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|  |  | SELECTION PROCEDURES FOLLOWING HYBRIDIZATION |  |  |
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|  | Selection procedures that may be used to identify desirable genotypes from segregating progenies, following hybridization in self-pollinated crops, include (1) pedigree-selection, (2) bulk-population, (3) single-seed-descent, and (4) doubled-haploid. |  |
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|  | **PEDIGREE-SELECTION** |  |
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|  | In the pedigree-selection procedure, selection for plants with the desired combination of characters is started in the F2 generation, and continued in succeeding generations until genetic purity is reached (Fig). An example of the pedigree-selection method follows: |  |
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|  | Crossing generation. Cross cultivar A × cultivar B. |  |
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|  | F1 generation. Grow 50 to 100 F1 plants. Before harvest, eliminate plants that may have arisen from self-pollination. |  |
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|  | F2 generation. Grow 2000 to 3000 F2 plants. Space plants sufficiently that individual plants may be examined. Select and harvest superior plants in which desired characteristics of the parent cultivars are combined, harvesting the seed separately from each plant. |  |
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|  | F3to F5 generations. Grow progeny rows with seed harvested from superior plants harvested in the previous generation. Space plants in the row so that individual plants may be studied. Identify superior rows, then select and harvest 3 to 5 of the best plants within these rows. Continue selection between and within rows through the F5 generation. Normally, 25 to50 families may be retained at the end of the F5 generations. Identity of plant and row is maintained and superior traits of the plants are recorded.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  | | | |  | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  | | |  | |  | | | |  | F6 generation. Grow families of plant rows. Uniform related families may be harvested together and the seed bulked. The separate seed lots are designated experimental lines. |  | |  | | | |  | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  | | |  | |  | | | |  | F7 generation. Grow the experimental lines in a preliminary yield trial in comparison with adapted cultivars. |  | |  | | | |  | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  | | |  | |  | | | |  | F8 to F10 generations. Yield trials of superior experimental lines are continued at two or more locations in comparison with adapted commercial cultivars. Only the highest yielding lines are retained for testing in the next yield trial. During the testing period, observations are made on height, tendency to lodge, maturity, disease and insect resistance, quality, and other characteristics as appropriate in the crop being studied. Growing the lines in regional yield |  | |  | trials in environmentally diverse locations will assist in identifying lines with adaptation to a wide range of environments. If, after 3 to 5 years of yield testing, lines superior to the check cultivars have been identified, one line may be chosen for increase and distributed as a new cultivar. | | |  | |  | | | | | |  | | | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  | | |  | |  | | | |  | F11 and F12 generations. Increase seed and distribute the new cultivar. |  | |  |
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| Pedigree method of selection. From selected F2 plants, progenies of 25 to 30 plants are grown in plant rows in F3.  Superior plants from the best rows are selected and planted in families of plant rows in F4 to F6, with selection being made of best plants, in best rows, of best families. By F6 families should be relatively uniform. Preliminary yield  trials  areplanted in F7, and yield trials are continued through F10. Various modifications of this procedure may be  made. For example, after plants are selected in F3 and F4, remaining plants in row may be bulked and preliminary  yield tests started. |

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|  | Modifications of The Pedigree-Selection procedure may be employed, such as introducing yield trials as early as the F3 or F4 generation. Only the high-yielding lines are then grown in advanced generations. Or, selection may be terminated earlier than indicated if the lines appear to be uniform. |  |
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|  | PROs: It has the advantage that only progeny lines in which plants with genes for the desirable characters have been identified are carried forward to the next generation. This method also permits the collection of genetic information which is not possible with other procedures. The pedigree-selection method of breeding is best suited to crops where individual plants may be examined and harvested separately, as in cereals, garden bean, peanut, soybean, tobacco, or tomato. Pedigree-selection procedure requires 12 years to develop a cultivar if only one generation is grown each year. The number of years may be reduced by growing more than one generation per year, either in the greenhouse or by growing winter or off-season nurseries in an area with a favorable climate.  CONs: The pedigree-selection method is labor intensive and requires detailed record-keeping during the early segregating generations. |  |
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