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Sequential selection of potato clones

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ABSTRACT - *Selection in species of vegetative propagation can be realized with the phenotypic information of genotypes obtained in earlier stages grouped in a selection index, denominated sequential selection. Objective of this study was to verify the efficiency of the sequential selection in potato. Nine generations were used and the trials conducted at different sites in different years and different planting periods. For the construction of this index the phenotypic means were weighed by the number of replications per trial. A low correlation was observed between the clone means in the generations, indicating that the data of a single generation only should be used to discard the worst clones. Owing to the sequential selection index, a reduced number of generations for selection can be recommended for highly heritable traits. For low-heritability traits, the index presented an even greater efficiency, but evaluations of a larger number of generations are needed in such cases.*

Key words: Selection index, quantitative genetics, *Solanum tuberosum* L.

INTRODUCTION

Selection in species of vegetative propagation is realized in steps, according to the advance generations. In the first generations there is generally not enough seed-tubers available for the trials with an adequate number of replications.

As the genotypes are multiplied throughout successive years or harvests, the installation of experiments with a greater number of replications becomes possible. Phenotypic information on the genotypes selected in earlier stages is accumulated in this process. This information on previous generations can be grouped in the form of a selection index, aiming to maximize the selection efficiency (Wricke and Weber 1986). In the second generation of evaluation for example, an index can be obtained with information on the clones from the first two generations; in the third generation an index with information on clones from the three initial evaluations, and so on (Souza Júnior 1995). In the following, we will describe how this index, presented by Wricke and Weber (1986), is constructed according to the notes and comments of Souza Júnior (1995).

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Based on the evaluation of the genotypes in the two generations n and n', with n' = n +1, where the genotypes were selected in generation n, the selection index for trait j with the information from the two generations is given by:

$$I_{ij} = \left(\frac{r_n}{r_n + r_{n'}}\right)\overline{F}_{ijn} + \left(\frac{r_{n'}}{r_n + r_{n'}}\right)\overline{F}_{ijn'} \qquad (1)$$

where

I_{ij} is the selection index of genotype i for trait j with information from the generations n and n';

$\overline{F}_{ij}$ is the mean of trait j of genotype i in the generations n and n';

r_n and $r_{n'}$ are the number of replications in generations n and n', respectively.

The index is only advantageous when the selection based on it is more efficient than that based on the information of generation n'. The index-based information spawned for trait j must therefore be superior to that of generation n' (Souza Júnior 1995).

For various selection stages the index is given by:

$$I_{ij} = b_1\overline{F}_{ij1} + b_2\overline{F}_{ij2} + ... + b_n\overline{F}_{ijn} \qquad (2)$$

where $b_n = \frac{r_n}{\sum_{k=1}^{n} r_k}$

The index is easily obtained, once the estimates of variance and covariance are not necessary but depend only on the number of replications r and the mean phenotypic values ($\overline{F}$) in each generation. For two generations n and n' the phenotypic variance of the index can be expressed by:

$$\sigma^2_{FI} = \sigma^2_G + \frac{\sigma^2_E}{(r_n + r_{n'})} \qquad (3)$$

where

σ^2_G is the genetic variance of the trait and

σ^2_E the environmental variance.

The efficiency of the index in relation to a selection including only the mean of a particular generation is presented by Souza Júnior (1995) as follows:

$$Ef = \frac{\sigma_{Fn'}}{\sigma_{FI}} = \sqrt{\frac{\sigma^2_G + \sigma^2_E / r_{n'}}{\sigma^2_G + \sigma^2_E /(r_n + r_{n'})}} \qquad (4)$$

Ef is the efficiency of the index in relation to the selection of generation n',

σ_{FI} is the phenotypic standard deviation of the index for trait j,

$\sigma_{Fn'}$ is the phenotypic standard deviation of trait j in generation n',

σ^2_G is the genetic variance of the trait and

σ^2_E is the environmental variance.

The expression demonstrates that the efficiency of the index in respect to the selection of generation n' depends on the standard deviation values. The standard deviation of the index is always smaller than the standard deviation of the considered generation and index-based selection is therefore more efficient than selection with information on generation n' only.

The objectives of this study were to promote the use of the sequential selection index for potato and to verify its efficiency based on data obtained in experiments of nine clone generations, conducted in different planting periods and various sites in southern Minas Gerais State.

MATERIAL AND METHODS

The evaluated clones were originated by the crossing of national cultivars and heat-tolerant clones from CIP (Centro Internacional de la Papa). Based on 36 biparental crossings, 1200 clones were obtained as described by Menezes et al. (2001). Nine trials were realized alongside the advancing clonal generations, in different years, planting periods or sites. The trials are characterized in Table 1, four of which were conducted in the winter season, four in the rainy season and one in the dry season. The experimental design, number of replications as well as the included controls varied among the trials. The joint analyses of variance of the generations were based on the adjusted means of 51 clones included in all trials.

Prior to this study the clones were selected in the generations discarding those with a low performance for tuber yield per plant, percentage of large tubers, tuber specific gravity, unattractive appearance, and physiological disorders (independent selection). To make the understanding and nomenclature for an application of the sequential selection index easier, even those experiments realized in one and the same generation of multiplication but conducted in different environments were considered different generations.

The plots consisted of a single row with 5 plants spaced 0.30 m x 0.80 m. The fertilization at planting consisted in 3000 kg ha^{-1} of the commercial formula 4-14-8 (N-P_2O_5-K_2O) along with granulated insecticide, Aldicarb (13 kg ha^{-1}). Thirty to fourty days after planting nitrogen fertilizer was applied as side dressing with 60 kg ha^{-1} nitrogen (300 kg ha^{-1} of ammonium sulfate). Whenever necessary, weeding, irrigation and phytosanitary controls were carried out to maintain the crop at its top productive potential.

Table 1. List of evaluation trials of potato clones in nine generations showing the localities, experiment period, experimental design and number of replications

Clonal generations	Nr. of evaluated clones	Local	Period	Experimental design	Nr. of replications
1	698	Lavras	May to September 1998	Augmented blocks	1
2	605	Lavras	Nov. 1998 to february 1999	Randomized blocks	2
3	1009	Lavras	May to September 1999	Augmented blocks	1
4	256	Lavras	January to April 2000	Lattice 16 x 16	2
5	256	Três Corações	March to July 2000	Lattice 16 x 16	2
6	256	Lavras	May to September 2000	Lattice 16 x 16	2
7	81	Lavras	May to September 2001	Lattice 9 x 9	3
8	81	São João da Mata	August to November 2001	Lattice 9 x 9	3
9	81	Lavras	January to April 2002	Lattice 9 x 9	3

The index proposed by Wricke and Weber (1986) pointed out earlier (1) was applied to the clone means in the generations, while the phenotypic variance of the index was estimated as in 3 for the three traits. For the estimates, the genetic component of variance in relation to the clones was used as σ_G^2, isolated from the joint analysis for the traits, and the mean error of the experiments as σ_E^2.

Before the present study, the index had not been used as criterion for the selection practiced in the generations. The accumulated indices with the generations were therefore obtained, in order to verify the applicability and efficiency of the index, considering clones that were included in all trials and maintained in the population. Thus, indices were obtained for these clones from the second generation, using data of generations 1 and 2, up to the index accumulated in generation 9. The efficiency of the index compared to the selection of generation n' was obtained as in 4.

The correlation between the selection index containing information on generations n-1 and n, with generation n' was obtained by

$$r(I_{ij}^{n}, \overline{F}_{ij}^{n'}) = \frac{Cov(I_{ij}^{n}, \overline{F}_{ij}^{n'})}{s_{FIn} s_{Fn'}} = \frac{s_G^2}{s_{FIn} s_{Fn'}}$$

, which involves the genetic variance and the standard phenotypic deviations of the indices. Correlations based on the means of the clones in each generation and of the indices obtained for the generations were also estimated.

With the objective of studying the efficiency of the index further and the possibility of anticipating the selection according to the advancement of generations, selections of 20% and 30% of the clones were simulated, using the clone mean as base in a particular generation or the accumulated index up to generation n. The efficiency for the two selection modes was determined in relation to the best option, which would be the index-based selection accumulated up to generation 9. The following expression, proposed by Hamblin and Zimmermann (1986) was used for the estimates of the efficiency:

$$ES(\%) = \frac{B - C}{A - C} * 100,$$ where:

ES(%): efficiency of selection in percentage based on the index $ES_{(ind)}$ or on the mean ($ES_{(mean)}$) according to the generations, in relation to the selection that would be realized in the best option;
A: number of clones selected based on the index accumulated up to generation 9 (I_9) that would be the best option for the evaluated traits;
B: number of clones selected based on the mean of generation *n* or based on the index accumulated up to generation *n* (I_n, where n = 2,..., 8) that coincides with the selection considered in A;
C: expected number of exclusively random-originated common clones in both selections, considered equal to 10% of A.

For a comparison of the two methods, the ratio of the efficiency expected in the index-based selection at any stage by the efficiency calculated for the selection based on the generation n mean was determined by the following quotient:

$$RE = \frac{ES_{ind}}{ES_{mean}},$$ where:

RE: is the ratio of the efficiencies to compare the index-based selection of generation n with the selection based only on the generation *n* mean where n = 2, 3,...,8, referring to the selection that would be practiced with I_9 as reference;
ES (ind): efficiency of the index n-based selection in relation to the selection using I_9. *ES (mean)*: efficiency of the generation n mean-based selection in relation to the selection using I_9.

RESULTS AND DISCUSSION

Summaries of the joint analyses of variance of experiments are displayed in Table 2. The interaction clones x generations was significant for all traits, indicating that the clone performance in the different generations was not consistent. This means that there is a difference in the performance of clones according to the generation. This result had been expected since the experiments were conducted in different planting periods, years and locations. Consequently, there were great differences in the environmental conditions, contributing to the variation of response of clones in the environments. For tuber yield, a high value for the interaction clones x generation component (σ^2_{cxg}) was obtained. It was even higher than the genetic variance of clones (σ^2_c), indicating a greater influence of the environment in relation to the other traits.

The values obtained for the selection indices of clones are presented in Table 3, considering the information on the nine generations (I_9), besides the general mean of each clone. Some clones stood out in relation to others, presenting high means for all traits. The obtained indices were quite similar to the means of the corresponding clones, but when both are ranked, the order of classification by the index or by the mean differs. The index is preferable to the mean, since it represents the weighing of the phenotypic value by the number of replications of each experiment or generation.

The correlations between clone means in the generations (data not presented) were low, mainly for tuber yield, where the influence of the environment is pronounced, verifying great differences in the clone performances from one generation to the other. For this trait the coefficients of correlation varied from -0.37 to 0.48 and for the percentage of large tubers the magnitude of the correlations was -0.16 to 0.64. For tuber specific gravity, the coefficients of correlation between the means of clones in the generations were higher than for the other traits but did not exceed the value of 0.7, varying from 0.23 to 0.68. The coefficients of correlation between the selection indices of the generations (I_2 to I_9) were higher than the values of coefficients of correlation between clone means in the generations for all traits (data not presented). This way, the index presents greater reliability than the mean of the generation since it tends to present less alteration in the classification of the clones between one generation and the other.

The index with the information on all generations (I_9) is taken as the base for various considerations, since it is the best selection criterion of the clones under study. We underline that the index had not been applied to the clones before, and the correlations were estimated with the objective of understanding better what happens in generations' advancement. Table 4 shows the coefficients of correlation between means of clones in the generations and the index of the generations with index 9. It can be seen that the correlation between indices of previous generations with I_9 ($r_{In,I9}$) are higher than the correlation of means of generations with I_9 ($r_{Fn,I9}$), as expected. For the trait of highest heritability (tuber specific gravity), the correlation using the means of the generation is higher than that of the other traits though, and the correlation of the index with information of only two generations with I_9 is already quite high (0.834). This means that even the mean of one generation presents a good prediction for this trait and, possibly, with few generations, an early selection would be possible, as mentioned below. For the percentage of large tubers with intermediate heritability,

Table 2. Summary of the joint analyses of variance for yield per plant, percentage of large tubers and tuber specific gravity (analyses based on the means of 9 experiments)

Sources of variation	df	Mean squares: Tuber yield g plant^{-1}	Large tubers %	Tuber specific gravity x 10^{-4}
Clones (C)	50	133133.27**	1657.04**	7.200**
Generations (G)	8	14437988.83**	24169.03**	67.500**
C x G	400	85309.09**	328.68*	0.900**
Mean Error	1784	33216.64	279.71	0.577
Overall Mean		832.04	64.20	1.072
CV (%)		21.85	25.93	0.70
σ^2_c		2952.10	81.99	0.388
σ^2_{cxg}		28940.25	27.20	0.179
h^2_a		0.35	0.80	0.87

** and * F test significant at 1% level and 5% level of probability, respectively
σ^2_c : genetic variance among clones; σ^2_{cxg} : variance of clones x generations interaction and h^2_a: broad sense heritability

Table 3. Indices and means of clones for tuber yield (TY), percentage of large tubers (PLT) and tuber specific gravity (TSG). Data from 9 generations

Clones	**Indices** (n= 9 generations)			**Generation means**		
	TY g plant^{-1}	**PLT** %	**TSG**	**TY** g plant^{-1}	**PLT** %	**TSG**
CBM 13-19	806	66	1.0681	815	70	1.0686
CBM 15-10	961	68	1.0630	995	71	1.0623
CBM 15-25	822	76	1.0637	852	79	1.0645
CBM 16-7	876	52	1.0862	893	53	1.0856
CBM 16-8	712	42	1.0657	756	47	1.0663
CBM 16-12	849	63	1.0680	905	66	1.0667
CBM 16-15	881	64	1.0674	941	68	1.0683
CBM 16-16	906	67	1.0751	991	71	1.0759
CBM 16-21	680	60	1.0667	739	65	1.0635
CBM 16-27	733	67	1.0677	808	72	1.0684
CBM 16-28	601	61	1.0702	674	64	1.0695
CBM 18-11	845	72	1.0594	866	73	1.0599
CBM 19-8	797	68	1.0672	840	70	1.0684
CBM 2-1	703	48	1.0814	710	48	1.0828
CBM 2-2	794	63	1.0762	841	67	1.0764
CBM 2-3	802	48	1.0810	840	47	1.0805
CBM 2-6	847	76	1.0845	904	80	1.0845
CBM 2-8	688	45	1.0812	737	47	1.0816
CBM 2-10	615	60	1.0700	691	64	1.0712
CBM 2-11	736	58	1.0804	785	59	1.0802
CBM 2-13	654	60	1.0732	739	65	1.0734
CBM 2-16	707	62	1.0715	792	68	1.0743
CBM 2-18	777	55	1.0843	789	53	1.0845
CBM 2-19	723	58	1.0776	763	63	1.0797
CBM 2-20	622	53	1.0718	632	53	1.0735
CBM 2-21	775	59	1.0815	815	61	1.0824
CBM 2-27	782	67	1.0685	820	68	1.0707
CBM 22-7	799	69	1.0694	829	74	1.0701
CBM 22-17	867	58	1.0677	898	61	1.0676
CBM 22-19	944	64	1.0700	1015	68	1.0700
CBM 24-6	877	70	1.0706	910	73	1.0705
CBM 24-27	852	74	1.0646	864	78	1.0655
CBM 26-22	842	65	1.0648	903	68	1.0658
CBM 4-15	805	59	1.0733	833	64	1.0738
CBM 4-16	764	67	1.0689	833	72	1.0701
CBM 4-30	681	54	1.0826	753	54	1.0819
CBM 5-9	704	62	1.0672	764	64	1.0675
CBM 5-26	831	39	1.0625	864	37	1.0642
CBM 6-2	829	67	1.0676	872	69	1.0680
CBM 6-17	796	66	1.0856	839	67	1.0865
CBM 6-21	621	46	1.0770	660	45	1.0783
CBM 6-25	725	46	1.0800	825	51	1.0812
CBM 6-29	712	66	1.0672	778	72	1.0681
CBM 7-4	716	51	1.0690	796	55	1.0697
CBM 7-11	749	64	1.0624	849	70	1.0628
CBM 7-12	773	67	1.0735	848	74	1.0730
CBM 7-15	948	74	1.0685	1053	76	1.0678
CBM 7-17	859	76	1.0584	928	79	1.0590
CBM 7-24	760	56	1.0750	843	60	1.0753
CBM 8-11	723	62	1.0719	754	65	1.0732

the correlations of the indices of generations with I_9 are high (> 0.80) based on generation 5 and for tuber yield per plant, based on generation 6 only (Table 4).

In relation to the study of correlations, the comment of Souza Júnior (1995) should be taken into consideration, who stated that for the index to contribute in identifying superior genotypes in previous generations, the correlation of the selection index of generation *n* with that of generation *n'* must be superior to that using only the means of generations *n* and *n'*. These correlations were obtained in two ways and are shown in Table 5. The values on the top of Table 5 were obtained by the genetic variances and phenotypic standard deviations of the traits and indices. The coefficients presented below in Table 5, on the other hand, were obtained based on the sum of squares of the index values and the trait means. These two modes were used because when using the expressions that involve the genetic variances and the phenotypic standard deviations, it is considered that $^{2}_{Gn}$ $^{2}_{Gn'}$ and that $^{2}_{En}$ $^{2}_{En'}$, which are necessary for the construction of the indices. Thus, the coefficients of correlation based on the sum of squares of the index values and of the means of the

Table 4. Coefficients of correlation between clone mean or index in each generation with their respective accumulated indices up to generation 9 for tuber yield per plant, percentage of large tubers and tuber specific gravity

Generations	**Tuber yield** g plant^{-1}		**Large tubers** %		**Tuber specific gravity**	
	$r_{Fn, I9}$	$r_{In, I9}$	$r_{Fn, I9}$	$R_{In, I9}$	$r_{Fn, I9}$	$r_{In, I9}$
1	0.171	-	0.666**	-	0.719**	-
2	0.252	0.377**	0.218	0.565**	0.666**	0.807**
3	0.419**	0.529**	0.719**	0.751**	0.671**	0.834**
4	0.356**	0.565**	0.735**	0.762**	0.629**	0.850**
5	0.217	0.618**	0.737**	0.875**	0.765**	0.895**
6	0.747**	0.819**	0.716**	0.909**	0.763**	0.940**
7	0.608**	0.961**	0.624**	0.946**	0.778**	0.949**
8	0.601**	0.981**	0.727**	0.972**	0.834**	0.971**
9	0.236	-	0.483**	-	0.705**	-

** significant at 1% of probability by the t test

Table 5. Coefficients of correlation[1] between the means ($r_{Fn,Fn'}$) and the indices ($r_{In,Fn'}$) of the clones in the generations with their respective performances in the following generation for tuber yield per plant, percentage of large tubers and tuber specific gravity

Index or mean of generation n	**Performance in generation n'**	**Tuber yield** g plant^{-1}		**Large tubers** %		**Tuber specific gravity**	
		$r_{Fn,Fn'}$	$r_{In,Fn'}$	$r_{Fn,Fn'}$	$r_{In,Fn'}$	$r_{Fn,Fn'}$	$r_{In,Fn'}$
				R[1]			
2	3	0.11	0.13	0.29	0.33	0.48	0.52
3	4	0.11	0.20	0.29	0.45	0.48	0.65
4	5	0.15	0.23	0.37	0.49	0.57	0.68
5	6	0.15	0.25	0.37	0.51	0.57	0.70
6	7	0.18	0.31	0.42	0.59	0.62	0.76
7	8	0.21	0.34	0.47	0.61	0.67	0.77
8	9	0.21	0.35	0.47	0.62	0.67	0.78
				R[2]			
2	3	-0.14	0.03	-0.05	0.33 **	0.48 **	0.62 **
3	4	-0.05	0.28 *	0.52 **	0.67 **	0.48 **	0.55 **
4	5	-0.14	-0.18	0.39 **	0.44 **	0.44 **	0.63 **
5	6	0.02	0.30 **	0.61 **	0.57 **	0.54 **	0.58 **
6	7	0.34 **	0.13	0.41 **	0.42 **	0.59 **	0.73 **
7	8	0.16	0.44 **	0.47 **	0.57 **	0.61 **	0.73 **
8	9	-0.16	0.04	0.12	0.26 *	0.49 **	0.51 **

[1]estimates obtained based on genetic variances and phenotypic standard deviations of the indices of generation n and of the standard deviations of generation n' ($r_{Fn,Fn'=}$
[2]estimates based on the values of indices or means in generation *n* and the means observed in the trials for generation n', with *n'= n+1*
** significant at 1% level of probability by the t test

traits are more realistic, since they were obtained based on the data observed in the generations.

In spite of the low values of the correlations, mainly for tuber yield and percentage of large tubers, it is verified that the values of the coefficients were higher when involving the indices ($r_{In,\bar{F}n'}$) than when using only the means of generations ($r_{Fn,\bar{F}n'}$) by the two ways of establishing the coefficients. This indicates that the use of the index would be advantageous for all traits.

For a visualization of the advantage in using the index, the efficiencies of the indices of generations in relation to selection based only on the mean of any generation are shown in Table 6. The efficiency of the index increases with the generations since the phenotypic variance sinks with generations' advancement. As demonstrated by Souza Júnior (1995), the efficiency of the index is greater for traits of lower heritability. Nevertheless, even for the trait with highest heritability, tuber specific gravity, the efficiency of the index was high, varying from 8 to 35% higher in relation to selection based on the generation mean. For tuber yield, the variation of the efficiency was 18 to 77% higher in relation to selection based on the generation mean. The use of the index should therefore be recommended, since besides the high values of efficiency, with generations' advancement the efficiencies of the several stages accumulate, as shown by Souza Júnior (1995). The results are considered highly favorable and the index can contribute to the selection of genotypes that are superior in various environmental conditions.

The results obtained by expression (ES%) proposed by Hamblin and Zimmermann (1986), once more proved that the index presents a greater efficiency in relation to the generation mean for all traits, using the two selection intensities (i=20 and 30%). It became evident that early selection could be realized. This does not mean that the genotypes do not need to be evaluated in a large number of experiments, but mainly the identification of superior genotypes can happen earlier for the traits of high heritability and a greater number of inferior genotypes can be discarded, as in the case of tuber specific gravity. This would reduce the number of genotypes to be evaluated in the folowing generations (Souza Júnior 1995). Even the mean for tuber specific gravity presented good relative efficiency in some cases (> 0.7). With the index, it was always higher than this value. The efficiency was lower for tuber yield, utilizing the generations' means and with the index, only based on I_6, an efficiency > 0.7 was obtained for the two selection intensities. This indicates that the early selection is less effective for this trait, due to the

Table 6. Efficiency[1] of the index in relation to the selection based on the mean of one generation only for tuber yield per plant, percentage of large tubers and tuber specific gravity

Number of generations	**Tuber yield** g plant^{-1}	**Large tubers** %	**Tuber specific gravity**
2	1.18	1.13	1.08
3	1.79	1.54	1.35
4	1.52	1.31	1.18
5	1.66	1.38	1.21
6	1.77	1.42	1.23
7	1.60	1.30	1.16
8	1.67	1.33	1.17
9	1.73	1.35	1.18

[1]obtained by means of the phenotypic variances of the traits in the generations and of the phenotypic variances of the indices

Table 7. Ratio between the efficiencies of the index-based selection accumulated in the generations and selection based on generation mean

Number of generations	**Tuber yield** g plant^{-1}		**Large tubers** %		**Tuber specific gravity**	
	i = 20%	i = 30%	i = 20%	i = 30%	i = 20%	i = 30%
2	2.50	1.44	1.00	1.67	1.17	1.24
3	1.67	1.00	1.00	1.13	1.75	1.53
4	2.00	1.15	1.33	1.31	1.40	1.10
5	∞*	1.89	0.80	1.27	1.00	1.21
6	1.40	1.10	1.25	1.24	1.17	1.19
7	3.00	1.77	1.25	1.27	1.17	1.67
8	2.33	2.45	2.00	1.80	0.89	1.09
Mean	2.15	1.54	1.23	1.38	1.22	1.29

* ratio of the efficiencies of generation 5 equal to 0.44/0

great genotypes x environments interaction.

For a better visualization of the results, the quotient between the two efficiencies, that is, *Ef* (*ind*)/*Ef*(*mean*) was calculated (Table 7). It was observed that the index was superior in most cases. For tuber yield, the advantage in using the index was somewhat greater than for the other traits, in agreement with the results of the efficiency obtained by means of the expression of the phenotypic standard deviations (Table 6). For this trait, the efficiency of the index-based selection in relation to selection based on the mean was three times higher, and the efficiency was greater still under a higher selection intensity, different from what occurred for the other traits.

In this study, the sequential selection index proved effective in relation to the independent selection generations trials. The index can easily be taken into consideration in improvement programs without causing any complications. According to Souza Júnior (1995), the method of sequential selection can be recommended in schemes of improvement where selection goes through several stages and the genotypes are fixed as clones or lines in self-fertilizing plants. It is possible to apply higher selection intensity since the method of sequential selection is more effective, reducing the cost of the breeding program or allowing the evaluation of a greater number of genotypes at the same cost.

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Seleção sequencial de clones de batata

RESUMO - *A seleção em espécies de propagação vegetativa pode ser realizada com as informações fenotípicas dos genótipos obtidas em estádios anteriores e agrupadas em um índice de seleção, denominado seleção seqüencial. O objetivo deste trabalho foi verificar a eficiência da seleção seqüencial em batata. Empregou-se nove gerações, cujos ensaios foram conduzidos em diferentes localidades, anos e épocas de plantio. Para construção desse índice as médias fenotípicas foram ponderadas pelo número de repetições de cada ensaio. Observou-se baixa correlação entre as médias de clones nas gerações, indicando que os dados de uma única geração somente devem ser usados para descartar os piores clones. Com o auxílio do índice de seleção seqüencial, para os caracteres de alta herdabilidade pode-se recomendar a diminuição do número de gerações para a seleção. Para os caracteres de herdabilidade mais baixa, o índice apresentou eficiência ainda maior, mas há necessidade de avaliações por um número maior de gerações.*

Palavras-chave: Índice de seleção, Genética quantitativa, *Solanum tuberosum* L.

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