

## **EFFECT OF VARIETIES AND MULCHES ON FIELD PERFORMANCE OF *IN VITRO* PLANTLETS AND CONVENTIONALLY PROPAGATED POTATO PLANTS**

M.A. ALI<sup>1</sup>, \*S.M. FAISAL<sup>2</sup>, K.M. NASIRUDDIN<sup>3</sup>, M.S. HAQUE<sup>3</sup>, M.A. CHOWDHURY<sup>4</sup>  
AND A. ULLAH<sup>5</sup>

<sup>1</sup>PPS, DAE, Kurigram; <sup>2</sup>SSO, Horticulture Division, BARI, RARS, Hathazari, Chittagong; <sup>3</sup>Professor, Dept. of Biotechnology, Faculty of Agriculture, BAU, Mymensingh-2202; <sup>4</sup>SSO, SRDI, Farmgate, Dhaka-1215 and <sup>5</sup>Former MS Student, Department of Genetic Engineering & Biotechnology, University of Chittagong, Bangladesh.

### **ABSTRACT**

Field performance of *in vitro* plantlets and conventionally propagated potato plants was observed. Five types of mulch viz. no mulch (control), black polythene, white polythene, straw and water hyacinth and six types of potato viz. Diamant conventional (conv.), Cardinal (conv.), Granola (conv.), Diamant plantlet (Plt.), plantlets of Cardinal and Granola were considered in this investigation. Significant effects of variety and mulch were found among the parameters studied. The highest (20.92 t ha<sup>-1</sup>) yield was recorded from Diamant, followed by Cardinal and the lowest (0.56 t ha<sup>-1</sup>) yield was obtained from Granola plantlet. Among the five different mulches, the highest (9.19) number of tubers hill<sup>-1</sup> was harvested from straw mulch, whereas the lowest (7.35) number of tubers hill<sup>-1</sup> was found in no mulch treatment. Straw mulch also gave the highest (10.97 t ha<sup>-1</sup>) yield than other treatments.

### **KEY WORDS**

Tuber yield, dry weight, main stem, hill, haulm.

### **INTRODUCTION**

Potato (*Solanum tuberosum* L.) is the 4th most cultivated food crop after wheat, rice and maize and therefore, the most important dicotyledonous and tuber crop in the world (Jones *et al.* 1994). Potato is a good and cheap source of

---

\* Corresponding author e-mail: [osru2002@yahoo.com](mailto:osru2002@yahoo.com)

M.A.ALI<sup>1</sup>, \*S.M.FAISAL<sup>2</sup>, K.M.NASIRUDDIN<sup>3</sup>, M.S.HAQUE<sup>3</sup>,  
M.A.CHOWDHURY<sup>4</sup> AND A. ULLAH<sup>5</sup>

carbohydrates, vitamins, minerals and proteins and provides most of the trace elements which can meet the energy requirements of the people living in the developing countries.

In Bangladesh, potato is cultivated over an area of 345 thousand hectares with an annual production of 5167 thousand tones with an average yield of 14.83 t ha<sup>-1</sup> (BBS 2007). This yield is very low compared to other potato growing countries like the Netherlands (45 t ha<sup>-1</sup>), Germany (46 t ha<sup>-1</sup>), Scandinavian countries (48-52 t ha<sup>-1</sup>) and neighbouring India (21 t ha<sup>-1</sup>) (Beukema and Vander Zaag 1990; Rashid *et al.* 1993). Lack of quality seed potato is one of the most important factors for this low yield.

In tropical and subtropical areas like Bangladesh, it is difficult to produce seed tubers of potato due to lack of appropriate storage facilities and transport, as well as the presence of virus diseases (Omidi *et al.* 2003). Now a days, use of microplants and microtubers from virus free materials as seed potato is becoming popular all over the world. In our country, the Tuber Crop Research Centre (TCRC) of Bangladesh Agricultural Research Institute (BARI) is now producing microplants and microtubers for the national seed production programme (Hossain and Sultana 1995). Some NGOs and Companies are also producing microplants and microtubers in a limited scale as supplementary propagules. As their production of virus free seed potato is limited and still not well spread throughout the country for environmental adaptation; its popularity yet not reached to the farmers' level. Microplants can not be stored and microtubers are also more vulnerable to storage damage due to their smaller size (Naik and Sarker 1997). Direct field planting of microplants and microtubers is also difficult. In that case, comparatively larger minitubers produced from microplants and microtubers can be used for the next season. To find out the suitable seed, research on comperative environmental adaptability in the field as seed potato of microplants and microtubers is necessary.

Without these, many potato growers faced problem of poor plant population in direct sown TPS beds (Maniruzzaman 1994), which is mainly due to deficit soil moisture content. So mulching is a recognized practice in many crops to conserve soil moisture. Mulching has been reported as a means of improving production in many crops, especially vegetables like potato, sweet potato, carrot, cabbage, cauliflower etc. (Rashid *et al.* 1981, Sarker and Hossain 1989, Khatun 1999).

EFFECT OF VARIETIES AND MULCHES ON FIELD PERFORMANCE OF *IN VITRO*  
PLANTLETS AND CONVENTIONALLY PROPAGATED POTATO PLANTS

Mulch conserved soil moisture, increased leaf area index (LAI) and relative growth rate (RGR) significantly, and ultimately yields were higher compared to unmulched (Singh *et al.* 1987). Based on the above facts, the present research work was undertaken to see the effect of mulch on *in vitro* plantlets and normal plants of different potato varieties.

### **MATERIALS AND METHODS**

The investigation was conducted at the field of USDA Biotechnology Laboratory under the Department of Biotechnology of Bangladesh Agricultural University, Mymensingh during January 2005 to December 2008, as a part of Ph.D. research works. There were two factors in this experiment. Factor A consisted of five types of mulch, viz. no mulch (control), black polythene, white polythene, straw and water hyacinth and Factor B consisted of six type of potato viz. Diamant conventional (conv.), Cardinal (conv.), Granola (conv.), Diamant micro propagated plantlet (Plt.), Cardinal Plt. and Granola Plt. So total number of treatments were 30 ( $5 \times 6$ ). The experiment was laid under Completely Randomized Design (CRD) and replicated 3 times. Seed potato tubers were collected from TCRC, BARI, Joydebpur, Gazipur. Disease-free potato tubers were sprouted in the dark condition at room temperature in the Laboratory. The sprouted potato tubers were then ready to use. The area of a block was first divided into five main plots for mulch treatment. Each main plot was sub divided into 6 sub plots for variety (three conventional varieties and three tissue cultured plantlet of same variety). The experimental plot was divided into 90 unit plots; each unit plot was  $1.5\text{m} \times 1.0\text{m}$  size. A spacing of 0.5m was maintained between the plots. So, the area of unit plot was  $1.5 \times 1.0 \text{ m}^2 = 1.5 \text{ m}^2$ . Row to row spacing was 60 cm and tuber plantlet<sup>-1</sup> to tuber plantlet<sup>-1</sup> was 20 cm. Total 20 kg tubers @  $1.5 \text{ t ha}^{-1}$  and 640 plantlet were used. Weeding, earthing-up, irrigation, pesticide spraying and other cultural practices were done as and when necessary. The maturity of the crop was determined by the appearance of yellowish colour of the leaves, falling of stems on the ground and finally drying of leaves. The crop was harvested after 85 days of planting. Haulm cutting was done before 07 days of harvesting. Initially 05 sample plants were harvested from each plot to collect data and the rest tubers were harvested with the help of country plough. Before harvest the mulches were removed. Data on different yield contributing parameters and yield, such as- Number of main stems hill<sup>-1</sup>, Number of tubers hill<sup>-1</sup>, Fresh weight of tubers hill<sup>-1</sup> (g), Tuber yield hectare<sup>-1</sup>(t), Percent dry weight of tubers, Fresh weight of haulm per hill (g), Dry weight of haulm per hill (g), Plant height (cm), Size grade of tubers by number (expressed in %) were recorded. At

M.A.ALI<sup>1</sup>, \*S.M.FAISAL<sup>2</sup>, K.M.NASIRUDDIN<sup>3</sup>, M.S.HAQUE<sup>3</sup>,  
M.A.CHOWDHURY<sup>4</sup> AND A. ULLAH<sup>5</sup>

the time of haulm cutting the tubers from 5 hills per unit plot were collected and graded by number on the basis of diameter, viz. size grade A (28-35 mm), grade B (36-45 mm), grade C (46-55 mm) and grade D (>56 mm). Total number of tuber hill<sup>-1</sup> and plot<sup>-1</sup> was determined and converted into percentage. Recorded data were analyzed using MSTAT-C statistical software. Differences among the means were compared following LSD values.

## RESULTS AND DISCUSSION

### *Effects of variety on growth, yield and yield contributing characters of micropropagated plantlets and conventionally propagated potato plants*

All the varieties of *in vitro* plantlets and conventionally propagated potato plants showed significant differences among the parameters studied (Table 1). Maximum (2.87) number and main stems per hill (2.73) were produced by Cardinal which was statistically identical with Cardinal plantlet. Minimum (2.37) number of main stems was produced by Granola plantlet, which is statistically identical with values recorded from Diamant, Granola and Diamant plantlet. The highest (11.31) number of tubers per hill was recorded from Granola plantlet, followed by Cardinal plantlet and the lowest (5.21) number of tubers hill<sup>-1</sup> was harvested from Diamant. Maximum (247.00) fresh weight of tubers hill<sup>-1</sup> was found in Diamant, followed by Cardinal and Granola, respectively, and minimum (72.95) fresh weight of tubers was recorded from Granola plantlet (Table 1).

The highest (20.92) yield was recorded from Diamant, followed by Cardinal and the lowest (0.56) yield was observed from Granola plantlet, which was statistically identical with mean (0.570) values of Cardinal plantlet (0.93) and Diamant plantlet, respectively. The higher yield of potato hectare<sup>-1</sup> may be attributed due to the varietal characteristics influenced by the growing conditions. Similar trend of yield was found in potatoes produced from plantlets. Although the plantlets showed lower yield, on the seed quality point of view it is too much higher. It is the best way to get more quantity of quality seed potatoes of lower generation directly from plantlets instead of *in vitro* production of microtuber in shortest possible time. Maximum (18.93 g) per cent dry weight of tubers was found in Diamant plantlet, which was statistically identical with mean values (18.50 g) of Diamant and (18.10 g) of Cardinal plantlet. Whereas, the minimum (16.52 g) dry weight of tubers was recorded from Granola plantlet, which was

EFFECT OF VARIETIES AND MULCHES ON FIELD PERFORMANCE OF *IN VITRO*  
PLANTLETS AND CONVENTIONALLY PROPAGATED POTATO PLANTS

statistically identical with mean values (16.72 g) of Granola and 17.62 g of Cardinal. The maximum (102.90) fresh weight of haulm hill<sup>-1</sup> was observed in Diamant, followed by Cardinal, Granola, Diamant plantlet and the minimum (72.67) fresh weight of haulm was produced by Granola plantlet which was statistically identical with values recorded from Cardinal plantlet (Table 2). Plantlets produced comparatively smaller size of hills that may be the cause for minimum fresh weight. The maximum (12.47) dry weight of haulm hill<sup>-1</sup> was recorded in Diamant, followed by Cardinal, Diamant plantlet and the minimum (10.15) dry weight of haulm was produced in Granola plantlet which is statistically identical with values noted from Granola and Cardinal plantlet (Table 1).

Diamant gave the tallest (51.45) plant followed by Cardinal. The minimum plant (41.31) height was recorded in Granola plantlet which is statistically identical with values recorded from Cardinal plantlet at 75 DAP (Fig. 1). The highest percentage (29.11) of tubers A grade by number were recorded in Granola, which was statistically identical with mean values (28.83) of Diamant. While, the lowest (23.56) small tubers found in Granola plantlet (Fig. 2). Among the varieties of potato plantlets and conventionally propagated potatoes the highest percentage (24.33) tubers of B grade by number was found in Granola and the lowest (15.57) medium tubers were recorded from Cardinal plantlet (Fig. 3). The highest percentage (18.63) of large tubers of C grade by number were found in Granola and the lowest (9.01) large tubers were recorded from Cardinal plantlet (Fig. 4). Similarly the highest percentage (15.02) of extra large tubers of D grade by number were found in Cardinal and the lowest (10.25) was recorded from Granola. Whereas, there was no extra large tubers of D grade produced by plantlets (Fig. 5).

M.A.ALI<sup>1</sup>, \*S.M.FAISAL<sup>2</sup>, K.M.NASIRUDDIN<sup>3</sup>, M.S.HAQUE<sup>3</sup>,  
M.A.CHOWDHURY<sup>4</sup> AND A. ULLAH<sup>5</sup>

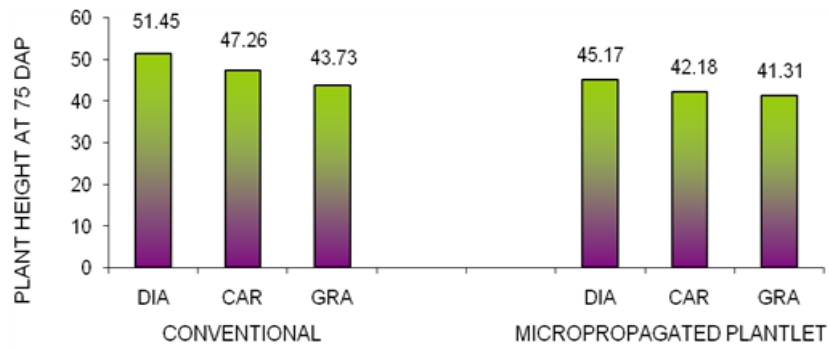


FIG. 1. EFFECT OF VARIETIES ON PLANT HEIGHT (CM): CONVENTIONAL – DIAMANT, GRANOLA AND MICRO-PROPAGATED PLANTLETS – DIAMANT, CARDINAL,

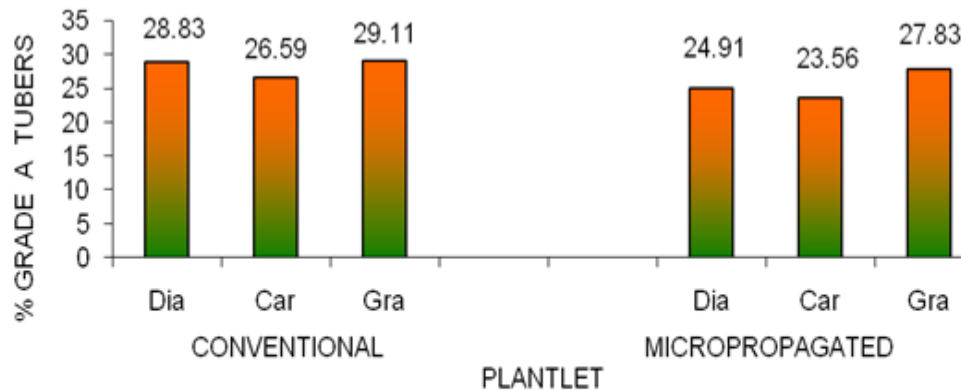


FIG. 2. EFFECT OF VARIETIES ON SIZE GRADE A OF TUBER (NUMBER): CONVENTIONAL – DIAMANT, CARDINAL, GRANOLA AND MICRO-PROPAGATED PLANLETS – DIAMANT, CARDINAL, GRANOLA

EFFECT OF VARIETIES AND MULCHES ON FIELD PERFORMANCE OF *IN VITRO* PLANTLETS AND CONVENTIONALLY PROPAGATED POTATO PLANTS

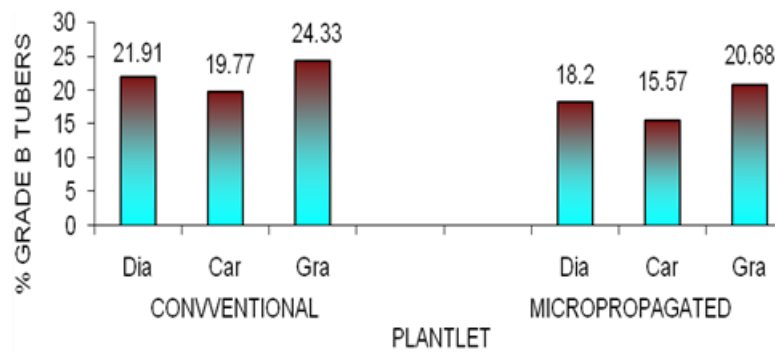


FIG. 3. EFFECT OF VARIETIES ON SIZE GRADE B OF TUBER (NUMBER): CONVENTIONAL – DIAMANT, CARDINAL, GRANOLA AND MICRO-PROPAGATED PLANLETS – DIAMANT, CARDINAL, GRANOLA

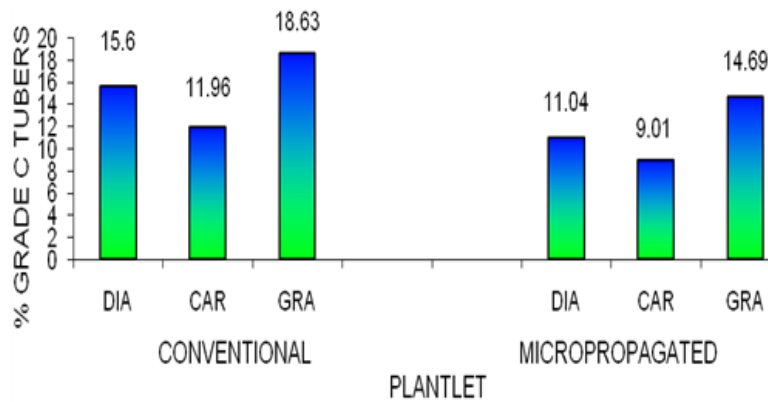


FIG. 4. EFFECT OF VARIETIES ON SIZE GRADE C OF TUBER (NUMBER): CONVENTIONAL – DIAMANT, CARDINAL, GRANOLA AND MICRO-PROPAGATED PLANLETS – DIAMANT, CARDINAL, GRANOLA

M.A.ALI<sup>1</sup>, \*S.M.FAISAL<sup>2</sup>, K.M.NASIRUDDIN<sup>3</sup>, M.S.HAQUE<sup>3</sup>,  
M.A.CHOWDHURY<sup>4</sup> AND A. ULLAH<sup>5</sup>

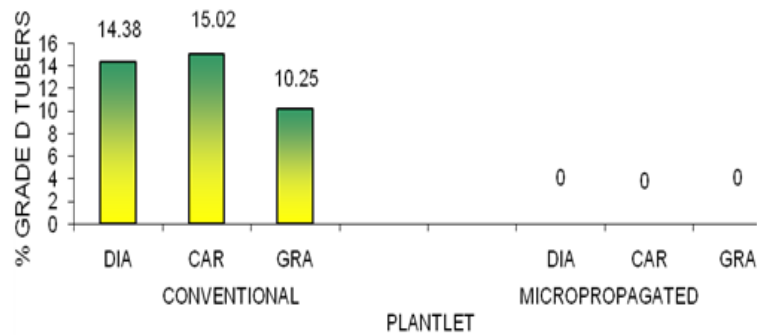


FIG.5. EFFECT OF VARIETIES ON SIZE GRADE C OF TUBER (NUMBER):  
CONVENTIONAL – DIAMANT, CARDINAL, GRANOLA AND MICRO-  
PROPAGATED PLANLETS – DIAMANT, CARDINAL, GRANOLA

TABLE 1. MAIN EFFECT OF VARIETY ON GROWTH, YIELD CONTRIBUTING CHARACTERS AND YIELD OF MICROPROPAGATED ACCLIMATIZED POTATO PLANTLETS AND CONVENTIONALLY PROPAGATED NORMAL POTATOES.

Method	Variety	No. main stems hill <sup>-1</sup>	No. tuber hill <sup>-1</sup>	Fresh wt. tubers hill <sup>-1</sup> (g)	Tuber Yield h <sup>-1</sup> (t)	Dry wt. tubers (%)	Fresh wt. haulm hill <sup>-1</sup> (g)	Dry wt. haulm hill <sup>-1</sup> (g)
Conventional	Diamond	2.51 b	5.21 f	247.00 a	20.92 a	18.50 ab	102.9 a	12.47 a
	Cardinal	2.87 a	5.92 e	206.60 b	18.33 b	17.62 bc	87.82 b	11.55 b
	Granola	2.47 b	6.83 d	187.60 c	16.17 c	16.72 cd	83.86 c	10.33 d
Micropropagated plantlet	Diamond	2.45 b	8.72 c	132.90 d	0.938 d	18.93 a	80.43 d	10.81 c
	Cardinal	2.73 a	9.11 b	83.83 e	0.570 d	18.10 ab	74.94 e	10.23 d
	Granola	2.37 b	11.31 a	72.95 f	0.562 d	16.52 d	72.67 e	10.15 d

The figures in a column with same letter(s) do not differ significantly



EFFECT OF VARIETIES AND MULCHES ON FIELD PERFORMANCE OF *IN VITRO*  
PLANTLETS AND CONVENTIONALLY PROPAGATED POTATO PLANTS

*Effects of mulch on growth, yield and yield contributing characters of  
micropropagated plantlet and conventionally propagated potato*

Significant effect of mulches were found in all the parameters studied (Table 2). Maximum (3.14) number of main stems hill<sup>-1</sup> was noted in straw mulch, followed by black polythene (2.54). While the minimum (2.28) number of main stems were produced by no mulch (control) treatment. Although white polythene and water hyacinth mulch showed significant differences but their values were statistically identical. The number of main stems hill<sup>-1</sup> in potato is generally related with the number of sprouts in seed potato tuber. This character is mainly dependent on the varieties and physiological stage of the seed rather than the fertility of the soil (Anand and Krishnappa 1988). Among the five different mulches, the highest (9.19) number of tubers hill<sup>-1</sup> was harvested in straw mulch, followed by white polythene mulch, which was statistically identical with mean values (7.66) of black polythene mulch. Whereas, the lowest (7.35) number of tubers hill<sup>-1</sup> was found in no mulch treatment and this value was statistically identical with values received from water hyacinth mulch. Straw mulch conserved sufficient soil moisture that increased plant height, thickness, vigorous growth of both type of plants originated from potato plantlets and conventionally propagated potatoes and increased number of tubers hill<sup>-1</sup>. The maximum (181.70) fresh weight of tubers hill<sup>-1</sup> was recorded from straw mulch, followed by black polythene mulch, which was statistically identical with mean values (158.80) of white polythene mulch. But the minimum (126.80) fresh weight of tubers was found in control treatment.

The highest (10.970) yield of tubers was recorded under straw mulch, followed by white polythene mulch, which was statistically identical with mean values of black polythene mulch. While, the lowest (8.125) yield of tubers was observed in no mulch. Yield in straw mulch treated plot was increased over no mulch treatment due to the conservation of adequate soil moisture and availability of optimum growing condition. Asandhi and Suryadi (1982) reported that rice straw mulching markedly increased potato plant height, leaf area and yield. Nick *et al.* (1969) found significantly higher yield of potato from straw mulch than unmulched plots. The maximum per cent (19.48 g) dry weight of tubers was recorded from straw mulch, followed by black polythene mulch, which was statistically identical with mean values (17.56 g) of white polythene mulch. Whereas, the minimum (16.57 g) dry weight of tubers was found in no mulch

M.A.ALI<sup>1</sup>, \*S.M.FAISAL<sup>2</sup>, K.M.NASIRUDDIN<sup>3</sup>, M.S.HAQUE<sup>3</sup>,  
M.A.CHOWDHURY<sup>4</sup> AND A. ULLAH<sup>5</sup>

treatment (Table 2). The highest (92.65) fresh weight of haulm hill<sup>-1</sup> was produced in straw mulch, followed by black polythene mulch, white polythene mulch, water hyacinth mulch. While, the lowest (75.26) fresh weight of haulm hill<sup>-1</sup> was found in control treatment. Straw mulch conserved sufficient soil moisture, that increased plant height and thickness of both type of plants originated from potato plantlets and conventionally propagated potatoes and increased fresh weight of haulm. The highest (12.43 g) dry weight of haulm hill<sup>-1</sup> was found from straw mulch, followed by black polythene mulch, white polythene mulch, water hyacinth mulch. On the other hand, the lowest (9.50 g) dry weight of haulm hill<sup>-1</sup> was recorded from control treatment. It followed the similar trend as in parameter of fresh weight of haulm, because the dry matter accumulation depends on the fresh weight of haulm (Table 2).

Due to the influence of mulch the maximum plant and plantlets height (53.80) at 75 DAP was noticed in straw mulch, followed by black polythene mulch. White polythene mulch showed the value which was statistically identical with mean values of black polythene mulch. Whereas, the minimum plant height (38.99) was found in control treatment (Fig. 6). Straw mulch conserved sufficient soil moisture and minimized soil temperature resulting in maximum plant height. Khalak and Kumaraswamy (1992) stated that the height of potato plant was higher under rice straw and plastic mulches compared with no mulch. The highest (28.51) percentage of small tubers of A grade was produced by straw mulch, which was statistically identical with mean values (27.59) of black polythene mulch. On the other hand, the lowest (25.51) small tubers yield was recorded under no mulch, which was statistically identical with mean values (25.99) and (26.41) of water hyacinth mulch and white polythene mulch respectively. The highest (23.57) percentage of medium tubers of B grade by number was obtained from straw mulch treatment and the lowest (15.92) medium tuber was recorded under no mulch. The highest (15.60) percentage of large tubers of C grade by number was recorded from straw mulch treatment and the lowest (11.89) large tubers found in no mulch. The percentage of extra large tubers of D grade as influenced by mulches ranged from 5.90 to 7.34 by number. The highest percentage of extra large tuber by number was recorded from straw mulch and the lowest was found in control treatment (Fig. 7).

EFFECT OF VARIETIES AND MULCHES ON FIELD PERFORMANCE OF *IN VITRO* PLANTLETS AND CONVENTIONALLY PROPAGATED POTATO PLANTS

TABLE 2. MAIN EFFECT OF MULCHES ON GROWTH, YIELD CONTRIBUTING CHARACTERS AND YIELD OF MICROPROPAGATED ACCLIMATIZED PLANTLETS AND CONVENTIONALLY PROPAGATED NORMAL POTATOES.

Mulches	No. of main stems /hill	No. of tuber /hill	Fresh wt. of tubers /hill(g)	Tuber yield/h(t)	Dry wt. of tubers (%)	Fresh wt. of haulm /hill(g)	Dry wt. of haulm /hill(g)
Control	2.28 d	7.38 c	126.8 d	8.125 d	16.57 d	75.26 e	9.50 e
Black polythene	2.54 b	7.66 b	166.1 b	9.769 b	18.06 b	87.09 b	11.67 b
White polythene	2.51 bc	7.67 b	158.8 b	10.050 b	17.56 bc	83.32 c	10.85 c
Straw	3.14 a	9.19 a	181.7 a	10.970 a	19.48 a	92.65 a	12.43 a
Water hyacinth	2.36 cd	7.35 c	142.4 c	8.992 c	16.98 cd	80.51 d	10.17 d

The figures in a column with same letter(s) do not differ significantly

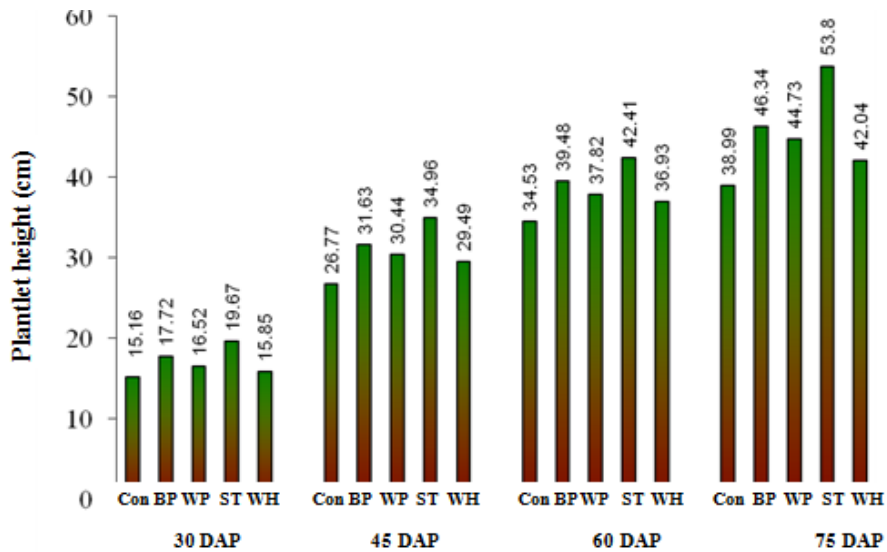


FIG. 6 EFFECT OF DIFFERENT TYPES OF MULCHES ON PLANT HEIGHT (CM): AT 30, 45, 60 AND 75 DAYS AFTER PLANTING OF MICROPROPAGATED PLANLETS AND COVENTIONALLY PROPAGATED POTATOES.

M.A.ALI<sup>1</sup>, \*S.M.FAISAL<sup>2</sup>, K.M.NASIRUDDIN<sup>3</sup>, M.S.HAQUE<sup>3</sup>,  
M.A.CHOWDHURY<sup>4</sup> AND A. ULLAH<sup>5</sup>

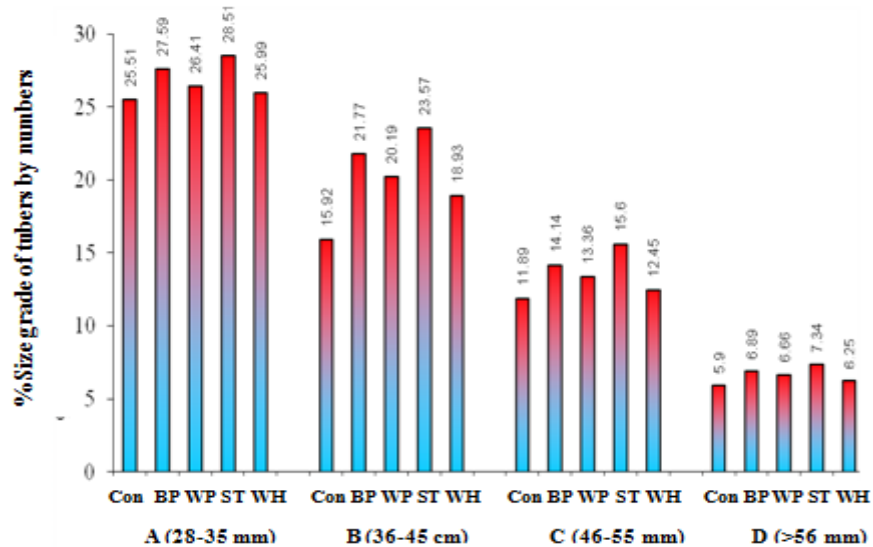


FIG. 7. MULCH EFFECT ON SIZE GRADE BY NUMBER (%): GRADE A (28-35 MM), B (36-45 MM), C (46-55 MM), D (>56 MM) OF MICROPROPAGATED PLANLETS AND COVENTIONALLY PROPAGATED POTATOES.

## CONCLUSION

To obtain higher yield, Diamant tuber was suitable and it was revealed that straw mulch was very effective to obtain maximum no. of tubers/hill as well as the highest yield. These findings may be helpful for researchers/growers who are working on potato.

## ACKNOWLEDGEMENT

The authors are grateful to “the Ministry of Science and Information and Communication technology” of the Government of Bangladesh for providing financial support during the study. The authors are also grateful to Dr. S. M. Faisal, Senior Scientific Officer, BARI to prepare this manuscript.

## REFERENCES

ANAND, S. AND KRISHNAPPA, K.S. 1988. Effect of different level of N and K on the growth, yield and quality of potato in sandy loam soil. *Mysore J. Agril. Sci.* **22**(4): 483-488.

EFFECT OF VARIETIES AND MULCHES ON FIELD PERFORMANCE OF *IN VITRO*  
PLANTLETS AND CONVENTIONALLY PROPAGATED POTATO PLANTS

- ASANDHI, A.A. AND SURYADI. 1982. Effect of shading by maize plants and mulching on the yield of potatoes. Bull, *Penelition Horticulture*, **9**(4):25-38 [Cited from *potato Abst.* **11**(6): 739. 1982]
- BBS. 2007. *Statistical Pocket Book of Bangladesh (April 2008)*. Bangladesh Bureau of Statistics. Bangladesh Secretariat, Dhaka- 1000. pp. 139-209.
- BEUKEMA, H. P. AND VANDER ZAAG, D.E. 1990. *Introduction to Potato Production*. Pudoc, Wageningen.
- HOSSAIN, M. J. AND SULTANA, N. 1995. *Report on tuber crops tissue culture of 1994-95*. Presented in the internal review of TCRC, BARI. July, 1995. pp. 1-16.
- JONES, M.G.K., VASIL I.V AND THORPE, T.A. (Eds.) 1994. *In vitro* culture of potato. *Plant Cell Tissue Culture*, Kluwer, Dodrecht, The Netherlands. Pp. 363-378.
- KHALAK, A. AND KUMARASWAMY, A.S. 1992. Effect of irrigation schedule and mulch on growth attributes and dry matter accumulation of potato. *Indian J. Agron.* **37**(3): 510-513.
- KHATUN, K. 1999. *Effect of different mulches and potassium levels on the growth and yield of carrot*. MS Thesis, Dept. of Horticulture, BAU, Mymensingh. p. 85.
- MANIRUZZAMAN, A.F.M. 1994. *Response of farmers to potato production from true potato seed (TPS)*. A survey report. Seed wing, Ministry of Agriculture, Govt. of the Peoples Republic of Bangladesh, Dhaka. p. 19.
- NAIK, P.S. AND SARKER, D. 1997. Influence of light-induced greening on storage of potato microtubers. *Biologia Plantarum.* **39**: 31-34.
- NICK, J.J., MOODY, J.E. AND LILIARD, J.H. 1969. Effect of number of tillage and mulch soil on water and plant growth. *Agron. J.* **61**(5): 719-721.
- OMIDI, M., SHAHPURI, A. AND YADA, R.Y. 2003. Callus induction and plant regeneration *In vitro* in potato. Potatoes - Healthy Food for Humanity: International Developments in Breeding, Production, Protection and Utilization. Proceedings of the XXVI International Horticultural Congress, Toronto, Canada, 11-17 August, 2002. *Acta-Horticulturae.* **619**: 315-322.
- RASHID, A., AHMAD, K.U. AND HABIB, A.K.M.A. 1981. Effect of artificial mulching on the performance of potato. *Bangladesh Hort.* **9**(1): 24-27.
- RASHID, M.H., AKHTER, S., ELIAS, M., RASUL, M. G. AND KABIR, M. H. 1993. Seedling tubers for ware potato production: Influence of size and plant spacing. *Asian Potato J.* **3**: 14-17.

M.A.ALI<sup>1</sup>, \*S.M.FAISAL<sup>2</sup>, K.M.NASIRUDDIN<sup>3</sup>, M.S.HAQUE<sup>3</sup>,  
M.A.CHOWDHURY<sup>4</sup> AND A. ULLAH<sup>5</sup>

SARKER, M.H. AND HOSSAIN, A.K.M.A. 1989. Effect of weeding and mulching on the growth and yield of potato (*Solanum tuberosum*). *Bangladesh J. Agric.* **14**(2): 105-112.

SINGH, P.N., JOSHI, B.P., SINGH, G. AND SINGH, G. 1987. Effect of mulch on moisture conservation, irrigation requirement and yield of potato. *Indian J. Agron.* **32**(2): 452-454.

Manuscript received on 03.12.2011; Accepted on 22.07.2014

*The Chittagong University Journal of Biological Sciences, Vol. 7 (1 & 2). Page No.*