

## THE EFFECT OF POTATO (*SOLANUM TUBEROSUM* L.) MINITUBER SIZE ON PLANT DEVELOPMENT AND SEED YIELD

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**Abstract.** Many potato seed production programmes worldwide use minitubers at initial stage of seed propagation. Minitubers are pathogen-free potato seed tubers obtained from *in vitro* plantlets at high planting densities in greenhouses. As field performance of various sized minitubers can be rather different, it is important to know the desired minimum minituber size which is acceptable for further field multiplication at particular conditions. The study was aimed to investigate the effect of planted potato minitubers size (weight) on some plant development characteristics (emergence, canopy closure) and yield parameters (tuber number and tuber yield of seed size grade >25 mm). The effect of cultivar was analysed as well. Three cultivars of different maturity ('Monta' – early maturity, 'Prelma' – medium early and 'Mandaga' – medium late maturity) were used. Minitubers of size ranges 3-5 g, 5-10 g, 10-20 g, >20 g were planted at field of State Priekuli Plant Breeding Institute, Latvia (57°31' N, 25°34' E) in 2014. Minitubers were pre-sprouted for two weeks before planting. The planting was conducted by hand on 15 May 2014. Split-plot design in three replications with cultivar as a main plot and minituber size as sub-plot was used for the study. Minitubers of each size range were planted at 0.2 m in-row spacing and 0.7 m distance between rows. Each sub-plot comprised 48 minitubers (12 tubers × 4 rows). Only inner 20 tubers from two inner rows (10 tubers × 2 rows) were subjected to further data collecting and analysis in order to avoid the competition effect between different cultivars or between plants emerged for tubers of different size. Tubers were harvested by hand without prior haulm killing. 'Monta' was harvested 91 days after planting (DAP), 'Prelma' – 92 DAP, 'Mandaga' – 112 DAP. Emergence in days after planting to 50% emergence, to 80% and between 50 and 80% emergence was significantly determined by cultivar ( $p < 0.05$ ). No significant effect of planted tuber size was observed. Canopy closure DAP was significantly affected by planted tuber size ( $p < 0.05$ ). No significant effect of cultivar was observed on this parameter. Both cultivar and planted tuber size significantly ( $p < 0.05$ ) affected number of main stems per  $m^2$ . Harvested tuber number of size >25 mm per  $m^2$  significantly depended on planted tuber size, whereas tuber yield >25 mm ( $kg\ m^{-2}$ ) and mean tuber weight (g) of size grade >25 mm was significantly affected only by the cultivar ( $p < 0.001$ ). Smaller minitubers produced significantly ( $p < 0.05$ ) less progeny tubers of size >25 mm per  $m^2$  (51 progeny tubers obtained from minitubers 3-5 g, 54 from minitubers 5-10 g, 59 from minitubers 10-20 g and 70 tubers from minitubers >20 g). As the progeny tuber derived from smaller minitubers tended to be heavier than tubers weight from bigger minitubers (statistically insignificant difference  $p = 0.391$ ), total yield of progeny tubers >25 mm  $kg\ m^{-2}$  did not differ significantly ( $p > 0.05$ ) between planted minituber sizes (3.48  $kg\ tuber\ yield$  from minitubers 3-5 g, 3.59  $kg$  from minitubers 5-10 g, 3.84  $kg$  from minitubers 10-20 g and 4.24  $kg$  from minitubers >20 g) This outcome can be partially explained by the fact, that planting distance between tubers remained the same among all sub-plots. Statistically significant correlations ( $p < 0.05$ ) were found between several plant development and yield parameters. Strong relationship was found between number of main stems  $m^{-2}$  and progeny tuber number >25 mm per  $m^2$  ( $r = 0.714$ ). The relationship between number of main stems  $m^{-2}$  and tuber yield,  $kg\ m^{-2}$ , was moderate ( $r = 0.485$ ). Canopy closure DAP correlated strongly negatively with the number of main stems  $m^{-2}$  ( $r = -0.767$ ) and progeny tuber number >25 mm per  $m^2$  ( $r = -0.756$ ). The relationship between canopy closure and tuber yield >25 mm,  $kg\ m^{-2}$  was moderately negative ( $r = -0.568$ ). Progeny tuber number per  $m^2$  had significant negative moderate correlation with DAP to 50%, 80% and between 50% and 80% emergence. However, no significant ( $p > 0.05$ ) relationship was found between tuber yield >25 mm,  $kg\ m^{-2}$  and previously mentioned emergence parameters. Further repetitive experiments must be carried out to find more certain minituber size effects on various yield parameters, i.e. progeny tuber size distribution. As well, relationships between plant development data and yield parameters should be verified in further trials.

**Key words:** *Solanum tuberosum*, minitubers, potato seed.