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| **GENETICS**. The plant breeder needs a thorough understanding of the mechanism of heredity in plants as modern plant-breeding methods are based on a knowledge of the gene and its inheritance. With the advances in molecular genetics, the knowledge of genes has been extended to the molecular level. |  |
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|  | **PLANT PHYSIOLOGY**. Cultivar adaptation is influenced by the response of plants to environmental stresses, such as extremes in temperature, light, soil moisture, and soil nutrients. The plant breeder strives to modify the plant's physiological processes that will enable it to function more efficiently in the environment in which it is grown. |  |
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|  | **PLANT PATHOLOGY**. Healthy plants are essential for good crop performance. The plant breeder cooperates with the plant pathologist in identification of genes for resistance to plant disease pathogens. Incorporation of genes for resistance to disease into cultivars improves plant performance and reduces the need for chemical disease control. |  |
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|  | **ENTOMOLOGY**. Breeding for insect resistance is an economical and an environmentally sound means for avoiding insect damage while reducing the use of pest control chemicals in field and horticultural crops. |  |
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|  | **PLANT BIOCHEMISTRY**. The inherent nutritional value of a crop cultivar for food or for livestock feed, or for utilization by industry, often may be improved by plant breeding. Examples are texture and flavor in tomato, increased lysine content in feed grains, milling and baking quality in wheat, or fiber fineness and strength in cotton. Molecular genetics has contributed toward a better understanding of the chemical structure and function of the genetic material. |  |
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|  | **STATISTICS**. The performance of genetically similar strains are compared in the breeding nursery. The breeder needs to be familiar with field plot evaluation techniques that will generate reliable data and statistical procedures to interpret the data accurately. Analytical statistical procedures provide a better understanding of quantitative genetics and its utilization in breeding for improved plant performance. |  |
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|  | **COMPUTER SCIENCE**. The computer has become an essential tool for systematic planning of the breeding nursery, recording observations, and rapid analysis and interpretation of the data. |  |
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|  | **AGRONOMY/HORTICULTURE**. Breeders need to know crops and how to produce them. They should understand the grower's needs in new cultivars of field or horticultural crops in order to evaluate available breeding materials, plan efficient breeding procedures, and direct breeding efforts toward important breeding goals. |  |
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