

Short Communication

Effect of day length and temperature on true potato seed (TPS) germination and seedling vigour

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Potato (*Solanum tuberosum* L.) is generally propagated by vegetative means. Although farmers must obtain quality seed tubers for good production of tubers, such seed tubers are often too expensive, especially for marginal farmers in developing countries (Roy *et al.*, 2005). Therefore, efforts have been made to develop the use of sexually produced seed known as true potato seed (TPS). TPS can be used as a low input alternative for raising commercial crop especially in areas where availability of quality tuber seed at reasonable price is a constraint. In this respect, TPS has good prospects because it can reduce the cost of production and thus farmers can become independent from conventional seed (tuber) sources. 150g TPS required for one hectare area.

Various studies had been conducted to extract information on effect of various environmental factors (i.e. photoperiod, temperature) on flowering and TPS production (Almekinders 1992). However very little information is available on effect of day length and temperature on TPS germination and seedling vigour. Such information is required to select a suitable time for TPS sowing in different parts of country. Present investigation was conducted to extract information regarding influence of environmental factors like photoperiod and temperature on TPS germination and seedling vigour. Experiment was conducted in factorial design under controlled temperature and photoperiod. Main effect of five temperature regimes (23, 25, 27, 29 and 31°C) and three photoperiods (10, 12 and 14 hrs)

Table 1: Effect of day length and temperature on true potato seed (TPS) germination and seedling vigour

Temperature (°C)	Photoperiod (hrs)	Germination (%)	Root length (mm)	Shoot length (mm)	Shoot dry weight(mg)	Leaf formation (%)
23	10	65.33	13.167	4.50	13.00	14.50
23	12	87.67	15.83	3.50	14.50	16.00
23	14	69.67	12.83	4.67	15.83	12.83
25	10	86.33	14.50	3.00	41.00	54.83
25	12	91.00	19.00	3.67	42.67	63.83
25	14	80.33	12.83	4.50	38.00	49.17
27	10	45.33	14.83	4.83	30.50	22.17
27	12	96.00	20.00	6.50	48.50	73.83
27	14	41.00	12.83	6.00	32.33	21.17
29	10	40.67	16.67	6.83	20.50	24.83
29	12	48.00	24.50	7.17	32.33	26.17
29	14	36.00	15.00	5.00	10.50	21.17
31	10	45.00	25.17	6.33	16.50	0.00
31	12	51.00	26.00	7.67	18.50	0.00
31	14	42.00	24.00	5.00	26.17	0.00
CV (%)		1.90	4.39	13.31	2.37	3.32
Grand mean		61.69	17.81	5.28	26.72	26.70
CD (P<0.05) Temperature (T)		1.13	0.76	0.68	0.61	0.36
CD (P<0.05) Photoperiod (P)		0.88	0.59	0.53	0.47	0.66
CD (P<0.05) T×P		1.96	1.31	1.18	1.06	1.48

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were studied. Seeds were kept in Petri dishes lined with moisture filter paper for germination.

Three replications of 25 seeds each were studied at each combination of temperature and photoperiod. Germination was recorded one week and other observations viz., root length, shoot length, shoot dry weight and leaf formation were recorded after third week of sowing. Statistical analysis was done by SPAR 2.0 (Ahuja *et al.* 2005).

At 27°C temperature for 12 hrs photoperiod TPS showed maximum germination percentage (96%) whereas at same temperature with less and more than 12 hrs photoperiod there was significant decrease in per cent germination. Temperature higher and lower than 27°C decrease per cent germination significantly except at 25°C with 12 hrs photoperiod. Root (26.00 mm) and shoot length (7.67 mm) are seedling vigour characteristics which were highest at 31°C temperature with 12 hrs photoperiod. However, shoot dry weight (48.50 mg) and leaf formation (73.83%) were highest at 27°C temperature with 12 hrs photoperiod. In both cases at same temperature with less and more than 12

hrs, significant decrease was recorded. The temperature effect was relatively higher for all the seedling characters under investigation followed by its interaction with photoperiod and least effects were of photoperiod. Best expression of TPS characteristics was observed at 27°C temperature with 12 hrs photoperiod, which explains the fact that potato evolved in the highlands of Andes near the equator where, photoperiod is around 12 hrs and appears to have been conserved evolutionarily. Optimum temperature for seed germination of potato was found to be 25-27°C and for seedling growth, it was 29-31°C.

References

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