

CROSSES AND CROSSING OF PLANTS.

This was the subject of a paper read at a late meeting of the Massachusetts State Board of Agriculture by Professor L. H. Bailey, of Cornell University.

Speaking of "crossing strengthening existing types," the Professor said: "The improvement of existing varieties by crossing is a more important office than the summary production of new varieties. This is the chief use which nature makes of crossing — to strengthen the type. Think, for instance, of the great rarity of hybrids or pronounced crosses in nature! No doubt all the authentic cases on record could be entered in one or two volumes, but a list of all the individual plants of the world could not be compressed into ten thousand volumes. There are a few genera, in which the species are not well defined or in which some char-

acter of inflorescence favors promiscuous crossing, in which hybrids are conspicuous; but even here the number of individual hybrids is very small in comparison to the whole number of individuals. That is, the hybrids are rare, while the parents may be common.

“ Darwin was the first to show that crossing within the limits of the species or variety results in a constant revitalizing of the offspring, and that this is the particular ultimate function of the operation. Darwin's results are, concisely, these: self-fertilization tends to weaken the offspring; crossing between different plants of the same variety gives stronger and more productive offspring than arises from self-fertilization; crossing between stocks of the same variety grown in different places, or under different conditions, gives better offspring than crossing between different plants grown in the same place or under similar conditions; and his researches have also shown that, as a rule, flowers are so constructed as to favor cross fertilization. In short, he found, as he expressed it, that ‘nature abhors perpetual self-fertilization.’ Darwin's well-known experiments show that crosses between fresh stock of the same variety were nearly thirty per cent. more vigorous than crosses between plants grown side by side for some time, and over forty-four per cent. more vigorous than plants from self-fertilized seeds. On the other hand, experiments showed that crosses between different flowers upon the same plant gave actually poorer results than offspring of self-fertilized flowers. It is evident, from all his experiments, that nature desires crosses between plants, and, if possible, between plants grown under somewhat different conditions.”

On the subject of “producing new plants” Professor Bailey says: “The second result of crossing, the summary production of new varieties, is the subject which is almost universally associated with crossing in the popular mind, and even among horticulturists themselves. It is the commonest notion that the desirable characters of given parents can be definitely combined in a pronounced cross or hybrid. There are two or three philosophical reasons which somewhat oppose this doctrine, and which we will do well to consider at the outset. In the first place, nature is opposed to hybrids, for species have been bred away from each other in the ability to cross. If, therefore, there is no advantage for nature to hybridize, we may suppose that there would be none for man; and there would be no advantage for man did he not place the plant under conditions different from nature or desire a different set of characters. We can overcome the refusal to cross in many cases by bringing the plant under cultivation where new conditions overpower its former antipathies. Yet it is doubtful if such a plant will ever acquire a complete willingness to cross. In like manner we can overcome in a measure the comparative seedlessness of hybrids, but it is very doubtful if we can ever make such hybrids completely fruitful. It would appear, therefore, that with plants in which fruits or seeds are the parts sought, no good can be expected, as a rule, from hybridization, and this seems to be affirmed by facts. It is evident that species which have been bred away from each other in a given locality will have more opposed qualities than similar species which have arisen quite independently in places remote from each

other. In the one case the species have struggled with each other until each one has attained to a degree of divergence which allows it to persist, while in the other case there has been no struggle between the species, but similar conditions have brought about similar results. These similar species which appear independently of each other in different places are called representative species. Islands remote from each other, but similarly situated with reference to climate, very often contain such species, and the same may be said of other regions much like each other. Now it follows that if representative species are less opposed than others, they are more likely to hybridize with good results; and this fact is well illustrated in the Kieffer and allied pears, which are hybrids between representative species of Europe and Japan. We will also recall that the hybrid grapes which have so far proved most valuable are those obtained by Rogers between the American *Vitis labrusca* and the European wine grapes and that the attempts of Haskell and others to hybridize associated species of native grapes have given, at best, only indifferent results."

Touching on hybridization the essayist says:—"among the various characters of hybrid offspring, the most prejudicial one is their instability; it is difficult to fix any particular form which we may secure in the first generation of hybrids; and, therefore, we find that the great majority of the best hybrids in cultivation are increased by bud propagation, as cuttings, layers, suckers, buds or grafts. In fact, there are few instances of undoubted hybrids which are propagated with practical certainty by means of seeds.

This simply means that it is difficult

to fix hybrids so that they will come true to seed, and makes apparent the fact that if we desire hybrids we must expect to propagate them by means of buds."

Professor Bailey sums up his able paper in the following words: "Encourage in every way crosses within the limits of the variety and in connection with change of stock, expecting increase in vigor and productiveness. Hybridize, if you are curious to know what nature will do about it, but do it carefully, honestly, thoroughly, and do not expect too much. Extend Darwin's famous proposition to read like this: Nature abhors both perpetual self-fertilization and hybridization."—*Florists' Exchange*.

BAMBOO.

Among the foreign plants which have been tried to be naturalized in France, one of the most useful is that "treasure of China," the bamboo. M. Amiral Aulio has sent to the Garden of Acclimatization a particular variety of bamboo, which, it seems, will very easily acclimatize, as well as two other kinds from M. Simon, French Consul in China. These latter, cultivated in the South, in the environs of Nimes, have answered all the hopes formed of them, and are used in the industry of light fancy furniture, tables, chairs, stools and etageres. These bamboos, now become French, are already the object of a commerce of export to England. This grass is most hardy, and little susceptible in its nature; for it is found in regions where there are fifty degrees of heat to support, as well as in countries where the winters are rigor-