The report, of course, contains much additional information, some of it incidental to the principal topic. For the calculation of replacement-rates, a female nuptiality table showing the proportion of the female population at different ages by marital status had to be computed, assuming current rates of death, marriage and dissolution of marriage; and interesting facts emerge about the marriage habits of different groups of the population.

One hopes that the fertility questions will be repeated in 1961, and that the questions will be asked of all married women this time. It is only through periodic inquiries such as this that the fertility of the population as a whole can be adequately studied, and the importance of the subject warrants inquiries of this kind to be made at intervals more frequent than once in forty years.

E. Grebenik

JOHN INNES HORTICULTURAL INSTITUTION

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THE accommodation and facilities at the John Innes Horticultural Institution, the annual report of which was recently published (Forty-ninth Annual Report, 1958. Pp. 44. Bayfordbury, Hertford: John Innes Horticultural Institution, 1959. 3*s*.), continue to expand. In the Department of Plant Breeding, much work has been carried out in an effort to improve the apple, with special attention to breeding for apple scab and apple mildew. Secondary emphasis has been placed on hybridization to fill varietal gaps. Pear–apple hybrids have been found to be only possible using the pear as female parent, and there appears to be no fundamental genetic barrier to crossing the two genera; however, hormone treatment is necessary for success. Very few of the hybrids have survived the seedling stage, due to rapid breakdown of root tissue. This weakness is only partly overcome by grafting and only about 2 per cent of those produced up to 1956 have survived. It has been claimed that parental performance can be improved by selection combined with inbreeding and that undesirable characters, such as disease susceptibility, can be removed without impairing the general breeding behaviour of the original genotypes. Whether or not worth-while results can be obtained in this manner is controversial, but a programme of inbreeding strawberries has been designed to answer some of these questions. The results so far suggest that selfing causes a considerable loss of vigour. In practice, changes affecting only one character are seldom brought about by selection after hybridization. Such changes are more likely to be achieved if genetic variability can be produced without crossing. Experiments on increasing genetic variability of inbred lines of tomato by irradiation using phosphorus-32 indicate that it may be possible to increase quantitative variation in tomato by this means.

Self-compatibility in the family Solanaceae and in the genus *Linaria* is being investigated in the Department of Genetics as well as the genetics of *Coprinus lagopus*. The Department of Potato Genetics has continued work on various aspects of species relationships. Until recently, breeding for resistance to late blight has been based on genes for resistance derived from *S. demissum*. At first, varieties possessing a single gene for resistance were satisfactory, but eventually succumbed to new races of *Phytophthora infestans*. Resistance based on field resistance presumably controlled by a number of genes is thought to be more promising. Selection of field-resistant varieties is slow and there is probably scope for varieties incorporating two or three different genes for resistance. The genetic variability of the fungus is also being studied as well as resistance of potato varieties to virus *X* and virus *Y*. The Department of Plant-Cell Biology has continued studies on leaf growth. Observations have continued on the relative contributions of cell division and cell expansion to the second pair of leaves and the tenth leaf of *Helianthus annuus*. The tenth leaf reached an area about three times greater than a leaf at the second node; on the other hand, the average volume of the cells of the tenth leaf was only about one-half that of the second leaf. The greater size of the tenth leaf is therefore due to longer duration of division rather than a greater final cell size. Division continued until the leaf was more than three-quarters fully grown. The results refute the older idea that during early development of the leaf, growth is due mainly to formation of new cells and that after division has ceased subsequent growth is due to cell enlargement. It is concluded that division and expansion do not determine leaf growth in two distinct developmental phases. Experiments have been initiated to investigate the metabolic activities of the shoot apex in both its vegetative and reproductive states. Observations are recorded on the terminal meristem of winter rye at a stage when the reproductive state of the apex is being initiated.

In the Department of Physiology and Plant Culture much attention has been given to design of growth rooms which will give the highest practical uniformity of light intensity, air temperature, air velocity and relative humidity in the space available for plants. Attention has also been directed to maximum flexibility. From the experience gained it has been possible to formulate the essential features necessary in such growth rooms. These facilities have been used to study the early growth and development of tomatoes. In all the conditions tested, plants grown in compost were found to have a higher growth-rate than can be obtained in vermiculite watered with nutrient solution. The factors involved are being studied. The light/temperature regimes in glasshouses are very important and it is hoped that a detailed study will prove of value in balancing the temperature of the glasshouse (which can be controlled especially at night) with the amount of light received, which cannot be controlled. If such a balance could be achieved, a great economy in glasshouse-tomato production would be attained.