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enzymatic processes *in vitro* has been found. Nord<sup>10</sup> has suggested that the effect of ethylene is on permeability, but the effect of ethylene on the water permeability of potato tuber tissue and on the permeability of cabbage petiole to thiourea has been found to be only about 15 per cent, which hardly seems able to account for the effects observed.

Lynch<sup>11</sup> was perhaps the first to suggest that the effect of ethylene was on the oxidative processes in ripening. Lynch, however, laid emphasis on the oxidase and peroxidase systems of the fruits rather than on simple respiratory activity and has stated that only those fruits which contain oxidase or peroxidase activity uniformly distributed should be amenable to ethylene treatment. But peroxidase activity is characteristic of all living tissue, so it can constitute no criterion, and the cucurbits, which contain no oxidase system, not only respond to ethylene treatment but also produce ethylene themselves. Evidently this viewpoint is not entirely satisfactory.

In any case, it seems that ethylene is concerned with the respiratory processes, being produced by them and perhaps acting as a regulator of them. More than this cannot positively be said at the present.

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## A SURVEY OF FATHER JOHN KATZNER'S HORTICULTURAL WORK

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A pioneer country is one whose potentialities are unknown, and a pioneer settler is an experimenter finding and realizing the potentialities of the country he inhabits. It seems incredible to us, surrounded as we are with numerous varieties of productive fruit trees, that Minnesota was once regarded by intelligent men as a land where "apples can't be grown."<sup>1</sup> As for pears, grapes and cherries—their domestic growth was hardly given a thought. The climate, with its severe winters, its late spring frosts and its frequent years of drought, was simply considered as an insurmountable barrier for fruit crops.

To some of the pioneers, however, accustomed as they were to childhood environments abounding in fruit, such a condition was not only seriously annoying but also, they rightly thought, perhaps not quite true. Experiments and tests began. The year 1870

<sup>10</sup> Nord, F. F. *Physikalisch-chemische Vorgänge bei Enzymreaktionen Ergebnisse der Enzymforschung* 1 77 (1932).

<sup>11</sup> Lynch, L. J. A suggested coenzyme hypothesis for the ripening of fruits by ethylene gas treatment. *Proc. Roy. Soc. of Queensland* 47 18 (1936).

<sup>1</sup> History of Stearns County. Mitchell W. B. Vol. II, p. 739. 1915.

saw many varieties of apples growing in Minnesota, apples imported for the greatest part from warmer climates. These, though growing, thrived but poorly and produced hardly at all. Intensive scientific testing and, if possible, development of suitable varieties were necessary steps for even a small degree of success in horticulture, and necessity found the way. Pioneer settlers became pioneer horticulturists—both professional, as at the Minnesota State horticultural fields, and amateurs on their own hill-side orchards.

Among the amateurs we find that the Reverend John Katzner, O.S.B., attained state-wide fame. Born in Bavaria in 1850, he emigrated to America with his parents at the age of seventeen. From that time until his death in 1930, he lived continually in Stearns County—at St. Joseph, at Albany, and at St. John's. His predilection for horticulture is attested by the fact that when but eight years of age he was already transplanting trees. At eighteen he made his first grafting attempts. Father John records that his first effort at transplanting only served to kill the tree and that his young stem-grafted trees soon died. Failure, however, did not dissuade him.

Years of labor, study, musical pursuits, and pastoral work passed by and Father John's interest in horticulture continued and increased. In 1893 an old unsuccessful orchard at St. John's was discontinued and apparently no one seemed inclined to begin a new one. Yet, someone was so inclined. An orchard, one of apple trees worthy of the name, became Father John's objective. He began at once a hobby that was to endure for a life-time and was to bring much to himself and to posterity. A breakdown in health in the year 1901 necessitated an outdoor life to remove him from the work and worry of musical study and of the sacred ministry. His ambitions in horticultural matters were quickened, and thereto he directed the greatest efforts which failing health and, later, old age allowed.

During these thirty-seven years he succeeded in developing an orchard of apple, cherry, and pear trees; a vineyard; and an extensive reforestation project at St. John's, besides offering considerable assistance to the gardening and floral departments.

Fr. John's first efforts were expended in testing a large variety of apples for their suitability to the soil and climate of Minnesota, and he became recognized as an authority on apple types. He soon developed an apple orchard of quality. In the year 1907 his orchard was made a Trial Station of the Minnesota State Horticultural Society. As superintendent of the Trial Station it was Father John's duty to raise divers kinds of apples under varying conditions and to note the results.

Not content with apple testing, he was shortly to learn the secret of raising pears, cherries, and grapes. Through patient labor he

grew and judged with a discerning eye fruits from Germany, Poland, Norway, Siberia, Russia, China, Canada, and from many of our neighboring states. He himself states<sup>2</sup> that he tested over three hundred varieties of apples, thirty of crab-apples, one hundred and fifty of pears, twenty-seven of cherries, and forty of grapes. The types tested and the results obtained are duly recorded in the "Annual and Midsummer Reports of the Colledgeville Trial Station."<sup>3</sup>

The development of new varieties interested Father John considerably, and he carried on extensive experiments, both in cross-fertilization and in grafting. His aim, the dream of every horticulturist, was to develop a fruit of commercial value as to quality, produced by a well-bearing plant sufficiently hardy to withstand the long, sub-zero winters of this climate and the death-dealing frosts of early spring.

Thus he succeeded in developing the "Translinda" apple, a variety approved by the State Horticultural Society and commercially handled by The Jewell Nursery Company of Lake City. The apple, a true-breeding variety, was secured by crossing the Transcendant crab-apple with a large, sweet apple introduced from a southern state. True to Father John's aim, the tree of this variety is extremely hardy, produces in good quantity, possesses fairly excellent quality, and keeps well throughout the winter. Only intensive and extensive professional experimentation has produced varieties excelling the "Translinda" in productive value for Minnesota.

In regard to pears, Father John conclusively proved that they could be grown in Minnesota. Experience had taught him that the young trees demanded special treatment to overcome the dangers of "winter-killing" and the heavy frosts of the budding season. He finally had a tree the roots of which descended below the frost line and, wonderfully true, the "winter-killing" ceased.<sup>4</sup> The spring-frost problem he met by providing the trees with an exceedingly heavy mulch. He also developed several new and successful varieties of pears by grafting productive branches of the Tate No. 2 pear onto the roots of Siberian pears. These trees are still thriving and produce an abundance of fruit each year.

Father John is often credited with the development of the Alpha Grape, probably the best known and most extensively cultivated grape of Minnesota. Certainly he is to be credited with its propagation and popularity. The Alpha Grape was discovered, according to Father John<sup>5</sup> by Brother William, also of St. John's. Brother William, in the year 1901, took note of the fact that of all the wild grapes in the St. John's forests one vine alone bore large, delicious fruit. Accordingly he transplanted the vine to the local orchard. Some years later he enthusiastically showed it to Fr. John. "Why,

<sup>2</sup> Autobiographical Sketch, Rev. John Kätzner, O.S.B. 1922.

<sup>3</sup> Minnesota Horticulturist — Volumes 35 to 47. 1907-1919.

<sup>4</sup> Minnesota Horticulturist — Vol. 38, p. 214-215. 1910.

<sup>5</sup> Minnesota Horticulturist — Vol. 46, p. 177ff. 1918.

Brother, your grape is better than the Beta Grape (a popular variety of Minnesota); you should call this the 'Alpha Grape.'<sup>6</sup> Father John realized its possibilities and set to work. In a few years he had a fine vineyard of Alpha Grapes, as the variety continued to be called. The vine is of extraordinary hardiness and bears well, and its fruit is of the desirable quality. Shortly Father John had the grape in the hands of nursery men who have spread it far and wide for cultivation; the Jewell Nursery Company sold as many as 20,000 plants in a single year. Its true origin is still the mystery that it was to Brother William.

The Minnesota State Horticultural Society has duly recognized his work. For sixteen years he managed the Trial Station at St. John's; for one year (1907) he was Vice-President of the Society, which in 1923 conferred upon him the signal honor of life membership. Worthily has he been styled the "Burbank of the Northwest."<sup>7</sup>

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## INFILTRATION AND CAPILLARY RISE IN SANDY SOILS

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Undoubtedly watersheds or drainage basins can be managed for maximum water yields in the same manner as other natural resources. Since the soil is an important natural reservoir, a thorough knowledge of the factors influencing the rate of movement of water through the soil is essential in making management plans for a particular area.

Such factors as texture, porosity, organic content, biologic channels, prevalence of monovalent basic cations, hydration of pores, and resistance of soil air are all generally considered important governing factors for the infiltration of water in soils. Capillary rise may be influenced by organic content, surface tension of the solution, texture and structure, and moisture content. Thus, the combined influence of all of these factors determines the rate of movement of water through soil.

However, in attempting to explain some results secured by the author from previous studies on infiltration capacities of sandy soils in Colorado,<sup>1</sup> it was thought that interfacial tension effects might influence infiltration capacity, although previous investigations by

<sup>6</sup> *Minnesota Horticulturist* — Vol. 46, p. 177ff. 1918.

<sup>7</sup> *Long Prairie Leader*, 1928.

<sup>1</sup> Unpublished data.

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