THE ADVANTAGES OF NATIVE OVER FOREIGN VARIETIES OF CULTIVATED PLANTS.

BY A. M. TEN EYCK.

At the meeting of the American Association of Agricultural Colleges and Experiment Stations last November, Prof. Green, of the Ohio Station, in his report, made the broad assertion that "A good variety of fruit is good always and everywhere." If this is the case, our experiment stations are doing a great deal of useless expensive work in experimenting with varieties in order to ascertain their adaptability to the soils and climates of their respective states.

Perhaps Prof. Green is mistaken. If he really means what he says, he must be. That varieties of fruit under cultivation vary in productiveness, quality and hardiness in different soils and climate is a fact generally admitted. No two experiment stations agree entirely in the varieties which they recommend for cultivation. But aside from the practical examples which might be given to disprove the above statement, we learn from a study of the origin and development of plant varieties that a variety of fruit or any other plant should not do equally well everywhere and why it should not.

PRIMITIVE TYPES.

"In tropical countries, the wild luxuriance of vegetation is so varied and abundant that there is no need for effort on the part of man, and cultivation is an art little practiced. But in the temperate climates nature wears a harsher and a sterner aspect. She is here not prodigal of perfections. Vegetation is less abundant. Fruits are meagre. Compare with the plantain, banana and nutritious bread-fruit of the tropics, the wild crabs, wild cherries and wild grapes of our own climate. "Yet these native fruits
which offer at first so little to the eye or palate are nevertheless the types of our garden varieties.” Destined in these climates to a perpetual struggle for food, we find man transforming and improving nature’s methods.

“Transplanted into a warmer aspect, stimulated by a richer soil, reared from selected seeds, carefully pruned, sheltered and watched, by slow degrees the sour and bitter crab expands into a Golden Pippin, the wild pear loses its thorns, the almond is deprived of its bitterness, and the dry and flavorless peach is at length a tempting and delicious fruit.” Out of 247 species of cultivated plants M. Decandolle has succeeded in finding the wild forms of 193 species. Of the remainder, 27 he considers doubtful, as half wild, and the rest he has not as yet been able to find in the wild state. Darwin holds that in these cases the cultivated plant has either changed so that its wild prototype can no longer be recognized, or that the original form has ceased to exist.

DIFFERENT FORMS DEVELOPED FROM ONE TYPE

From a single, comparatively valueless, primitive wild form then, have originated in the course of time, thousands of valuable varieties of cultivated plants, all differing from the original, and some to such an extent that they cannot be recognized. As an example of variation from one type, take the cabbage. The wild plant, resembling the Kale, grows native along the European shores of the Mediterranean. From it, we have the large shrub-like plant, twelve to sixteen feet high, grown on the island of Jersey, and used for canes; the single head cabbages, varying greatly in shape, size and color; the cauliflowers, the savoys, a less known race, the kohlrabi, with their stems enlarged into great turnip-like masses above ground, and a more recent race, resembling the kohlrabi with the enlargement beneath the ground.

Corn or maize has varied in an extraordinary and conspicuous manner. The different races vary in height from fifteen to eighteen feet to only sixteen to eighteen inches. The size of the ear and its seeds varies in like manner, and the ripening season, from six to seven months, in southern latitudes to three and four, in colder climates. These examples will serve, in some degree, to illustrate the amount of variation. But what is the cause of it.

ORIGIN OF VARIETIES.

Consider the thousands of varieties of roses, pansies, pelargoniums, of potatoes, strawberries, apples. How do they arise? What process of development has produced from a single type, these numerous and varied forms? The characters of plants are transmitted to their descendants, are hereditary. But in addition to inherited properties, new characters may arise in some of the descendants of a plant, which were not possessed by the parent, and it is this characteristic, this tendency to vary, which seems to be common in all plants, that has resulted in the existence of so many varieties.
The new characters which arise may not be transmitted at all, and nearly always are only partially hereditary, the new form making its appearance only in a certain proportion of the descendants. This proportion becomes larger from generation to generation, the new character becomes more and more constant and finally fixed. Selection is the process by which new varieties are fixed. It is the only real process of improvement. Artificial crossing is in fact, only a means to induce variation, with a view to promote the development of new forms. Selection is always the final process by which the new variety is established.

CAUSES OF VARIATION.

There are various reasons given for the cause of variation in plants. The late Prof. Asa Gray believed that "variation has been bad along certain beneficial lines," like a "stream along definite and useful lines of irrigation." This would imply that each particular variation was, from the beginning of all time, pre ordained by the Creator.

Sachs considers that "in the cross fertilization of different individuals, towards which there is always a tendency in nature, we have a perpetual cause of variation in plants." It is not due to external influences, because "under the same conditions of cultivation the most different varieties arise simultaneous or successively from the same parent form," and also "seeds from the same fruit produce different varieties."

Darwin, although he admits that cross-fertilization of distinct forms increases the tendency to vary, concludes that variation is due principally to "conditions to which the plants or their ancestors have been exposed." "Wild plants introduced into cultivation are more variable at first." Even the "seeds from the same pod are not subject to exactly the same conditions." Some receive more nourishment than others. They do not all ripen at the same time, etc.

Summing up the various opinions, we come to the conclusion that the reason why plants vary is unknown. Some of the conditions which affect variation are known, but why they affect it is not known. Scientists agree only on one point, and that is that plants do vary.

HOW PLANTS VARY.

Plants vary along certain lines. Cultivated plants have varied in the line of their use. The numerous varieties of fruit trees of the same kind differ very little, in general, in their roots, leaves, flowers and stems, but to an extraordinary extent in the size, shape, color, smell, taste, period of maturity and keeping properties of their fruit. In garden flowering plants on the other hand, the flowers differ much in shape, size, color and odor, but the seeds are all alike.

We cultivate the fruit tree for its fruit, the flowering plant for its flowers, i.e. for particular characters. And if these characters vary, or are more strongly displayed in descendants, the plants are propagated and the
variation is preserved. Other characters of the plants also vary, but are
disregarded because of no use to man, and so we find variation in one char-
acter prominent.

WILD PLANTS.

Darwin has shown that wild plants vary along certain lines. In their
"struggle for existence" only those individuals are able to maintain them-
selves which are best able to resist the prejudicial influences to which
they are exposed, that is those best suited to surrounding conditions, and
only such varieties will reproduce themselves and further develop their
special properties. Varieties and species which are not endowed with
qualities to endure the struggle for existence perish. As the cultivator
develops that which is best suited to his own purposes, so in the struggle
for existence only those varieties survive and reproduce their kind which
are better adapted through some property they possess to endure the
struggle.

By this natural selection, plants become even better adapted for the
purposes of self preservation than cultivated plants are for the purposes
of man. Our noxious weeds will serve as an example. Not only do they
vigorously sustain themselves in competition with other plants, but it re-
quires the united efforts of men, supported by a weed law, to keep them
within bounds. Every wild plant is very accurately adapted to the condi-
tions and circumstances in which it grows and is reproduced. Its organs
have the shape, size, mode of development, power of movement, etc.,
needful for this purpose. If they did not, the plant would inevitably per-
ish in the struggle for existence.

APPLICATION OF FACTS.

We have learned that plants vary in all their characters, but that, in the
case of cultivated plants, only those variations are preserved which are of
use to man, in the wild state, only those which are in harmony with the
surroundings. In no two countries, perhaps, in no two sections of one
country or of one state are the plants subject to exactly the same condi-
tions. One section may have a slightly different soil, a little more dry
weather, and the plants of this section vary to adapt themselves to these
conditions. If a plant is removed from its native place and planted in a
different part of the world or country, it is placed at a disadvantage, it is
exposed to new conditions to which it is not suited. Thus we can under-
stand why a good variety of fruit does not always give as good results in
all places. And we would expect a variety of plants originated from the
native plants of a certain region to do best in that region.

CULTIVATION OF NATIVE FRUITS, RESULTS.

In this respect, we have slighted our native fruits. In the old world a
class of fruits have been developed, which for thousands of years have
been adapting themselves to the soil and climate of that country. We
have sought to reap at once the benefit of that long process of improve-
ment, by removing these fruits to our land and its widely different conditions, with many failures. The foreign grape we have abandoned. In its stead has sprung up a multitude of vastly improved varieties of native grapes. Our raspberries, blackberries, strawberries and gooseberries of native stock are fast superceding foreign varieties. "The best authorities now agree that American trees are the best for America." In every case, the best improved native varieties of any tree or fruit surpass the best imported ones.

Prof. J. L. Budd, of Iowa Agricultural College, says* of our native plums: "Nearly every neighborhood has its varieties. Among those best known are the DeSoto, Wolf and Wyant. It has been truthfully said of these varieties that they have fruited in certain localities for a quarter of a century, without the total loss of a single crop, while others have failed. They are gaining favor with fruit-growers on account of their perfection of foliage, hardy fruit buds and relative exemption from rot and injury from the curculio."

In regard to last season's fruit crop, Prof. L. H. Bailey, horticulturist of the Cornell University Experiment Station, says in Bulletin 14, issued by that station: "The apple crop is almost a total failure. Peaches and plums are few. Pears are probably less than half a crop, and quinces range from small to fair in various sections. Raspberries and blackberries have yielded indifferently. Only the strawberry and grape crops are satisfactory."

Last season was an exceptionally poor one, but the results speak favorably for our native fruits. Apples, a total failure, not a native variety cultivated — only grapes and strawberries satisfactory, nearly all native sorts — raspberries and blackberries indifferent (due partly, perhaps, to neglected improvement of native varieties). The farmer who wishes to purchase pure bred stock will not buy of his neighbor at home, but of some distant breeder. The same is true of the fruit grower. The glamor of a foreign name and the deceptive haze of distance keeps the foreign varieties in cultivation and prevents the improvement of native ones.

PROSPECT FOR IMPROVEMENT.

Improvement is only just begun, but facts and experiments show that America's native fruits will furnish varieties equal to those of the old world, with the great advantage that they will withstand our climate and prejudicial influences. The grape, plum, and a few berries, have been domesticated. Probably we have other fruits and plants, not yet introduced into culture, that may, with improved cultivation and careful selection, be made to produce varieties beyond conjecture. Only a few years have been spent in improvement.

The grape has reached its high stage of development since 1845. The same broad road to improvement is open in the case of the cherry, and es-

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pecially the apple. Col. C. L. Watrous, president of the American Association of Nurserymen, in an address at their annual meeting of 1888, made the prophecy, "That before the close of the lives of many present the common and universally propagated varieties of the apple throughout the great northwest will be the descendants of the native crab apple."

There is work to be done. The improving process is too slow and expensive to be successfully undertaken by the individuals alone. The task belongs properly to the experiment stations. Each station should endeavor to improve the plants best suited to the state. Horticulturists are constantly taking more interest in the work, and we may hope before many years for wonderful results from their labor.

BOOK REFERENCES.


Improvement of the Plants of the Farm, by Henry Evershed.

Origin of Cultivated Plants, DeCandolle.

Downing's Fruits and Fruit Trees of America.

The Origin of Species. Darwin.


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DISCUSSION.

A. L. Hatch — I have been very much interested in this paper; it has exceeded my expectations and shows much thought in its preparation. There is one point touched upon that I do not think has ever been carried out, that is the principle of not taking foreign varieties, but keeping one variety and continuing its cultivation and improvement.

A. M. Ten Eyck — There is a man in France who saves seed and plants it, and by preventing cross fertilization keeps it pure.

Prof. Goff — We practice that plan with vegetables, but with apples it is more difficult to do so, because they cross fertilize more easily. The hardiness of northern grown seeds is superior to southern grown. The McMahon's White is hardy in Wisconsin, while some other varieties are not. The Norway spruce grown in this state will be hardier than if grown south.

F. K. Phoenix — It is an accepted fact that seeds are hardier grown in the north than in the south, and we ought not to lose sight of it in making our experiments. I do not believe that any two individuals of the same character, or similar, were ever raised from the same apple. I have never seen an instance of it.

8—H.
Question from program — Is it possible to prevent cross-fertilization? Will varieties reproduce themselves, and if so how far?

J. C. Plumb — Some people have the idea that we shall improve the race by developing native fruits. After planting crab apple seed for thirty years I have yet to know of a single native apple or good crab apple that has come from that line of planting. It is said the Wealthy was grown from seed of the Cherry crab brought from the east, but I do not credit the statement notwithstanding the originator, Peter Gideon, says it is so. The Canada people have left off the term, crab, and say Siberian, instead. I wish we could do so. I believe our relief will come from cross fertilization. We do not get a superiority of the individual, owing to pre potency of the parent.

Q. Cannot that fixedness that is desirable in the individual become better established by prevention of cross-fertilization, and the pre potency of the parent in time to be overcome?

A. I think not.

Prof. Goff — It is possible by covering the blossom and fertilizing with its own pollen, to prevent cross-fertilization, but it is practicable only in a small way. Varieties will reproduce themselves if not the result of previous crosses. If a seed be taken from fruit grown on a graft on a tree, the future plant will depend largely on past history. A cross must be fixed by a long period of careful selection; a tomato, for instance, will require five years before a variety becomes permanently fixed in type.

J. M. Smith — Is it possible to cross potatoes by planting tubers of different kinds in the same hill? I have heard it so stated but have never credited it.

Prof. Goff — It cannot be done, sports will occur but not a crossing; we are likely to have sports from the potato as well as from the plants.

Mr. Saunders — As a rule the longer time a variety has been in cultivation the more tendency there is to broad variation. One gets out a new thing and we sometimes hear of some one else, in another part of the country, getting the same thing.

F. K. Phoenix — Mr. Saunders, do not roses grown from sports finally revert to the original plant?

Mr. Saunders — No, sir, they do not usually do so, although there may be instances in which they do. The nectarine is always a nectarine although it was originally a bud variation.

Q. — Prof. Goff, is the idea advanced by Mr. Saunders corroborated by your observation?

A. — It is.

Mr. Saunders — Fixedness comes from certain varieties; some will not stand with you while others will go on indefinitely without change or reverting to the original stock. There are some interesting instances related of plants grown in pots; one example came out of a certain plant propagated by roots, the rooted plants reverted back while the cuttings
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were the same as the original plant; the cause of its so reverting was because it was not fixed in its character when sent out.
J. M. Smith — Prof. Goff, what part of bones is lost by burning them?
A. The nitrogen, the best part.
Adjourned.

THURSDAY AFTERNOON.

Convention called to order by President Thayer.
Motion made and adopted that the programme for the summer meeting be prepared by the secretary.
J. C. Plumb — We have with us Mr. Lyon who wishes to present the subject of pomology.
T. T. Lyon — I think I have remarked somewhat upon some points of this matter previously. The facts will be readily recognized by all that the Division of Pomology is somewhat novel and at first its movements were somewhat restricted, by being narrowed to a small circle in its operations. There seems to be no better way in which to meet its needs than to appeal to state societies; therefore the Pomological Society has requested me to meet the state societies when convened in annual meeting. There is no possibility that any adequate work on the subject of pomology can be published that will be in any way remunerative. The Division of Pomology has been gathering up catalogues published by the different nurserymen, and design publishing a list of synonyms and names that can be sent out broadcast over the country under the frank of the Division. Any person wishing to identify a certain fruit under these names has now no way of so doing, and it is proposed to publish a short description of the varieties of fruits in connection with the name.
These books cannot be published in sufficient numbers to send out to every one; a copy can only be furnished to the members of the Pomological Society, but this society has in view the object of benefiting the general public by being enabled to send them out broadcast. Pomology has an interest in its relation to Horticulture, so also has Forestry; these societies publish bulletins that can be sent out under the frank of the Division of Pomology or the Department of Agriculture; out of all these, and others I have not mentioned, may come methods that may strengthen and secure members.
The Division would ask of the state societies that they may collect information and send direct to them instead of sending it haphazard or from single members. Just before I left home I wrote to the chief of the Division, Mr. Van Deman, what had been gathered up from different states and I asked him if it would not be possible to bring about some means to obtain the desired result, and out of all, elaborate some method by which the Division may furnish some information that will be useful to all.
G. J. Kellogg — I am in favor of aiding all we can as a society, individ-
ually and collectively and I understand that the work is going to be put in shape so we can get at it.

T. T. Lyon — The Division is preparing to make wax specimens of fruits for the Columbian Exposition for the purpose of identifying fruits when out of season. They have secured the services of Col. Brockett who did so well at the Paris exposition in that direction, and he intends to gather different specimens of the same varieties from different sections so as to show the tendency to variability. The address of Col. Brocket is 2307 Indiana Ave., Chicago.

G. J. Kellogg — I wish Mr. Lyon had given us this information before our tables had been stripped; we had some very fine specimens on exhibition.

J. C. Plumb — I want to explain that all specimens of fruit must be perfect as any indentation in an apple will show in the wax, consequently the gathering must be done early in the fall.

Secretary — The question of our summer meeting should be considered. Moved and carried that the location of summer meeting be left with the Executive Board.

A. D. Barnes moved that the next annual meeting be held at some other point than Madison.

A substitute to this motion was made and carried that it be left with the Executive Board for decision.

J. C. Plumb presented the following resolution:

Whereas, Mr. T. T. Lyon, of South Haven, Mich., representing the Division of Pomology, United States Department of Agriculture, has presented the desire of that department to enter into closer relations with the several state societies, for the purpose of advancing the great interest of pomology.

Therefore, be it resolved, That we hereby endorse the work of the department, as presented by Mr. Lyon, and instruct our recording secretary to communicate and co-operate with said department in all matters pertaining to the horticultural interests of this society.

Adopted.

Adjourned.

Assembly Chamber,
Thursday Evening.

Joint session with agricultural society.
President Thayer in the chair.

Opened with music by the University Glee Club. The hearty encores of the audience were responded to by a second and third song.