

Number of plants necessary to recover a trait

Sedcole (1977) discussed four methods for calculating the needed, with a specified probability, the number of traits needed to recover a trait. A simple and conservative method to estimate (n) the number of plants to be evaluated to recover at least one plant with the trait is as follows:

$$n \geq \log (1-p) / \log (1-q)$$

where p is the probability of recovering at least one plant with the trait and q is the probability of the occurrence of the trait.

References

Sedcole, J.R. 1977. Number of plants necessary to recover a trait. Crop Sci. 17:667-668.

BACKCROSS METHOD

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Table 28-1 Total Number of Plants Needed to Obtain Required Number with Desired Genes

p^*	$q^\dagger$	r (Number of Plants to Be Recovered)								
		1	2	3	4	5	6	8	10	15
0.95	$\frac{1}{2}$	5	8	11	13	16	18	23	28	40
	$\frac{1}{3}$	8	13	17	21	25	29	37	44	62
	$\frac{1}{4}$	11	18	23	29	34	40	50	60	84
	$\frac{1}{8}$	23	37	49	60	71	82	103	123	172
	$\frac{1}{16}$	47	75	99	122	144	166	208	248	347
	$\frac{1}{32}$	95	150	200	246	291	334	418	500	697
	$\frac{1}{64}$	191	302	401	494	584	671	839	1002	1397
0.99	$\frac{1}{2}$	7	11	14	17	19	22	27	32	45
	$\frac{1}{3}$	12	17	22	27	31	35	44	52	71
	$\frac{1}{4}$	17	24	31	37	43	49	60	70	96
	$\frac{1}{8}$	35	51	64	77	89	101	124	146	198
	$\frac{1}{16}$	72	104	132	158	182	206	252	296	402
	$\frac{1}{32}$	146	210	266	318	368	416	508	597	809
	$\frac{1}{64}$	293	423	535	640	739	835	1020	1198	1623

* p = probability of recovering r plants with the desired genes.

† q = frequency of plants with desired genes.

Source: Sedcole, 1977.

Source: Fehr, 1987 Principles of Cultivar Development. Macmillan Pub Co.