

EVALUATION OF TRAITS STABILITY FOR SELECTION PURPOSES IN POTATO BREEDING PROGRAMME

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Abstract. One of the aims in potato breeding programmes is to develop varieties with high yield potential; essential for successful variety introduction into production additionally is yield stability in changing growing conditions. The quality and composition of important for human health substances became more important for competitiveness of food product. As well as evaluation of stability of quality traits become relevant task in development of new varieties. For evaluation yield stability dynamic concepts are recommended: parametric statistic methods – regression coefficient, ecovalence and several other approaches – and some nonparametric methods. For quality traits the static stability concept is more acceptable, like phenotypic or environmental variance and regression coefficient (Becker and Leon, 1988, Lemelin et al., 2005). The trial for trait stability evaluation methods assessment was carried out in three farming systems (2 conventional fields with different fertilisation and organic field) for three years (2011-2013), in total nine environments. Five potato varieties were involved in trial ('Agrie Dzeltenie', 'Lenora', 'Prelma', 'Brasla' and 'Imanta'). Yield, starch content in tubers, concentration of carotenoids, vitamins C and B1 in tubers (fresh weight) was detected for each variety in each environment. The data were analysed using analysis of variance (ANOVA) with two factors (variety and environment). The variety environmental variance (s^2) from ANOVA was one of traits stability assessment parameters – static. The regression approach (regression coefficient r_1) was also used for evaluation of traits stability. The ecovalence (E) was used for stability evaluation in variety – environment interaction as dynamic concept (Becker and Leon, 1988). The s^2 and E were expressed in percentage of the total interaction sum of squares (Legzdina, 2013).

The potato tuber yield was significantly determined by variety and environment ($p < 0.05$). The average yield of varieties ranged from 26.8-44.4 t ha⁻¹. Yields of 'Brasla' and 'Prelma' exceeded mean yield level. Comparatively the parameter s^2 for 'Prelma' was lower, but E was higher than 'Brasla'. Parameter b_j for both varieties was significant ($p < 0.05$) and did not differ significantly from 1, it means that both varieties were quite high yielding and acceptable for different growing environments. As static stability evaluation concept (s^2) is inappropriate for yield evaluation, the dynamic concept E shows that more stable and simultaneously high yielding is 'Brasla'. Quality traits – starch content, concentration of vitamins C, B1 – was significantly determined by variety and environment ($p < 0.05$), but concentration of carotenoids was significantly determined only by genotype ($p < 0.05$), influence of environment was not significant ($p > 0.05$). The highest starch content stability using s^2 and r_1 (lower values) was detected for 'Brasla' with higher starch content level, but applying E – for 'Lenora'. Evaluating stability of quality traits like concentration of vitamins C, B1 and carotenoids using s^2 , r_1 and E with the lowest values, the best stability was detected for varieties with lower average trait value: vitamin C – 'Brasla', vitamin B1 – 'Prelma', carotenoids – 'Imanta'.

Key words: potato, trait stability, yield, quality.

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