from the plants by thresher. Grains were then sun dried at 14% moisture level and cleaned. The straw was also sun dried properly. Finally, the yield of grain and straw plot<sup>-1</sup> were recorded and converted to t ha<sup>-1</sup>. The collected data were compiled and tabulated in proper form and subjected to statistical analysis. Data were analyzed using the analysis of variance technique with the help of computer package program MSTAT-C (Russel, 1986) and mean differences were adjudged by Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984).

## Results and Discussion

### *Weed density*

The effect of variety, weed management and their interaction on weed density was significant at 30, 45 and 60 DAS (Table 1). The highest weed density of 78.42 m<sup>-2</sup> was found in BARI Gom-26 whereas the lowest weed density (44.00m<sup>-2</sup>) was found in BARI Gom-29 at 60 DAS and intermediate (55.08 m<sup>-2</sup>) was found in BARI Gom-25 at 60 DAS (Table 2). Selection of wheat varieties with early prostrate ground cover might be responsible for decreasing the number of weed (Davies and Welsh, 2002). In case of weed management, the highest weed density of 81.67m<sup>-2</sup> was found in herbicide pendimethalin treatment and the lowest one (43.85 m<sup>-2</sup>) was recorded in combine herbicide of pendimethalin + 2, 4-D treatment at 60 DAS (Table 2). Meena et al. (2017) observed that combine application of herbicides effectively lowers the weed density in wheat. BARI Gom-29 along with combine herbicide of pendimethalin + 2, 4-D produced the lowest weed density (26.00 m<sup>-2</sup>) and BARI Gom-26 with herbicide pendimethalin treatment produced the highest weed density (94.00 m<sup>-2</sup>) (Table 2).

### *Yield Contributing Characters*

Different yield contributing characters of wheat differed significantly due to wheat variety, weed management and their interactions (Table 1). The tallest plant (78.47cm) was recorded in BARI Gom-25 which was at par with BARI Gom-29 and the lowest plant height (74.27cm) was recorded in BARI Gom-26 (Table 3). Similar result was reported by Uddin et al. (2015) and Halder et al. (2016) who noticed that the variation in plant height among the varieties was probably due to heredity or varietal character. Combine herbicide of pendimethalin + 2, 4-D treatment produced the tallest plant (79.87 cm) compared to other weed management treatments while the shortest plant

(72.56cm) was recorded in 2, 4-D treatment. Plant height was not significantly influenced by the interaction between variety and weed management.

**Table 1.** Summary of ANOVA (mean square values) of variety and weed management on weed density (WD) and crop characters, yield contributing characters, and yield of wheat.

Trait	Mean square				
		Varieties (A)	Weed Management (B)	A × B	Error
	df = 2	df = 3	df = 2	df = 6	df = 22
WD at 30 DAS	54.36	5660.43**	453.84**	255.17**	13.92
WD at 45 DAS	32.97	4612.92**	1555.00**	570.21**	44.18
WD at 600 DAS	5.75	2304.87**	3704.35**	209.44**	10.93
Plant height (cm)	21.91	87.59**	52.94**	3.64NS	9.64
Total tillers hill <sup>-1</sup> (no.)	0.011	0.529**	0.334**	0.023*	0.009
Effective tillers hill <sup>-1</sup> (no.)	0.005	0.548**	0.347**	0.034**	0.010
Non-effective tillers hill <sup>-1</sup> (no.)	0.008	0.010NS	0.032NS	0.045**	0.012
Length of spike (cm)	0.073	11.53*	8.01NS	1.735NS	2.935
Grains spike <sup>-1</sup> (no.)	1.054	39.08**	18.87**	1.40NS	0.957
Sterile spikelets spike <sup>-1</sup> (no.)	0.006	0.216**	0.064**	0.011NS	0.008
1000- grain weight (g)	0.940	0.230NS	2.08*	0.028NS	0.609
Grain yield (t ha <sup>-1</sup> )	0.006	1.84**	1.07**	0.024*	0.009
Straw yield (t ha <sup>-1</sup> )	0.076	4.25**	1.40**	0.210**	0.042
Harvest index (%)	0.97	8.85**	5.86NS	6.34*	2.16

Note: \*\* =Significant at 1% level of probability,\* =Significant at 5% level of probability, NS = Not significant

The highest number of total and effective tillers hill<sup>-1</sup> (3.31 and 2.94, respectively) was observed in BARI Gom-29 while the lowest total tillers hill<sup>-1</sup> (2.99) was observed in BARI Gom-25 and lowest effective tillers hill<sup>-1</sup> (2.60) was recorded in BARI Gom-26 (Table 3). This result was in conformity with Sarkar et al. (2009) and Halder et al. (2016) who observed that number of total and effective tillers hill<sup>-1</sup> differed among the varieties. In case of weed management, the highest number of total and effective tillers hill<sup>-1</sup> (3.51 and 3.08, respectively) were obtained in pendimethalin + 2, 4-D treatment followed by 2, 4-D treatment and the lowest total and effective tillers hill<sup>-1</sup> (2.94 and 2.53, respectively) were obtained in pendimethalin treatment. The increase in total and effective tillers hill<sup>-1</sup> might be due to effective weed control which might decrease competition for resources and increase the tiller number in wheat. Weed free condition increased number of total and effective tillers (Amare et al. 2016). In interaction, BARI Gom-29 along with pendimethalin + 2, 4-D treatment produced the highest number of total tillers and effective tillers hill<sup>-1</sup> (3.73 and 3.33,

respectively) compared to other treatment combinations while the lowest values (2.73 and 2.47, respectively) were recorded in BARI Gom-25 with pendimethalin treatment.

**Table 2.** Effect of variety, weed management and their interaction on weed density at different days after sowing.

Treatments	Weed density (number m <sup>-2</sup> )		
	Days after sowing (DAS)		
	30	45	60
Varieties (V)			
BARI Gom-25	79.81a	104.6c	55.08b
BARI Gom-26	80.26a	127.3a	78.42a
BARI Gom-29	69.39b	114.3b	44.00c
S $\bar{x}$	1.08	1.92	0.955
Level of significance	**	**	**
Weed Management (W)			
W <sub>0</sub>	95.07b	129.3a	54.63b
W <sub>1</sub>	99.70a	135.1a	81.67a
W <sub>2</sub>	63.61c	112.6b	56.52b
W <sub>3</sub>	47.56d	84.62c	43.85c
S $\bar{x}$	1.24	2.22	1.10
Level of significance	**	**	**
CV (%)	4.88	5.76	5.59
Interaction (V× W)			
V <sub>1</sub> ×W <sub>0</sub>	98.33ab	120.1b	58.67e
V <sub>2</sub> ×W <sub>0</sub>	95.20ab	135.2a	65.23d
V <sub>3</sub> ×W <sub>0</sub>	91.67b	132.7a	40.00g
V <sub>1</sub> ×W <sub>1</sub>	101.9a	120.2b	78.67b
V <sub>2</sub> ×W <sub>1</sub>	99.33a	140.4a	94.00a
V <sub>3</sub> ×W <sub>1</sub>	97.88ab	144.7a	72.33c
V <sub>1</sub> ×W <sub>2</sub>	75.00c	110.1b	49.67f
V <sub>2</sub> ×W <sub>2</sub>	60.50de	115.3b	82.22b
V <sub>3</sub> ×W <sub>2</sub>	55.33e	112.2b	37.67gh
V <sub>1</sub> ×W <sub>3</sub>	44.00f	68.00c	33.33h
V <sub>2</sub> ×W <sub>3</sub>	66.00d	118.2b	72.23c
V <sub>3</sub> ×W <sub>3</sub>	32.67g	67.67c	26.00i
S $\bar{x}$	2.15	3.84	1.91
Level of significance	**	**	**
CV (%)	4.88	5.76	5.59

In a column figures having common letter(s) under each treatment do not differ significantly as per DMRT. \*\* =Significant at 1% level of probability; V<sub>1</sub>= BARI Gom-25, V<sub>2</sub>= BARI Gom-26, V<sub>3</sub>= BARI Gom-29. W<sub>0</sub>= No use of herbicides, W<sub>1</sub>= herbicide pendimethalin at the dose of 2.5 L ha<sup>-1</sup> (pre-emergence), W<sub>2</sub>= herbicide 2, 4-D at the dose of 2 L ha<sup>-1</sup>(post-emergence), W<sub>3</sub>= combine herbicide of pendimethalin + 2, 4-D.

Length of spike was not significantly influenced by variety and variety weed management interactions. The longest spike (12.83 cm) was obtained in pendimethalin + 2, 4-D treatment while the shortest one (10.20 cm) was found in pendimethalin treatment (Table 3). Grains spike<sup>-1</sup> and sterile spikelets spike<sup>-1</sup>were significantly affected by variety and different weed management but they were not significant due to the interaction between variety and weed management (Table 4). The highest number of grains spike<sup>-1</sup> (33.22) was produced in BARI Gom-29 followed by BARI Gom-

25 while the lowest number of grains spike<sup>-1</sup> (30.71) was produced in BARI Gom-26 (Table 3). Number of grains spike<sup>-1</sup> differs with variety was highlighted by previous study carried out by Halder et al. (2016). Combine herbicide of pendimethalin + 2, 4-D treatment produced the highest number of grains spikelet<sup>-1</sup> (34.32) followed by 2, 4-D treatment and the lowest one (29.41) was recorded in pendimethalin treatment. Considerable enhancement in grains per spike may be the result of reduced weed competition due to the mix application of herbicide and availability of adequate quantities of plant nutrients and moisture to crop plants. Similar result was also documented by Mustari et al. (2014) and Kaur et al. (2020).

**Table 3.** Effect of variety and weed management on yield contributing characters of wheat.

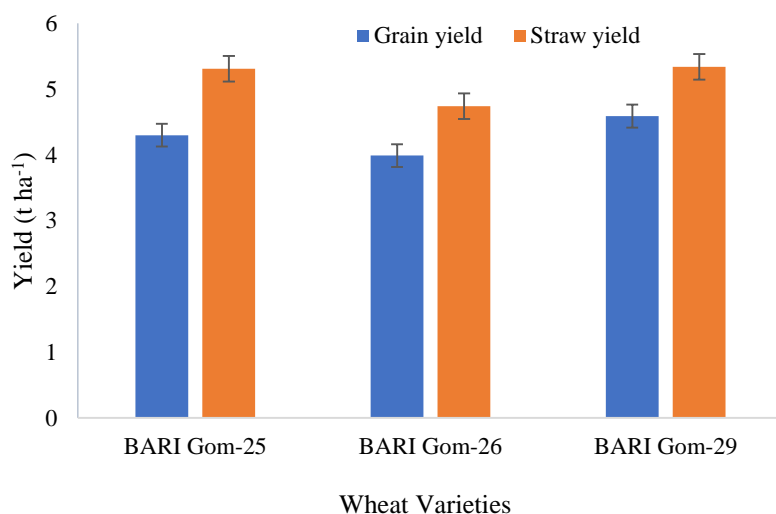
Treatments	Plant height (cm)	Total tillers hill <sup>-1</sup> (no.)	Effective tillers hill <sup>-1</sup> (no.)	Length of spike (cm)	Grains spike <sup>-1</sup> (no.)	Sterile spikelets spike <sup>-1</sup> (no.)	1000-grain weight (g)	Harvest index (%)
Varieties (V)								
BARI Gom-25	78.47a	2.99b	2.76b	11.13	31.94b	0.85a	45.20ab	44.89
BARI Gom-26	74.27b	3.24a	2.60c	10.53	30.71c	0.91a	44.80b	45.77
BARI Gom-29	76.38ab	3.31a	2.94a	12.15	33.22a	0.77b	45.63a	46.27
S $\bar{x}$	0.897	0.027	0.029	0.495	0.282	0.026	0.225	0.425
Significance	**	**	**	NS	**	**	*	NS
Weed management (W)								
W <sub>0</sub>	75.45bc	3.07c	2.62c	10.74b	31.36c	0.83b	45.18	46.11a
W <sub>1</sub>	77.62ab	2.94d	2.53c	10.20b	29.41d	1.05a	45.26	45.87a
W <sub>2</sub>	72.56c	3.21b	2.83b	11.33ab	32.75b	0.81b	45.02	44.19b
W <sub>3</sub>	79.87a	3.51a	3.08a	12.83a	34.32a	0.68c	45.40	46.39a
S $\bar{x}$	1.04	0.032	0.033	0.571	0.326	0.030	0.260	0.491
Significance	**	**	**	*	**	**	NS	**
Interactions (V×W)								
V <sub>1</sub> ×W <sub>0</sub>	78.27	2.93e	2.53e	10.73	31.48	0.83	45.15	46.00b
V <sub>2</sub> ×W <sub>0</sub>	71.87	3.10bcde	2.60de	10.00	29.79	0.87	44.78	46.17b
V <sub>3</sub> ×W <sub>0</sub>	76.20	3.20bcd	2.73cd	11.48	32.82	0.80	45.60	46.15b
V <sub>1</sub> ×W <sub>1</sub>	74.67	2.73f	2.47e	11.27	32.56	0.80	45.25	46.41b
V <sub>2</sub> ×W <sub>1</sub>	71.33	3.03de	2.53e	11.13	32.04	0.86	44.85	45.76b
V <sub>3</sub> ×W <sub>1</sub>	71.67	3.07cde	2.60de	11.52	33.64	0.78	45.67	45.44bc
V <sub>1</sub> ×W <sub>2</sub>	78.60	3.13bcd	2.60de	10.12	29.67	1.07	44.90	44.24bc
V <sub>2</sub> ×W <sub>2</sub>	76.47	3.23bc	2.80c	9.81	28.63	1.21	44.58	45.74b
V <sub>3</sub> ×W <sub>2</sub>	77.80	3.27b	3.10b	10.68	29.93	0.90	45.57	44.27bc
V <sub>1</sub> ×W <sub>3</sub>	82.33	3.20bcd	2.80c	12.39	34.07	0.72	45.50	42.88c
V <sub>2</sub> ×W <sub>3</sub>	77.40	3.60a	3.13b	11.18	32.39	0.73	45.00	45.41bc
V <sub>3</sub> ×W <sub>3</sub>	79.87	3.73a	3.33a	14.91	36.49	0.60	45.70	49.19a
S $\bar{x}$	1.78	0.055	0.058	0.989	0.565	0.053	0.451	0.851
Significance	NS	*	**	NS	NS	NS	NS	*
CV (%)	4.07	2.92	3.54	15.20	3.06	10.87	1.73	3.23

In a column figures having common letter(s) under each treatment do not differ significantly as per DMRT. \*\* =Significant at 1% level of probability, \* =Significant at 5% level of probability, NS = Not significant, V<sub>1</sub>= BARI Gom-25, V<sub>2</sub>= BARI Gom-26, V<sub>3</sub>= BARI Gom-29. W<sub>0</sub> = No use of herbicides, W<sub>1</sub> = herbicide pendimethalin at the dose of 2.5 L ha<sup>-1</sup> (pre-emergence), W<sub>2</sub> = herbicide 2, 4-D at the dose of 2 L ha<sup>-1</sup>(post-emergence), W<sub>3</sub> = combine herbicide of pendimethalin + 2, 4-D.

The highest number of sterile spikelets spike<sup>-1</sup> (0.91) was recorded in BARI Gom-26 followed by BARI Gom-25 and the lowest one (0.77) was obtained in BARI Gom-29. The highest number of sterile spikelets spike<sup>-1</sup> (1.05) was produced in pendimethalin treatment and the lowest one (0.68) was found in pendimethalin + 2, 4-D treatment. The weight of 1000-grain was significantly affected by wheat variety but it was not significant in case of weed management and due to variety-weed management interaction. The heaviest 1000-grain (45.63 g) was recorded in BARI Gom-29 which was as good as BARI Gom-25 and the lightest 1000-grain (44.80 g) was found in BARI Gom-26 (Table 3). The variation of 1000-grain weight among the varieties might be hereditary characters of wheat variety. This result was in conformity with Uddin et al. (2015) and Halder et al. (2016) who reported that 1000-grain weight varied due to variety.

#### *Grain and straw yield*

The grain and straw yield varied significantly due to different variety, weed management and their interaction (Table 1). The highest grain and straw yield (4.59 t ha<sup>-1</sup> and 5.34 t ha<sup>-1</sup>, respectively) was obtained in BARI Gom-29 while the lowest grain and straw yield (3.99 t ha<sup>-1</sup> and 4.74 t ha<sup>-1</sup>, respectively) was recorded in BARI Gom-26 (Figure 1).

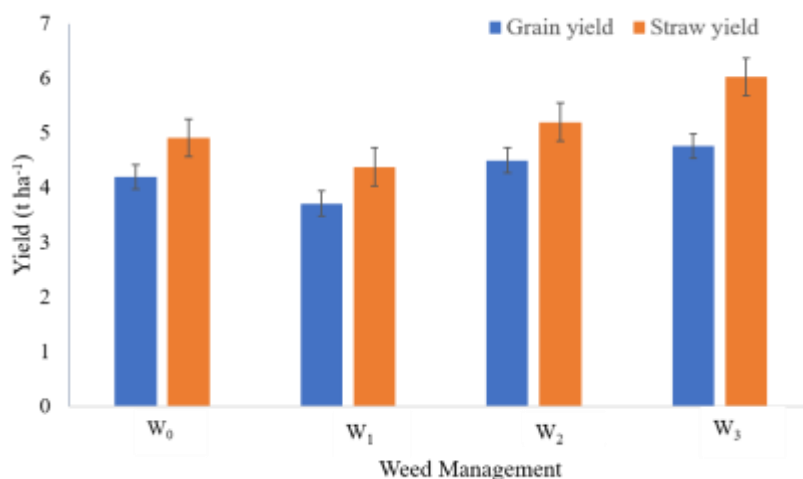


**Figure 1.** Grain and straw yield influenced by variety.

The highest grain yield from BARI Gom-29 could be attributed mainly to its greater number of total and effective tillers hill<sup>-1</sup> and higher 1000-grain weight. Grain yield of wheat was significantly affected by variety was reported elsewhere (Alam et al. 2003; Sarkar et al. 2009; Halder et al. 2016). In case of weed management, the highest grain and straw yield (4.76 t ha<sup>-1</sup> and 6.03 t ha<sup>-1</sup>, respectively) was obtained in pendimethalin + 2, 4-D treatment while the lowest values of grain



and straw yields ( $3.71 \text{ t ha}^{-1}$  and  $4.38 \text{ t ha}^{-1}$ , respectively) were recorded in pendimethalin treatment (Figure 2).



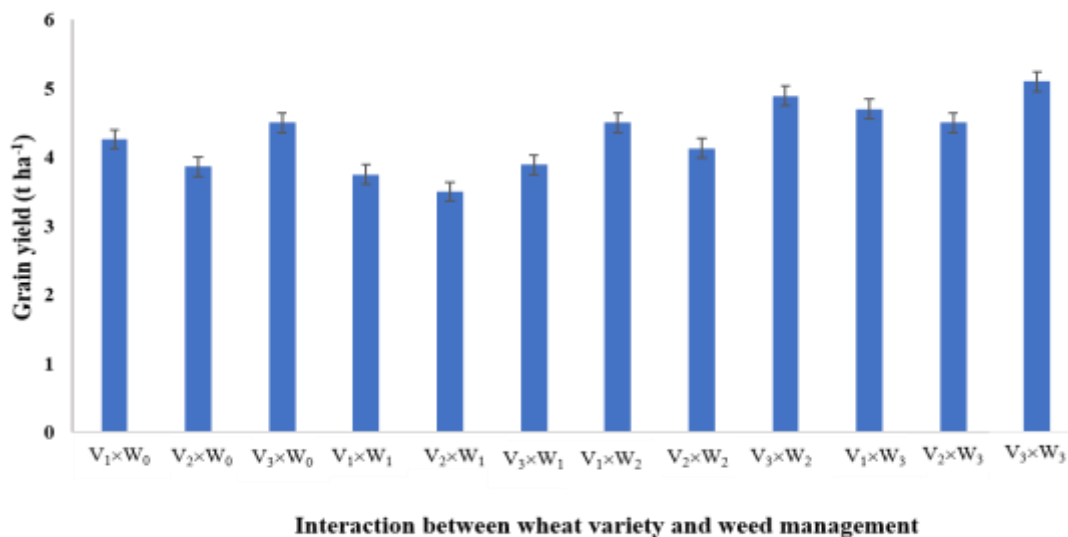
**Figure 2.** Grain and straw yield influenced by weed management.

The employment of herbicide at proper time could have provided effective suppression of weed density and decrease competition for resources which increase the availability of more photosynthetic active radiations to enhance the metabolic activities of plant leading to highest number of total and effective tillers plant<sup>-1</sup>, highest number of grains spike<sup>-1</sup> as well as better grain filling. Application of herbicide increased the grain and straw yield in wheat was reported by Bibi et al. (2008) and Kumar et al. (2018). In interaction, the highest grain and straw yield ( $5.10 \text{ t ha}^{-1}$  and  $6.42 \text{ t ha}^{-1}$ , respectively) was obtained in BARI Gom-29 with pendimethalin + 2, 4-D treatment and the lowest grain yield ( $3.50 \text{ t ha}^{-1}$  and  $4.15 \text{ t ha}^{-1}$ , respectively) was obtained in BARI Gom-26 with pendimethalin application (Figure 3 and Figure 4). These results corroborate with the findings of Sultana et al. (2012) and Islam et al. (2018) who noticed that interaction between variety and weed management had significant influence on grain and straw yields of wheat.

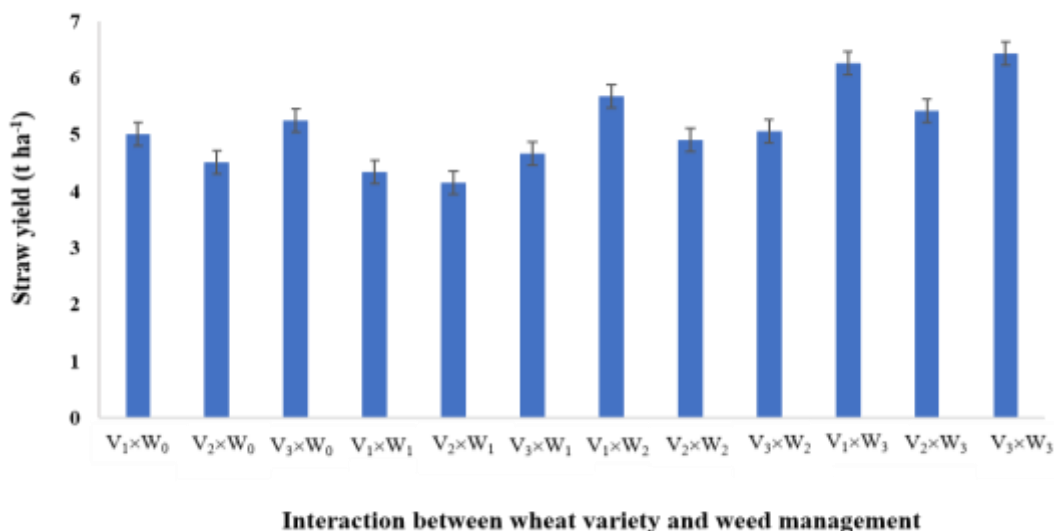
#### *Harvest index*

Harvest index was not significantly influenced by variety but weed management and variety-weed management interaction significantly influenced on harvest index (Table 1). The highest value of harvest index (46.39%) was obtained in pendimethalin + 2, 4-D treatment which was at par with pendimethalin treatment and control (no use of herbicides) while the lowest one (44.19%) was found in 2, 4-D treatment (Table 3). Interaction between variety and weed management had significant influence over harvest index. The highest harvest index (49.19%) was obtained in BARI

Gom-29 with pendimethalin + 2, 4-D treatment while the lowest harvest index (42.88%) was found in interaction of variety BARI Gom-25 with pendimethalin + 2, 4-D treatment.



**Figure 3.** Grain yield influenced by interaction between wheat variety and weed management.



**Figure 4.** Straw yield influenced by interaction between wheat variety and weed management.

## Conclusion

Results reveal that BARI Gom-29 produced the highest grain yield compared to BARI Gom-25 and BARI Gom-26, and pendimethalin + 2, 4-D treatment provided the highest grain yield compared to other weed management treatments. In interaction, the highest grain yield was obtained in BARI Gom-29 with pendimethalin + 2, 4-D treatment. Therefore, BARI Gom-29 along with combine

herbicide of pendimethalin @ 2.5 L ha<sup>-1</sup> (pre-emergence) + 2, 4-D @ 2 L ha<sup>-1</sup>(post-emergence) can be used for increasing higher yield as well as controlling weed in an effective manner. But further studies are required in different regions of the country to confirm the results before recommending at different parts of Bangladesh.

### Conflicts of Interest

No conflicts of interest have been declared.

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