

## HOW DOES AN AGRICULTURAL REGION ORIGINATE?

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IN the descriptive and analytical literature of agricultural geography there still exists a significant gap concerning the processes by which a particular region of the earth becomes the agricultural region it later is described to be. This gap is most notable with reference to the original development of an agricultural region out of what essentially is a lightly modified wild landscape, but it also is present where an established agricultural region is transformed into a different kind of agricultural region. In writings on the geography of agriculture there are many papers that demonstrate the regional dominance of a particular crop or crop combination, once that crop or crop series becomes well accepted in the region. Similarly, there are recently available excellent studies that demonstrate changes, once those changes have been initiated or have taken place. The techniques and methodology of recognition and demonstration of dominance and significant change are developing effectively, but too little attention is paid to the intrinsic processes by which dominance and change take place.

This article is a tentative and speculative inquiry into cultural causation, centering its attention on the issue of processes in origination and in change. No attempt is made to crystallize theory, but the issue is raised in the hope of focusing attention on the problems involved.

The question of treatment in a speculative article emerges as a first consideration. It seems to us that the basic nature of this article ought to be exploratory, and that any tentative conclusions suggested here should be verified, rejected, or modified by substantive research carried out on specific agricultural regions. A second question logically follows: How many regions should be examined for potential conclusions, one or more? Should one region be studied in depth or should we extend our survey to include different kinds of regions? The exploratory nature of the article makes a multi-regional survey highly desirable and, in order that the peculiarities of one culture realm may be avoided, cross-cultural regional analysis should form the basis of the tentative con-

clusions. With this in mind we have surveyed one occidental and two oriental examples, beginning with the American Corn Belt, and followed by the Philippine coconut landscape and the Malayan rubber landscape. The American Corn Belt has been clearly identified as an agricultural region, whereas the coconut-producing sector of the Philippines and the rubber-producing zone of the Federation of Malaya have not yet been clearly recognized and labelled as agricultural regions of a mature sort. The article will not inquire into and demonstrate fully the origin and evolution of the three regions, in part because of the limitations of space. A preliminary survey will be presented, which will necessarily preclude the consideration of all aspects exhaustively.

### THE ORIGIN AND EVOLUTION OF THE AMERICAN CORN BELT

First of all it may be asked: What is the Corn Belt or what are its basic characteristics? Viewed as an agricultural complex the Corn Belt is a crop and animal assemblage primarily producing corn (mainly used as an animal feed), hogs, and cattle, and secondarily yielding several minor products. A considerable variation is encountered within the region. For example, predominantly cash grain areas with few animals are found as well as permanent pasture areas with many animals. Besides areal variation the Corn Belt has changed significantly through time. Weaver has demonstrated beyond all doubt that the Corn Belt has been changing internally and no longer is so clearly the Corn Belt.<sup>1</sup> Many geographers, the writers included, have informally dubbed it something else, but its formal name appears to be shifting to the Corn-Soy Belt.<sup>2</sup> Weaver has suggested in fair detail the process by

<sup>1</sup> John C. Weaver, "Changing Patterns of Cropland Use in the Middle West," *Economic Geography*, Vol. 30 (1954), pp. 1-47, "Crop-Combination Regions in the Middle West," *Geographical Review*, Vol. 44 (1954), pp. 175-200, and "Crop-Combination Regions for 1919 and 1929 in the Middle West," *Geographical Review*, Vol. 44 (1954), pp. 560-72.

<sup>2</sup> Ladd, Haystead and Gilbert C. Fite, *The Agricultural Regions of the United States* (Norman: Univ. of Oklahoma Press, 1955).

which the soybean intruded itself into one portion of the region, though he has not fully elaborated the story.<sup>3</sup>

Comment on Corn Belt beginnings is not entirely absent from the literature. As early as 1925 J. Russell Smith offered an explanation of how the Corn Belt began.

"The Corn Belt is a gift of the gods—the rain god, the sun god, the ice god, and the gods of geology. In the middle of the North American continent the gods of geology made a wide expanse of land where the rock layers are nearly horizontal. The ice gods leveled the surface with their glaciers, making it ready for the plow and also making it rich. The rain god gives summer showers. The sun god gives summer heat. All this is nature's conspiracy to make man grow corn. Having corn, man feeds it to cattle and hogs, and thereby becomes a producer of meat."<sup>4</sup>

Though we may admire the poetic tenor of the explanation, we can only query: Who told man to raise corn, and to have cattle and pig breeding stock handy? If the explanation were true, why had not the first man to live here, the American Indian, originated the Corn Belt hundreds, if not thousands, of years before the white man finally produced it?

The following statement is also pertinent to the problem of origins:

"Only gradually have the present agricultural patterns of eastern North America made their appearance. At first there was very little difference between one place and another. The European grains were tried, but very quickly the colonists adopted both Indian crops and Indian methods. In the course of time, however, certain areas became differentiated from other areas in terms of agriculture."<sup>5</sup>

In the same paragraph thirteen crop regions were enumerated, but there is no suggestion of the specific processes by which these separate regions originated and became differentiated.

It is not our purpose to criticize two outstanding works, but rather to show two earlier statements which are somewhat symbolic of a variety of views on geographic causation. A third and more recent statement is given in the following section on colonial antecedents.

### *Colonial Antecedents*

The pattern of early colonial agriculture was a blend of American Indian and European crops and practices. After European crops and cropping methods failed, Indian crops and methods were borrowed. Most notable among the Indian crops was corn. The initial agricultural contribution of the Indians to the colonists was great, for it included not only a number of crops which were well suited to the local environment, but it also included methods and techniques, such as clearing land and fertilizing fields. To the aboriginal agricultural complex, the settlers added livestock, especially cattle and hogs. The hog found excellent conditions in the forest and multiplied rapidly. They foraged for themselves and required only a little of the farmer's attention. At harvest time they might be fed some corn to fatten them before slaughter. Cattle were also important in the early subsistence stage.

In the Colonial Period commercial agriculture emerged slowly in favored localities. One of the earliest pork packing centers was the Connecticut Valley, where as early as 1660 hogs were fattened with corn for market.<sup>6</sup> Later Virginia and North Carolina came to be the outstanding pork-producing areas of the Colonies. As for cattle, an early division of grazing and feeder areas occurred. The Connecticut Valley was an early feeder area and was the center in which cattle were collected from grazing areas as far afield as Vermont.<sup>7</sup> The western portions of the Carolinas and, to a lesser degree, western Virginia and Pennsylvania were the most important colonial grazing areas. These areas contributed to the evolution of the grazing and droving practices that later characterized the humid prairies and finally the semi-arid West. Cattle and some hogs were driven from these early feeder areas to the markets in New York and Philadelphia.

One outstanding area can be identified in which another feature of the Corn Belt complex was further evolved—southeastern Penn-

<sup>3</sup> See Weaver's first article, *op. cit.*, pp. 44-47.

<sup>4</sup> J. Russell Smith, *North America* (New York: Harcourt, Brace & Co., edition of 1925), p. 290.

<sup>5</sup> Preston E. James, with the collaboration of Hibberd V. B. Kline, *A Geography of Man* (Boston: Ginn & Co., 1949 ed.), p. 245.

<sup>6</sup> P. W. Bidwell, and J. I. Falconer, *History of Agriculture in the Northern United States 1620 to 1860* (Washington: Carnegie Institute of Washington, Pub. 358, 1925), p. 31. (Quoted from Sylvester Judd, *History of Hadley [Mass.]* (New Ed., Springfield, Mass.) p. 370.)

<sup>7</sup> Bidwell and Falconer, *op. cit.*, pp. 224-25.

sylvania. Higbee has described this area as the cradle of the Corn Belt, tracing the Corn Belt almost intact to a Colonial start in southeastern Pennsylvania.<sup>8</sup> Higbee has pointed out one of the truly outstanding areas in American agricultural history and the evolution of some Corn Belt characteristics can be traced back to southeastern Pennsylvania. However, it appears an oversimplification to deduce the whole complex from this one source. The first and most important difficulty is that the dominance of corn is not explained. A second important difficulty is that the hog never assumed a primary position among livestock in southeastern Pennsylvania.

Perhaps the two most important areas bridging the gap between the Eastern seaboard and the classical Corn Belt are the Kentucky Bluegrass area and the Nashville Basin.<sup>9</sup> During the 1790's these areas apparently had a rudimentary Corn Belt economy, but later became centers, respectively, for breeding fast horses and growing tobacco.<sup>10</sup> It seems that these two areas may have been the most significant areas in the evolution of the Corn Belt system lying outside the classical Corn Belt.

<sup>8</sup> Higbee has closely approached the issue of origins in some of the chapters of a recent volume, and his chapter on the Corn Belt deals specifically with the issue. Though less dramatic than Smith's description, Higbee's description covers the same ground in discussing physical origins of the region. He says, in part, in his section on cultural origins: "Early in the eighteenth century an industrious group of immigrants from the German and Swiss Rhineland came to settle in the shale and limestone lowlands of what are now the counties of Chester, Lancaster, and York. These people built fine barns, bred high-grade livestock, and were adept at maintaining soil fertility by the use of ground limestone, gypsum, and animal manures. They were successful at clover culture, and practiced crop rotations which generally included corn, wheat, barley, oats, and clover-grass meadows. They were good dairymen as well as cheese and butter makers and kept hogs to dispose of such dairy wastes as skim milk, buttermilk, and whey . . . The crop and animal husbandry practices of these farmers of early Pennsylvania set the style for the modern Corn Belt." Edward Higbee, *American Agriculture: Geography Resources, Conservation* (New York: John Wiley, 1958), p. 233.

<sup>9</sup> Also noted by Higbee, *op. cit.*

<sup>10</sup> P. C. Henlein, "Shifting Range-Feeder Patterns in the Ohio Valley before 1860," *Agricultural History*, Vol. 31 (January, 1957), pp. 2-4. See also C. T. Leavitt, "Transportation and the Livestock Industry of the Middle West to 1860," *Agricultural History*, Vol. 8 (January, 1934), pp. 20-33.

In summary, there occurred a significant development of Corn Belt traits in Colonial America; the European settler's contact with the American Indian resulted in an agricultural metamorphosis. During the subsequent development several favored localities can be identified as significant centers in the evolution of the Corn Belt system: the Connecticut Valley, Southeastern Pennsylvania, the Kentucky Bluegrass area, and the Nashville Basin. In the Corn Belt the major traits were combined, modified, and further evolved. The story that follows will attempt to indicate the steps by which American farmers developed this agricultural scheme and fitted it to the forested and grassland landscapes of the Middle West.

#### *The Landscapes of the Middle West and Their Settlement*

Within the area to become the Corn Belt pioneer settlers encountered two major landscape types: first, the woodlands, and second, the grasslands of the prairie and great plains. In general the forested area covered almost all of the eastern portion of the region, but the percentage of woodland decreased towards the west, finally occurring only in narrowing belts associated with the rivers. The grasslands, conversely, increased in area towards the west, though they occurred only in small areas in central Ohio and Indiana.<sup>11</sup>

Two types of woodland can be distinguished: those which were well-drained and those which had excessive water. The latter occurred in the flood zones adjacent to rivers and low lying swamps.<sup>12</sup> The grasslands of the prairie are commonly divided into wet and dry prairie, depending on drainage. In general the sectors of prairie and woodlands having poor drainage were settled later than were the areas which were well drained.

From the geographic point of view, the settling of the Midwest and the evolution of the Corn Belt can be divided into two periods related to the collective interaction of farmers

<sup>11</sup> Ralph H. Brown, *Historical Geography of the United States* (New York: Harcourt, Brace and Co., 1948), p. 206.

<sup>12</sup> The significance of the Black Swamp on the settlement pattern is shown nicely in: M. R. Kaatz, "The Black Swamp: A Study in Historical Geography," *Annals, Association of American Geographers*, Vol. 45 (1955), pp. 1-35.

with the two landscapes. The first period lasted roughly until 1850<sup>13</sup> and was characterized by the restriction of farming to the forested areas or grasslands adjacent to the woodland. The Corn Belt began in several places within the forested landscape. The techniques necessary to subsist in this environment were long a part of the colonial farming culture in the seaboard zone. The outstanding characteristic of the second period was the dispersal of farmers into the grasslands of the prairie and great plains, which at first presented a significant hindrance to the farmer whose technology and crop mentality had developed in the forested landscape. Before the modern Corn Belt could take its present outline there had to occur a major transformation in the abilities and understandings of American farmers to deal with the new prairie landscapes.

The typical sequent economic utilization of the two landscapes is difficult to determine. A Corn Belt economy was reached in different parts of the present Corn Belt at different times. For example, the Scioto River basin of Ohio had the beginnings of a Corn Belt economy in 1805, whereas large scale wet prairie cultivation did not occur until the 1880's.<sup>14</sup> Further difficulty arises because the typical sequent utilization of the grasslands differs from that of the forest landscapes. In the drier forested areas subsistence farming developed first and was followed by commercial farming, and then by Corn Belt farming. The grasslands proceeded from livestock grazing to subsistence farming to commercial farming and, finally, to Corn Belt farming. In the woodlands as well as the grasslands there were differences in the cropping sequence owing to good or poor drainage.

#### *The Forested Landscape*

Near the end of the 18th century, American pioneers began settling the forested river

courses west of the Appalachian Mountains. The Ohio River valley and the valleys of its tributaries were the early focus of this activity. The forested environment was well suited to the economy of these earliest pioneers since they derived the greater part of their sustenance from hunting, fishing, and gathering. The early pioneers often engaged in a small amount of agriculture, copying Indian methods and cultivating Indian crops. Their main crop was corn.<sup>15</sup>

Characteristically, a more farming-minded group of settlers followed, causing the neighbor-shunning pioneers to move on to virgin country. At first the newcomers' economies differed little from those of the earlier pioneers; however, subsistence agriculture played an ever increasing role. The settlers clung tenaciously but not exclusively to the wooded land, which required many years of toil to clear. Beginning in Western Ohio the treeless prairie often was available, but such areas were either avoided or only their margins were cultivated. For two centuries American farming had taken place in a wooded landscape and the livelihood of the early farmers depended on this kind of environment.<sup>16</sup> The river supplied domestic water, a means of transportation, and some fish. The forest supplied logs for fences, cabins, and domestic fuel, and the good soils, once cleared, were easy to cultivate with simple tools, and provided bountiful yields. Corn continued to be the chief crop in the cropping patterns of the subsistence farmers, though additional new crops were grown, including wheat and several kinds of vegetables. The farm diet included the ever-present hog.

The evolution of a commercial economy proceeded very slowly at first. A small surplus of corn or wheat might be produced which could be sold to settlers passing through

<sup>13</sup> L. B. Schmidt, "The Agricultural Revolution in the Prairies and Great Plains of the United States," *Agricultural History*, Vol. 8 (October, 1934), p. 169.

<sup>14</sup> P. C. Henlein, "Cattle Driving from the Ohio Country, 1800-1850," *Agricultural History*, Vol. 28 (April, 1954), p. 83, and Leslie Hewes and P. E. Frandson, "Occupying the Wet Prairie: The Role of Artificial Drainage in Story County, Iowa," *Annals*, Association of American Geographers, Vol. 52 (1952), pp. 24-50.

<sup>15</sup> W. A. Lloyd, J. I. Falconer, and C. E. Throne, *The Agriculture of Ohio* (Wooster, Ohio: Agriculture Experiment Station Bulletin 326, July, 1918), p. 48, and Alfred H. Meyer, "Circulation and Settlement Patterns of the Calumet Region of Northwest Indiana and Northeast Illinois," *Annals*, Association of American Geographers, Vol. 46 (1956), p. 325.

<sup>16</sup> For an analysis of the importance of the woodlands see Leslie Hewes, "Some Features of Early Woodland and Prairie Settlement in a Central Iowa County," *Annals*, Association of American Geographers, Vol. 40 (1950), pp. 40-57.

or to new settlers in the area. The hogs brought in by settlers found excellent conditions and multiplied rapidly by foraging in the forest. One of the qualities of the razorback which made it a successful animal in the woodlands was its ability to elude predators. Most pork was bound for home consumption, though some could be transported to another settlement down river.

Within the classical Corn Belt the emergence of the Corn Belt system can be traced back to several scattered areas in the forested landscape. Four areas are noteworthy: the Scioto Valley, the Miami Valley, the Indianapolis-Middle Wabash, and the Sangamon Valley. The Scioto River basin may well be the earliest Corn Belt nucleus, dating back to 1805, when the first herd of corn-fattened cattle were driven to the eastern market from the area which was to become a part of the Corn Belt.

Corn very early assumed a dominant position among the commercial crops grown in the forested landscape. One reason for the popularity of corn was that many of the settlers came from an area which had a well established corn cropping tradition. Added to this was the corn growing tradition of the Indians who inhabited the area. Since corn proved to be the most useful and reliable crop for a subsistence economy, its ascendance to dominance as a commercial crop came rather easily.

One of the most important qualities of corn was its reliability. Time and time again the agricultural literature and pioneer letters point out this quality. For example, Solon Robinson notes in passing, while describing a harvest, "Corn was good, as usual."<sup>17</sup> The varieties of wheat grown, on the other hand, were plagued by rust. The ecological superiority of corn was a very important consideration to the subsistence-oriented farmer, but soon more corn could be grown than could be eaten by the local population. As the farmer began to think of outlets for this surplus, the ways of disposing of corn seemed to be a primary con-

sideration, and agriculture began its trend toward the commercial pattern.

Wheat was the only crop that came near challenging the dominance of corn. Many western pioneers understandably wanted to grow wheat, since wheat has traditionally been an excellent frontier cash crop, and it had a history of use in colonial seaboard or European cropping. Wheat had a number of drawbacks, of which the most important were that it was not as reliable a crop as corn and transportation during the pre-railroad era was difficult and costly. The Miami Valley is an excellent example of an area which produced wheat until 1820 and turned to corn, hogs, and cattle after repeated troubles with wheat.<sup>18</sup> Solon Robinson said in 1850, after many years of advocating wheat as the crop for the prairies, "Is it not time for you (prairie farmers) to begin to think that wheat is not the most natural and profitable staple crop . . . Does any land in the world produce better beef than the prairies . . . Indian corn, the best crop in the world for making beef, rarely, if ever, fails."<sup>19</sup>

A major problem associated with the commercial production of corn was its bulkiness. Corn could be shipped down the Ohio and Mississippi rivers to New Orleans but this was never satisfactory. Transportation was so difficult that even when market prices were favorable, transport cost often proved to be the limiting factor.<sup>20</sup> An early solution was to turn the corn into a more compact and valuable product. Converting corn into whiskey, pork, or beef satisfied this need. Hogs and cattle could be raised without being fed corn, but it was soon found that corn-fed livestock commanded much higher prices. Another aspect of the utility of livestock was that they could be turned onto a field of corn, hence eliminating the need to harvest, a practice which fit well into the prevailing farming philosophy that "land is cheap but labor is dear." An added advantage to fattening hogs and cattle was that they could transport themselves to market. The golden age of droving

<sup>17</sup> Solon Robinson was a leading pioneer agricultural commentator during the 1840's and 50's. H. A. Kellar (ed.), *Solon Robinson, Pioneer and Agriculturalist* (Indianapolis: Indiana Historical Bureau, Vol. II (1846-1851), 1936), p. 77.

<sup>18</sup> Henlein, "Shifting Range-Feeder Patterns in the Ohio Valley before 1860," *op. cit.*, p. 5.

<sup>19</sup> Kellar, *op. cit.*, p. 394.

<sup>20</sup> Norma M. Stone (Translator), *Letters of Jakob Schramm and Family from Indiana to Germany in 1836* (Hanover: Dartmouth Printing Co., 1951), p. 80.

was between 1810 and 1840, although droving began well before 1800 and continued up to the Civil War, when herds of cattle, horses, sheep, hogs, and sometimes even turkeys were driven across the Appalachian Mountains to the eastern seaboard.<sup>21</sup>

After 1817 the steamboat became a significant stimulant to the production of hogs. Pork could be satisfactorily salted and shipped in barrels down the Mississippi River. The limited market for salted beef explains the continuance of cattle droving. Hogs in smaller numbers were still driven with the cattle, since they added no extra expense.

The emergence of a Corn Belt economy can be seen in the years preceding 1850. The scattered zones were in many respects miniature forerunners of the modern Corn Belt. The farmers primarily grew corn which they fed to hogs and cattle. The evolution of the present extent of the Corn Belt is the result of the spread of this agricultural system into the grasslands from the forested zones.

#### *The Grasslands of the Prairie and Great Plains*

No precise date can be given for the farmers' emancipation from the forested landscape.<sup>22</sup> First, the oak openings in Ohio were cultivated and during the 1840's a small number of farmers began moving out onto the edge of the prairie. As a result of the development of successful prairie cultivation techniques, the late 1850's, the 60's, and the 70's saw the rapid populating of the prairie. The complete exploitation of the wet prairie awaited tiling and ditching which became popular in the 1880's. Development of the steel plow during the 1830's had made the breaking up of the tough sod a far easier task than before.<sup>23</sup>

<sup>21</sup> I. F. King, "The Coming and Going of Ohio Droving," *Ohio Archaeological and Historical Publications*, Vol. 17 (1908), p. 248.

<sup>22</sup> The occupying of the grasslands is described in: Harlan H. Barrows, *Geography of the Middle Illinois Valley* (Illinois State Geological Survey Bulletin 15, 1910), pp. 79-80; Carl O. Sauer, *Geography of the Upper Illinois Valley and History of Development* (Illinois State Geological Survey Bulletin 27, 1916), pp. 155-58; Hewes, *op. cit.*

<sup>23</sup> The mould board plow had been developed earlier, but the sticky prairie soils adhered to its rough wood or cast iron mould board. The steel plow carried a smoothly polished mould board that cut smoothly through all types of soils. See W. D. Rasmussen, *Readings in the History of American Agriculture* (Urbana: University of Illinois Press, 1960), p. 78.

The corn crop was limited by the acreage the farmer could cultivate; consequently, introduction of the horse-drawn cultivator contributed to rapid expansion of the area of production. Well drilling equipment and the windmill provided a means of securing water and removed the necessity of living near a stream; barbed wire solved the fencing problem. A subsistence farming economy did not fare well on the prairie, but commercial farming did and the settlement of the prairie was made possible by the technological advances that came in this era.

The extension of railroads to the Midwest during the 1850's had a significant influence on the extension of a Corn Belt economy. The railroad removed the dependence on river transportation for exporting Midwest products. It hauled in lumber for the construction of houses and fences, and made access to the West much easier from the eastern United States. The end of droving must be attributed to the railroad, but this did not occur at once. Farmers were reluctant to change because they considered the cost too high and some believed at first that the animals lost more poundage in a moving car than in walking to market.<sup>24</sup> Grains rather than livestock were affected by the railroad in the early years and an increased percentage of corn was sold as a cash crop.<sup>25</sup> The railroad companies sold their lands to settlers and were vitally concerned about farm production. As a result, the railroad companies engaged in crop experimentation, promoted agricultural fairs, and made other efforts to promote prosperity. In other words, the influence of the railroad, unlike other transportational developments, was far more than just another improvement in transportation.

Corn was the leading crop on the prairie almost from the beginning.<sup>26</sup> Early trial and error found that other crops were not well suited to prairie conditions and that corn was

<sup>24</sup> Henlein, "Cattle Driving from Ohio Country, 1800-1850," p. 93.

<sup>25</sup> Leavitt, *op. cit.*, pp. 30-31.

<sup>26</sup> Theodore L. Carlson, *The Illinois Military Tract* (Urbana: Illinois Studies in the Social Sciences, Vol. 32, 1951, University of Illinois Press), p. 139; Margaret B. Bogue, *Patterns from the Sod* (Springfield: Illinois State Historical Library, 1959), p. 116; Earle D. Ross, *Iowa Agriculture* (Iowa City: The State Historical Society of Iowa, 1951), p. 22.

the best first crop to plant on the rich prairie soils, because it was a quick maturing, highly versatile crop that seldom failed. Corn was an important constituent of the "hog and hominy" diet of the pioneer farmers in addition to being a cash grain crop or livestock feed crop. Other assets of corn were: first, planting corn cost only one-fourth to one-half the cost of planting wheat;<sup>27</sup> second, corn was an easier crop to grow; and third, corn did not need to be harvested within a short period, eliminating the need for additional labor.

Wheat, the second most logical crop from the viewpoint of cultural acquaintance patterns, was rarely successful on the prairie soils.<sup>28</sup> Repeated wheat failures caused many advocates of wheat to abandon it. However, wheat remained a crop in the Corn Belt until the 1870's, when wheat produced in the more arid parts of the great plains permanently lowered the market price of wheat, making it an uneconomical crop on the increasingly expensive Corn Belt land.

The bulkiness of corn remained a hindrance to its sale and the limited consumer-industrial demand left the prairie farmer with the choice of turning to a new crop or finding a use for corn. Feeding corn to hogs and cattle was apparently not obvious to the prairie farmers at first. Local newspapers and agricultural newspapers were hardly in accord on the crop for the prairie, and Ross lauds the foresight of a writer in 1859 who advised: "Raise Corn always in preference to Wheat. Learn to convert Corn into Pork, Beef, and Wool by the cheapest and most economical modes."<sup>29</sup>

The hog fitted nicely into the prairie farming pattern. The reason for the popularity of the hog was summed up by British agriculturalists visiting the Middle West: "The hog . . . met the requirements of the middle western farmer more perfectly than any other animal because of its omnivorous character, its hardiness, and the great abundance of cheap food."<sup>30</sup>

<sup>27</sup> Carlson, *op. cit.*, p. 137.

<sup>28</sup> Bidwell and Falconer, *op. cit.*, p. 330-31.

<sup>29</sup> Ross, *op. cit.*, p. 72. (A quote from an 1859 edition of the *Iowa City Republican*.)

<sup>30</sup> H. J. Carman, "English Views on Middle Western Agriculture, 1850-1870," *Agricultural History*, Vol. 8 (January, 1934), p. 17.

Cattle retained an important position in the grassland portion of the Corn Belt. The expansion of corn-growing onto the prairie displaced the livestock raising economy from the humid prairie to the semiarid portions of the great plains. However, the same functional relationship between stock raising areas and stock fattening areas was retained. Many Corn Belt farmers kept dairy cattle, especially in areas which had a great deal of land in permanent pasture.

Sheep raising was short-lived in the Corn Belt. Wild dogs, diseases, price decline, and, perhaps most important, the unwillingness of farmers to give sheep the necessary care contributed to the rapid decline of sheep raising.<sup>31</sup>

When all things were considered over a long period of time, the most reasonable utilization of corn was as a feed to livestock in both forest and grass landscapes.

The suitability of corn, hogs, and cattle to frontier life and to the natural environment was an important consideration, but this alone does not explain production of any of these products. The role of the market in forming the character of the Corn Belt is indisputable. Thus, as the early reason for feeding corn to livestock, "to walk corn to market," declined as a factor, hogs and cattle remained because of increased market demand. Price continued to be an important determinant in the corn-hog-cattle economy and the relative amount of each commodity sold depended on its price.<sup>32</sup> However, the lesson had to be learned slowly, because objective data were not originally available.

#### *Elements of a Farming "Mentality"*

Up to this point the inquiry has emphasized the economic, technologic, and agronomic aspects of the origin of the Corn Belt; although scattered remarks have pointed to the role of the social and psychological elements of culture. The myths, beliefs, or mental set of a particular group may or may not have any basis in fact; nevertheless a belief or mental set may be the cause of a particular pattern. The decline of sheep as an important animal can not be fully explained by disease and wild

<sup>31</sup> Ross, *op. cit.*, p. 57.

<sup>32</sup> Carlson, *op. cit.*, p. 127; see also Mildred Throne, "Southern Iowa Agriculture 1833-1890," *Agricultural History*, Vol. 23 (April, 1949), p. 130.

dogs, for these were minor problems. The Corn Belt farmers have surmounted more formidable obstacles, i.e., the draining of the Black Swamp and the wet prairie, and the up breeding of livestock. Rather the decline of sheep is better explained by considering the psychological factors and cultural traditions of a society. The farmers' unwillingness to give sheep the necessary care, and, perhaps even more important, the general dislike for sheep were the causes for the decline of sheep on Corn Belt farms.

The probings of rural sociologists into the question of how farmers accept new ideas have indicated the workings of an involved cultural process. The regularity with which an innovation comes into a farming region and diffuses through it has led to a classification of individuals according to the speed with which they accept new ideas. According to this classification, a given farming population is composed of innovators, adopters, and non-adopters. One study indicates that this process was operating during the settlement of the Corn Belt.<sup>33</sup> Thus, the interaction of neighbor with neighbor and of individual with community regarding agricultural matters represents the working of this cultural process at the grass roots. The process involves individual and collective diagnosis of an environment, selection of a suitable crop from acquaintance patterns, and observation of the reaction of the crop to the environment and to the market. The argument of two neighbors over some cropping technique or the advice given to new arrivals in the area by older residents can have far-reaching consequences, in view of the fact that this same scene is taking place throughout an area about to become an agricultural region settled by an immigrating population.<sup>34</sup>

<sup>33</sup> Allan G. Bogue, "Pioneer Farmers and Innovation," *Iowa Journal of History*, Vol. 56 (January, 1958), pp. 1-36.

<sup>34</sup> The experience of the senior author's father illustrates the role of the neighbor in the development of an agricultural region. In 1891 he bought a piece of unimproved farmland in Iowa, in a sector not yet fully occupied. Having come from a northern Ohio farm originally, he was unfamiliar with the local Iowa cropping practices. Since he had a limited economic stake behind him, and could not afford to engage in unproven experimentation, he canvassed the local farmers for advice. He planted nothing but corn and handled his land as did his neighbors. In accepting the local traditions, he succeeded and also moved with the

Several institutions, such as the general agricultural newspaper, the local newspaper, and the agricultural fair, magnify or modify this basic cultural process. In a sense the newspaper magnified the basic neighbor-to-neighbor discussion by printing the points of view of local farmers on the merits of some agricultural issue. The agricultural fair allowed farmers from a wide area to get together to see agricultural developments. However, "the evaluation of the fair as a composite educational institution apart from other educational or semi-educational organizations . . . is impossible."<sup>35</sup>

The agricultural experiment station and the government agricultural literature may also have influenced the crop pattern. But Bardolph states that "Illinois farmers in the years before 1870 shared an almost pathological aversion to book farming that characterized the rural class throughout the nation."<sup>36</sup>

Taken from the point of view of psychological aspects, social processes and cultural traditions of the settlers, the Corn Belt can be regarded as the landscape expression of a farming "mentality." A farming "mentality" in this context refers to the totality of the beliefs of the farmers over a region regarding the most suitable use of land in an area.

#### *The Maturing of an Agricultural Region*

Another issue which can be raised, but not here completely resolved, is: When does an agricultural landscape become an agricultural region, or when did the Corn Belt become the Corn Belt? The seemingly crucial element in this question is some form of recognition. It may well be that the kind of recognition that is chosen must be arbitrary. In the case of the Corn Belt, one might ask, when was the term Corn Belt first used? The earliest date that Warntz found in popular sources was 1882.<sup>37</sup>

trends, acting as one more agent to mature an agricultural region.

<sup>35</sup> Wayne C. Neely, *The Agricultural Fair* (New York: Columbia University Press, 1935), p. 157.

<sup>36</sup> Richard Bardolph, *Agricultural Literature and the Early Illinois Farmer* (Urbana: University of Illinois Press, 1948), p. 1.

<sup>37</sup> William Warntz, "An Historical Consideration of the Terms 'Corn' and 'Corn Belt' in the United States," *Agricultural History*, Vol. 31 (January, 1957), p. 43, noting that the popular source using the term "corn belt" was *The Nation*, 35: 34, July, 1882.



The crystallizing of the concept of the Corn Belt appeared in print in 1903.<sup>38</sup> The date by which a Corn Belt economy was achieved varied from one part of the region to another. Western Ohio had a Corn Belt economy decades before eastern Nebraska. An inclusive date might be between 1890 and 1900. The outline of the Corn Belt took its present form around the turn of the twentieth century. The basic distribution of corn and hogs has remained rather similar to the distribution in 1900 although minor changes have occurred.<sup>39</sup> By 1925 the maximum acres in corn had been achieved and since then there has been a decline.

In summary the Corn Belt system is the result of a long evolutionary process. The seaboard area of the Colonial period contributed significantly to the development of the primary traits of the region. Later scattered Corn Belt nuclei can be identified in the forested landscape near rivers. By about 1850 a new technology plus experience with the prairie resulted in a dispersal of settlers and the Corn Belt system into grasslands of the dry prairie and later into the wet prairie. This inquiry into the origin and evolution of the Corn Belt points to the working of a cultural process, in an evolutionary way, rather than to a gift from a pantheon of gods or to a widespread and purposeful copying of an efficient model known to all settlers.

#### THE PHILIPPINE COCONUT LANDSCAPE

May we turn now to southeastern Asia for an interesting variation in the development of agricultural regionalism. One of the distinctive landscapes of the Philippines is the coconut landscape.<sup>40</sup> There are about 2,800,000 acres of coconut palms in the Philippines today, and the area is expanding steadily. Coconut trees can be found growing throughout the archipelago, entering into home domestic economy or commercial agriculture, but there are several environmental factors that have

motivated a regional concentration in planting coconut trees. The most significant environmental factor is the seasonal distribution of the typhoon, whose strong winds damage the crowns of the trees, blow off the fruits, or break off the trunks and blow down lightly anchored trees. Another factor is temperature, since the tree does not produce well in the lower temperatures found at high altitudes. Lesser factors are local occurrences of poor drainage or very low quality in soils. For the Philippines, environmental factors help set the northern boundaries of the coconut-producing region, and also affect its localized expression. The southward boundaries of the region find no such environmental limitation and recent expansion of coconut plantings has been in this direction.

In major terms the coconut palm becomes really significant in the landscape south of Manila, and the chief concentration of trees in 1962 is in central southern Luzon, south of the Laguna de Bay. Here millions of trees are found in almost solid plantings, in spaced plantation patterns, and in the more crowded irregular plantings of the traditional type; coconut trees are so dominant in the landscape that the term coconut landscape has real meaning.

#### *The Background of Coconut Cultivation*

The coconut palm has been grown for a great many centuries in the Philippines as a basic crop plant, since the tree and its fruit have extremely wide-ranging utility as construction material, handicraft raw material, tool and utensil material, and as food and beverage. Earlier the oil was the primary lighting fluid in Philippine homes. Almost every Filipino is familiar with coconut in most of its ramifications, as a crop tree and as a product of almost infinite use in Filipino culture. He is well aware that in the southern Philippines, in the lower hill country and on the lowlands, the coconut is very dependable as a crop. Colloquially the coconut often is referred to as the "lazy man's crop" for, once the tree is well started, the owner may, figuratively, recline under it the rest of his life with coconuts falling in his lap. The coconut palm has a very long productive life, with a maximum not clearly determined but appearing to approach one hundred years. Familiarity with, confi-

<sup>38</sup> *Ibid.*, pp. 43-44, as evidenced in T. N. Carver's *The World's Work*, 7: 4127-37, November, 1903.

<sup>39</sup> A. Grotewold, *Regional Changes in Corn Production in the United States from 1909-1949* (Chicago: University of Chicago Press, 1955), p. 75.

<sup>40</sup> Coconut landscape and rubber landscape are used simply as descriptive terms, uncapitalized, since neither can be equated to the Corn Belt as a formal agricultural region at its present stage of development.

dence in, and liking for the coconut seem to resemble the feeling of earlier American occupants of the central midwest for corn.

Since at least the 10th century whole coconuts have been a commodity purchased by Chinese traders, and from the 15th to the 19th centuries China was the chief buyer of such coconut products as were exported from the Philippines. European interest in coconut products was satisfied by India, Ceylon, or the Indies, and exports to Europe from the Philippines were insignificant until the very end of the 19th century. The utility of the coconut to the native economy of an increasing population during Spanish times was the real reason for expansion of plantings from the 15th to the late 19th centuries. As Spanish prohibitions on general foreign trade with the Philippines were relaxed during the latter half of the 19th century, sugar, manila hemp from abacá, and tobacco became items sought after and, as agriculture changed, these three products attracted the attention of farmers to the possibilities of commercial agriculture. In 1870 a geographical study of the islands treated the production and export of each of the three crop products at length, but almost ignored coconut, even though it must have been widely distributed and basic among crop plants of the islands.<sup>41</sup>

#### *Factors Contributing to Change*

During the late decades of the 19th century the European demand for edible fats began to outrun mid-latitude supplies, and the coconut began its rise as an item of export agriculture in the Asiatic tropics. By 1890 the Philippine export figure still stood at only 4,654 tons of copra, but by 1897 it had climbed to 50,714 tons, and the Philippines were about to become important as a world source of coconut products.<sup>42</sup> Already the south central Luzon region was notable for its coconut plantings, for this region had long supplied most of the

domestic volume of lighting oil and the slowly rising volume of coconut exports. Here already were centered the small undertakings in coir manufacture, the making of small volumes of dessicated coconut, and such other industrial operations as related to coconut. Manila and the central plain of Luzon formed the chief markets. Elsewhere in the islands only Cebu was a significant contributor to foreign markets. Had the world demand for coconut levelled off near the 1897 level, the southern Luzon area could have continued to supply the Philippine export volume, plantings elsewhere would not have increased greatly, and those local surpluses would have gone to waste as they had done for centuries. But the world demand continued to rise, and free trade patterns between the United States and the Philippines became operative in 1909. These changes stimulated the market for Philippine coconut products, and produced a marked increase in palm plantings in southern Luzon. Filipinos became aware that the coconut was becoming a saleable product, adding still another utility to the already long list of its uses.

After 1910 increasing acreages of coconut were planted in various southern sectors of the Philippines, both as small holdings and as plantations. Filipinos have controlled almost all small holdings, and Filipinos, Chinese, and Americans have participated in plantation development. However, the total amount of land that is devoted to plantation-sized holdings is relatively small, and coconut production from such holdings is only about ten per cent of the total Philippine production.<sup>43</sup>

The share of coconut land today owned by non-Philippine citizens is very small, and coconut production primarily is on small Filipino-operated farms. About half the farms south of Manila today grow coconut palms, and only rice is grown on more farms than grow coconut. Sugar cane, abacá, and tobacco, by contrast, are chiefly specialist crops grown by relatively few farmers. The former concentration of coconut plantings in south central Luzon today amounts to less than one-fifth the total coconut plantings of the islands. The

<sup>41</sup> D. A. de la Cavada, and M. de Vigo, *Historia geográfica, geológica, y estadística de Filipinas* (Manila: Ramirez & Garaudier, 1876), 2 volumes.

<sup>42</sup> John Foreman, *The Philippine Islands* (New York: Scribner, 1899), 2nd edition. Rather typically, along with brief comments on many other domestic crops, this volume devoted a bare three pages to comment on coconut, but gave 14 pages to manila hemp, 12 pages to sugar, 9½ pages to tobacco, and 4 pages to coffee.

<sup>43</sup> Elsewhere in southeastern Asia 100 acres normally is the holding used to distinguish between the "small-holder" and the "plantation" or "estate" operator. This is the criterion used here.

coconut landscape of the Philippines forms a positive and dynamic regionalism today which is occupying an ever larger proportion of crop land and is extending farther southward.<sup>44</sup>

The mechanics of extending the coconut landscape are varied. Some new farms now are being planted to coconut by operators who are commercially minded at the outset, and who can afford to plant a given acreage fully. There are also the dooryard or field margin plantings by farmers who are primarily growers of rice, sweet potatoes, abacá, or corn, in a diversified cropping pattern which envisions the coconut only as a portion of a cropping complex. And there are farmers who plant rice, corn, abacá, bananas, sweet potatoes, or manioc as short-run cropping patterns, but who annually interplant coconut seedlings until the time when the palms cover the whole of the farm, and the farm then becomes a commercial coconut producer. Since coconut plantings are almost invariably a part of any of the specific techniques, the coconut landscape is being extended. The ultimate extent and shape of the coconut producing region cannot now be clearly predicted.

In the years since 1910 the price for coconut products on the world market has fluctuated widely. During periods of war, prices have been high, but there also have been periods during which coconut product prices have been low. However, prices of other agricultural commodities flowing into international trade also have fluctuated, and coconut production has maintained its "lazy man's crop" advantage in the popular mind. The rate of expansion in plantings of coconut palms has fluctuated over the decades but planting has never ceased.

#### *The Psychology of Coconut Planting*

Coconut planting occupies a prominent place in the minds of most farmers in the southern Philippines. This psychological mind-set is a strong force in the evolution of the coconut landscape. It is a culturally habituated predisposition toward a particular crop providing a stable return which helped to start an

agricultural regionalism and continues to expand that regionalism at present. The regionalism was begun under circumstances of international economics, and is continuing and expanding in consequence of the long life of the palm, its long-term utility, and its simple technology regardless of short-term factors of international economics. To most Filipino coconut farmers the world price and competitive volume of coconut products do not now figure very prominently in their thinking, since the "lazy man's crop" psychology has strengthened. If coconut continues to be a marketable crop, even at low prices, if no epidemic of disease wipes out plantings wholesale, or if no other crops enter the picture with psychologically strong competitive attractions, the Philippine coconut landscape will continue its expansion. Coconut farming, as a way of life, pleases the Filipino and he persists in it despite periodic low prices. Agricultural agents in the Philippines often despair at this persistence and at the refusal of farmers to experiment with other potentially more profitable crops, but in the mind of the Filipino farmer changes in the way of life are involved in such crops, in addition to the risk of experiment.

In summary, a coconut landscape in the Philippines has come about somewhat differently from the way in which the Corn Belt developed in the United States. In a region in which coconut has long been grown as a subordinate subsistence crop, its comprehensive utility made it known to all inhabitants throughout the Philippines, and younger generations grew up thoroughly indoctrinated. The basic technologies for processing the harvested coconut matured in the small core area of south central Luzon. A sudden change in the expression of world commodity demand provided a set of circumstances by which subsistence coconut farmers could become commercial coconut farmers, in their own home area and on their own terms. Had the world demand arisen in 1700, Filipinos might then have capitalized upon it, or had the demand not appeared when it did, the crystallization of the region would have been delayed. Increasingly Filipinos have capitalized upon the opportunity, and they now consume a very small percentage of their total coconut production. In what has been a home area of the

<sup>44</sup> The best descriptive analysis in geographic literature is that of A. Kolb, in *Die Philippinen* (Leipzig: Koehler, 1942), pp. 197-222, incorporating an article published in 1939 in the *Zeitschrift der Gesellschaft für Erdkunde*, Berlin.

coconut palm for many centuries a strong agricultural regionalism has crystallized. At this point there are gaps that remain still uncultivated or that contain a complex of other crops in the landscape. The dynamics of change still are in process toward a mono-crop regional landscape, an agricultural pattern satisfying the way of life preferred by many Filipinos.

#### THE MALAYAN RUBBER LANDSCAPE

As a last example of the way in which cultural elements impinge upon the issues of agricultural regionalism, we may review the case of the Malayan rubber landscape. The crop creating the chief agricultural regionalism was entirely alien, and the chief creators of the regionalism also were alien to the country. Though at one point a clear regionalism showed itself, recent developments have moved in the direction of diffusion of the rubber landscape to all parts of Malaya.

#### *Nineteenth Century Malaya*

In the early 19th century Malaya was a country with a small population, with only localized expressions of agricultural landscapes, with a large expanse of lightly altered tropical forest, and with only the beginnings of the plural culture and economy that became so characteristic of the early 20th century. Malays participated to a small extent in the 19th century forest extraction of various of the rubbery gums that were becoming of interest to Europe, but they preferred their riverine and coastal village kampong life, in which fishing and jungle gardening were combined in a distinctive pattern that made little areal impact upon the landscape. During the century Europeans and Chinese actively pursued tin mining, chiefly in a zone inland from the west coast. During the last half of the century Europeans interested in agriculture or in trade in agricultural commodities could not interest Malays in participating in the production of items which interested Europe. As British efforts to establish plantations for growing sugar, cacao, coffee, and pepper persisted, the Malays declined to work as wage earners on the plantations, and the British imported Indian laborers, thus contributing a significant element to the population. Had the Malays been willing to engage in wage-earning in

agriculture, thus altering their own living patterns, the social history of Malaya might well have taken a different course, and the rubber landscape might have presented a different appearance today.

#### *The Introduction of Rubber*

None of the efforts at growing sugar, cacao, or coffee succeeded, and the growing of spices was almost a lost art when British efforts at agricultural production in Malaya reached major proportions. Between 1870 and 1895 there was considerable experimental growing of several of the rubbery gum-producing trees. Brazilian *hevea* rubber seedlings were first grown in the Singapore Botanical Gardens in 1877. By 1895 experiments in Malaya concluded that Brazilian *hevea* rubber trees were the most satisfactory of the several possibilities, and there were numerous interplantings of *hevea* rubber trees with young coffee plantings near Kuala Lumpur. Coffee prices slumped in the last years of the century, whereas the price of rubber rose, and by 1901 all the European-owned coffee plantations had been interplanted with rubber trees. In 1905 the total area of rubber trees was about 50,000 acres, and the price was about two Malayan dollars a pound, but most of the trees still were too young to tap, and the Malayan export was but 105 tons. Falling coffee and cacao prices, booming rubber prices, and the successful growing of *hevea* rubber trees turned the tide of opinion rapidly to favor rubber growing, in itself clearly a case of economic motivation.

By 1909 the acreage of young rubber trees was 290,000 and the 1910 price of over 5 Malayan dollars a pound produced a crisis-boom reaction in Malaya. British plantation companies were rapidly formed, Chinese interests greatly expanded, and in the states of Selangor and Negri Sembilan even Malays planted rubber trees in their kampong gardens or converted a few of their rice fields to smallholdings of rubber. The ease of securing land on which to plant rubber was a significant factor in the whole operation. By 1921 plantings had expanded to just over 1,500,000 acres, the Malayan production totalled 181,000 metric tons, and the price of rubber went down to thirty-three Malayan cents. Malaya produced nearly half the world supply of rubber in what

amounted to a crisis-depression. About half the rubber plantings were in smallholdings of under 100 acres each, the plantations of over 100 acres being owned by Chinese and British interests. The larger smallholdings were Chinese or Indian, and Malay holdings were in the very small acreage category.

The crisis-depression was clearly an economic matter of supply and demand, but it had few objective guide lines by which to determine the proper levels of development of agriculture, and the reactions of the participants varied. The Malays went back to their traditional living patterns, not much affected by an interesting gamble that had not paid off very well. Europeans and Chinese, however, floundered in the depression, and put into effect governmental restrictions on tapping, planting, and the alienation of land for rubber planting purposes. The Europeans and Chinese saw the Indonesians greatly expand Indonesian plantings, production, and exports, and then they slowly eased Malayan restrictions and increased their own plantings. Some kind of restriction on alienation of land to rubber planting, in the various Malay states, remained in effect until 1947. By 1940, however, the acreage under rubber had increased to 3,481,000 of which 2,107,000 acres were on plantations for which land had been alienated before the restrictions had been imposed. The increase in smallholder acreage came chiefly through the diversion of lands alienated for other purposes, and was chiefly effected by Chinese and by Indians.<sup>45</sup>

By 1940 the expansion of rubber planting had created a "rubber belt" regionalism in Malaya. Though there were scattered plantings elsewhere, by far the largest share of the acreage was found in a forty-mile wide belt, inland from the west coast, stretching some 500 miles north-south between Singapore and

Penang. Throughout much of the rubber belt there was a marked tendency to mono-crop patterns, the result of the large acreages of plantations and the larger units in the smallholdings which were planted in the European pattern. As an often repeated colloquialism put it: "Years ago the monotony of driving through Malaya was the endless miles of jungle. Now the monotony of touring in Malaya is the endless miles of rubber plantings." Only the southern Selangor and Negri Sembilan zone of Malay smallholdings broke the mono-crop regionalism, wherein small patches of rubber, rice fields, and kampong gardens of jungle-like mixture produced one of the most attractive landscapes of Malaya.

#### *Change in Malay Attitudes*

In the mid and late 1930's considerable numbers of Malays began to accept the wage-earning outlet and to work on rubber plantations or the larger small holdings of Chinese and Indians. They then discovered anew the comparative advantages of rubber as a cash crop, and the comparative values of different daily work schedules for a tropical environment.<sup>46</sup> Rice field labor patterns involve much arduous work during the heat of the day, whereas the daily routine of rubber gathering is done early in the day during the cooler hours and involves less work in the open sun. Though Malays in one part of Malaya had participated in the early boom-gamble, and had suffered the ups and downs of the market price structure, the experience of the 1930's gave Malays in other parts of the country a comparative taste of a good daily work schedule. The experiments made an impression, and by 1940 rubber planting had begun to interest the Malays as a satisfactory kampong garden crop which could be worked when money was needed and the trees rested with a beneficial effect at other times. This change in attitude on the part of the Malays can be documented and dated, but the basic causes for such change have not been explored. Whether or not the course of development may be ascribed ultimately to simple economic motivation, the psychological change among the Malays themselves is significant in bring-

<sup>45</sup> The above paragraphs draw collectively upon Richard Winstedt, *The Malays, A Cultural History* (New York: Philosophical Library, 1950), G. C. Allen and A. G. Donnithorne, *Western Enterprise in Indonesia and Malaya* (London: George Allen and Unwin, 1957), D. H. Grist, *An Outline of Malayan Agriculture* (Kuala Lumpur: Department of Agriculture, 1950), and two studies by J. B. Ooi, "Rural Development in Tropical Areas, with Special Reference to Malaya," *The Journal of Tropical Geography*, Vol. 12 (1959), pp. 1-222, and "The Rubber Industry of the Federation of Malaya," *The Journal of Tropical Geography*, Vol. 15 (1961), pp. 46-65.

<sup>46</sup> See this comparison in Ooi, *op. cit.*, 1959, pp. 33-34.

ing about the recent areal changes in the nature and limits of the rubber landscape.

*Recent Developments in Rubber Planting*

By 1953 the total rubber plantings of Malaya stood at 3,727,000 acres by official record, of which 2,029,000 acres were operated as plantations, and 1,698,000 acres were classified as smallholdings of under 100 acres each. All four ethnic elements participated in plantation production, with European plantations totalling 1,412,000 acres, Chinese plantations 462,000 acres, Indian plantations 113,000 acres, and Malays operating the smallest total of 41,950 acres. In the smallholder pattern the Chinese are dominant in acreage units that range from 25 to 99 acres, and the Malays clearly are dominant in the smallholdings of under 25 acres. Two-thirds of the holdings under 25 acres in 1953 were held by Malays, with over 200,000 holdings totalling over 675,000 acres and probably yielding an arithmetic mean of about 3.2 acres per smallholder.<sup>47</sup> However, the 1953 statistics are somewhat fictitious, for they are derived from official Land Office records of alienation of land to rubber planting. For the plantations the figures are relatively sound, but for the Malay smallholders in particular the official data do not reveal the actual rate at which Malays have turned their previously alienated land into rubber plantings, nor do they suggest the patterns of interplanting kampong gardens with rubber trees.<sup>48</sup> Only about 200,000 Malay smallholdings were represented in the 1953 data itemized above, and it is thought that rubber tree plantings are to be

found on far more Malay homesteads and other landholdings than the official record indicates.

Chinese and Indian smallholder plantings, particularly those in the 25-99 acre category, tend to be aligned within and around the margins of the former "rubber belt," whereas many Malay rubber plantings fall outside the main rubber zone, and are diffused over Malaya at the present time.

The late 1950's, for all of Malaya, brings still another issue of change to the picture of agricultural regionalism. The rise of synthetic rubber in the Industrial West might seem to pose a threat to the continuance of agriculturally produced natural rubber, or at least to the expansion of such planting. Many throughout the Malayan rubber industry are aware of this threat, and there is a strong pressure for diversification of agriculture among the rubber growers which could eventually break the dominance of rubber in the rubber belt as the dominance of corn has been broken in the American Corn Belt. However, the great advances made in rubber tree breeding, producing strains of very high-yielding trees, offsets this industrial threat in the minds of the Malayan plantation operators. Concern over the threat lies behind the whole replanting program that is going on among European, Chinese, and Indian plantation operators, and also among Chinese and Indian smallholders of the 25-99 acre group. Despite the industrial threat new plantings of rubber, in all acreage patterns, are actively in process throughout Malaya, in which process government programs of rural agricultural development are taking an active role.<sup>49</sup> This latest trend is to

<sup>47</sup> Ooi, *op. cit.*, 1959, is the source for this data, which is not absolutely complete as to nationality control of smallholdings. His 1961 study does not provide later data of equal detail though it does have more generalized data of more recent date. The two studies by Ooi previously cited provide by far the best geographical analysis of the Malayan rubber industry.

<sup>48</sup> The official data obviously cannot reflect a total acreage with accuracy, because the traditional Malay procedure in a kampong garden is to mix many species of small plants, vines, shrubs, and trees together in a "jungle garden" combination, and rubber trees have been added to this already rich complex as one more element. But Malays also have been turning old rice fields and other lands toward rubber in an increasing trend, adding new rice fields and other types of planting patterns to compensate for the loss of rice lands. Seldom is this done in mono-crop field patterns, so

that accurate acreage data are almost impossible to derive. Ooi, *op. cit.*, 1959, comments on this subject, and detailed field examination of Malay agricultural holdings clearly reveals such changes. See, for example, R. Wikkramatileke, "Mukim Pulau Rusa, Land Use in a Malayan Riverine Settlement," *The Journal of Tropical Geography*, Vol. 11 (1958), pp. 1-31, and "Trends in Settlement and Economic Development in Eastern Malaya," *Pacific Viewpoint*, Vol. 3 (1962), pp. 27-50.

<sup>49</sup> Personally observed by the senior author in 1962. See also Wikkramatileke, *op. cit.*, 1962, pp. 46-50. Ooi, *op. cit.*, 1961, also comments generally on current continuance of new and replacement planting of rubber. In the early 1950's a tax on all rubber exports began to provide funds by which breeding programs were financed to produce high-yielding planting stock. See Ooi, *op. cit.*, 1959, pp. 152-55.

extend the former "rubber belt" widely over Malaya as a result of what seems to be almost a "rubber planting fever" gripping Malaya.

The kampong garden and small patch of low-yielding seedling rubber create a new and serious question for the Malay. Government replanting subsidies and technological procedures are not really applicable to the small Malay holdings, many of which are not registered as rubber lands. The Malays now find themselves potentially in the position of marginal and uneconomic producers, for their low-yielding seedling stock is aging rapidly past the productive age. Kampong rubber fitted the Malay way of life and, by its very volume and distribution, affected both the regionalism of the rubber landscape and the annual production of Malayan rubber. Will the Malay abandon his kampong plantings for the larger holdings of mono-cropping that make feasible government subsidy and provision of new plantings? Will he drop out of rubber production again because he does not choose basically to alter his way of life? Or will the Malay gradually find a way to secure new planting stock of improved quality and continue to lead his traditional life centered around the kampong garden? In any case the resultant cultural choice will affect the distribution of rubber plantings and hence impinge upon the regionalism of agriculture in Malaya.<sup>50</sup>

In Malaya today government experiment station trials of many different crops in new strains and varieties find successful opportunities for diversification, and though many pressures exist toward diversification, no other crop has captured the minds of Malaysians (be they Malay, Chinese, Indian, or British) comparable to the psychological mind-set toward rubber. In 1957-1962 more land has gone into

<sup>50</sup> This discussion is pointed at the issue of regionalism, and not at the issue of production economics. However, it can be said that the Malay kampong garden, with its mixed plantings, is ecologically sound for the tropical environment, and that the addition of rubber trees to the jungle garden was a valuable addition. The Malay kampong rubber producer was a low cost producer whose practices approached the most economical technology of producing natural rubber, and if the Malay can secure new high-yield planting stocks the continuance of the system is ecologically and economically sound for the kind of life that many rural Malays have so far preferred. See Ooi, *op. cit.*, 1959, pp. 33-36 and 142-47.

high-yield grafted rubber plantings than into any other crop.<sup>51</sup> Not only is the Malay smallholder making efforts to find a way to remain a rubber grower but Chinese and Indian farmers are planting smallholdings of rubber, and almost every government land settlement project has devoted a major share of its land to rubber trees.

Between the large planter and the smallholder, rubber is coming to dominate the agricultural landscape of increasing portions of Malaya, despite the continuance of a narrow coconut belt along the west coastal fringe and despite local successes with coffee, palm oil, pineapple, and other crops. The former easily delineated "rubber belt" remains on the Malayan landscape as a core region, but eastward the rubber landscape is spreading steadily, in ribbons, block units, and patches. The Malayan rubber landscape has been created in little more than a half century by aliens, using an alien plant. The cultural refusal, or reluctance, of the Malays to participate in the development of an alien system of agriculture in the early stages of the evolution of the agricultural system and the rubber landscape was a strong element in its early distinctiveness. The later acceptance of rubber planting began to change the nature of the rubber landscape. The recent marked expansion of rubber planting by all ethnic elements resident in Malaya again is altering the composition of the rubber landscape and is rapidly spreading it across Malaya.

#### SUMMING UP

Three agricultural patterns have been presented which represent three different type examples. They are similar in that a commercial production results in each case, but there are dissimilarities in the other characteristics of the three regions. The diversity involves many aspects, the more notable of which follow:

- a. Regarding crop origins rubber is alien, coconut is native or practically so, and the corn-animal assemblage is of mixed ancestry.

<sup>51</sup> Nursery grown seedlings now are field-planted and grafted with material from a highly selected parent (clone), whereas older plantings were of unselected seedlings allowed to mature into trees of tapping age.

- b. In age the Corn Belt is the oldest, its regional aspects taking shape during a span of decades ranging from about 1810 through 1900; the coconut zone began to develop regional characteristics during the decades from 1890 through 1910; and the rubber zone is the youngest, with its regional expression taking shape only during the decades 1900 through 1920.
- c. The coconut and rubber areas are beginning to approach a mono-crop pattern, whereas a multiple crop-product complex has developed in the American area.
- d. In maturity the Corn Belt has passed a zenith as a climactic agricultural region and is undergoing change of a secondary nature, whereas both the coconut and rubber landscapes are still in states of growth and expansion that do not yet justify the specific term "agricultural region" in either case.
- e. The landscape of the Corn Belt now is a strongly developed cultural landscape created from mid-latitude grassland and forest regions, the coconut landscape contains important sectors of still lightly modified wild subtropical forest not yet incorporated into the cultural landscape, and the rubber landscape contains an older core of "rubber tree forests" surrounded by a large zone of lightly altered tropical forest upon which the rubber landscape is advancing.
- f. In human occupation the coconut region is marked chiefly by the expansion of a native population, the rubber area is occupied by a polycultural population involving a majority of non-Malay immigrants, and the Corn Belt is a synthesized population of European ancestry.
- g. Crop-and-product yield for the Corn Belt came to depend strongly on sophisticated determinations of cost-price features which controlled the annual production cycle and the rates of secondary change characterizing the nature of the agricultural region, whereas the product for both the coconut and rubber zones is significantly determined for many of the producers by popular judgments based on different criteria.
- h. Crop-and-product yield for the Corn Belt had the benefit of plant and animal breeding programs producing steadily larger yields-per-unit. In the rubber zone a strong plant breeding program now achieves a notably larger yield-per-unit for a portion of the producers only, but the coconut zone has as yet seen little agronomic change improving yield ratios.
- i. In farm size the coconut landscape chiefly is an assemblage of very small units, the Corn Belt has been a landscape of moderately sized holdings but has shown a tendency toward increasing size, and the rubber landscape is a mixed assemblage of holdings of many sizes, varying from very small to very large.

#### *Treatment*

The dissimilar nature of the three agricultural regions has called for varied treatment. Such varied treatment seems to be required because an agricultural region is the landscape expression of a particular agricultural system. Since much of the operation of cultural processes having to do with the evolution of the Corn Belt complex lay outside the present confines of the Corn Belt it was necessary to present more historic material on the early issues of development. The Corn Belt system was an evolutionary product of a rapidly spreading population over an unfamiliar landscape. The polycultural background of the farm settlers yielded a blended culture creating a distinctive agricultural system. The Philippine case was a more localized affair involving a native plant and a native system in a familiar landscape. In this discussion there seems to be little need of tracing the centuries-long evolution of coconut planting in the early Philippines. The origin of the Philippine coconut landscape properly begins with the late 19th century and the subsequent stimulus to commercial production. The Malayan example begins with the introduction of the rubber tree into Malaya.

#### *Perspective on Agricultural Regions*

It may be asked what generalizations emerge from the considerable volume of diverse data presented in this type of survey? Can a perspective or point of view be gleaned with re-



gard to the processes which create agricultural regions? To begin with a point that seems axiomatic, the processes which create agricultural regions all involve cultural procedures. This is basic, although when agricultural regions mature and are recognized by geographers they appear on our maps as specific entities. They have been treated as independent phenomena, almost as if they possessed animate powers of determining their own densities, boundaries, and degrees of perpetuity. They have been related to environment, to economic forces, to technology, to agronomic development, and to market demands, but often discussed almost independently of man as a causal force. We have found, in the three examples presented, that agricultural regions, in one sense, are expressions of the subjective choices of man operating in groups, affected by a myriad of cultural influences, all produced by man himself. It is man that creates agricultural landscapes or agricultural regions, since man decides in the end the kinds of crops he will produce. The point that is clear in all three regions examined is that crop-growing traits, in the assemblages we call agricultural regions, originate, take shape, evolve, mature, change, and decline as part of the whole culture of man operating in groups.

The processes of selecting crops to be grown in a given region prior to the maturing of a successful regional assemblage are essentially cultural, subject to many different kinds of stimuli, and affected by a wide variety of historic influences. Among the stimuli are such matters as acquaintance with particular domesticated plants and animals, patterns of ignorance or awareness of the suitability of specific crops in particular ecologic situations, commitment to a particular result in growing crops at all, psychological reactions of people to changing circumstances, and specific formulations for a way of life desired by the people who carry on agriculture. As the selection of crops continues toward the point at which some general uniformity of human decision results, the operation becomes a group procedure in which many different specific cultural processes are joined in the making of collective decisions. Herein lies the determination of a way of life and the patterns of crop combinations which the geographer can recognize as regional expressions.

### *Cultural Processes Which Create Agricultural Regions*

Conceptually, the "whole culture of man operating in groups" is far too broad to be used as an analytical device in the examination of the agricultural region. We have stressed this holistic concept because it has seemed to us that many discussions of agricultural regions have omitted the operation of significant cultural processes. Particularly is this true with regard to discussions of the origins of agricultural regions. Obviously some division of cultural processes is required to permit the formulation and employment of specific analytical devices. We suggest that it is possible to identify six different categories of cultural processes significant to the study of the cultural origin, maturity, and change of the agricultural region. These are: psychological, political, historical, technologic, economic, and agronomic.<sup>52</sup> We have here used specific terms to denote processes which clearly distinguish particular sectors of culture. Perhaps either more or fewer than these six conceivably may be discernible, and perhaps other words may be deemed preferable for denoting process categories. Preliminary assessment of any agricultural region may not achieve recognition of the interplay of the whole series of processes, and it may not isolate the significance of any one process. In a zone of highly developed culture the separate operation of the several processes may be obscure and difficult of assessment.

In our survey of three regional patterns the six processes are not developed in equal depth for each of the three areas. Since the three regions are of different kinds, ages, and stages of maturity a strictly conformal treatment has been impossible, and we have been concerned to emphasize aspects which often have not received attention in geographical literature.

<sup>52</sup> Most of these terms have been used in their common definitions. The term psychological has been employed to denote mental, social, and cultural reactions of crop growers to changing circumstances, with mental itself having specific reference to habits of thinking, mind-set, mentality, and state of mind. The term agronomic, commonly applied to field crop and soil management, has been extended to include reference to the management of tree crops for the Philippines and Malaya, normally included under the term horticulture.

The following examples identify these processes and briefly show how they operate.

Psychological process is evident in all three regions, but it operates quite differently. In the Corn Belt it is seen operating in the way in which farm populations accept new ideas, in the manner in which farmers influence one another, and in the way institutions such as the newspaper and the fair influence practices, these composite elements working to produce a farming "mentality" among settlers new to the region. The traditional conditioning of the Filipino toward coconut is in good part psychological, but as a specific operation it differs markedly from the operation of the process among Corn Belt farmers. Though our explanation of the process is brief, its common knowledge and positive assertion by Filipinos makes it both a rational and satisfactory accounting for the acceptance of coconut as a crop. Psychological process clearly operated among the Malays in their early refusal to accept rubber, and in their later acceptance of it. Their present enthusiasm for rubber is self-evident to any observer. The striking operation of psychological process has been clearly evident among the Malays; accounting for its operation is another matter, and we do not find material easily available for such an accounting. Studies of Malay life and patterns of reaction to alien culture are few and have so far too often been superficial and satisfied with the unsound generalization that the Malay is indolent and not interested in basic improvements in his level of living. It would be a mistake to expect a really strong operation of psychological process as an important factor in producing change in a mature agricultural region inhabited by people possessing complex and acute cultural equipment for determining the validity of changing crops, and at this level the isolation of the significance of the psychological factor, as independent of other processes, would be particularly difficult. On the other hand, psychological process should be very significant in the early stages of the evolution of an agricultural regionalism when the technologic, economic, and agronomic equipment has not been developed.

Though we have not dealt explicitly with political process in discussing the Corn Belt it should be self-evident that the role of

government has been involved from the time of the very initial land survey. In the Philippines the obvious role of political process shows itself in the prohibition of plantation land-holding patterns, and in the free-trade legislation that gave coconut a guaranteed market in the United States. The program of restriction of Malayan production of rubber during the depression crisis of the early 1920's was a clear operation of political process. The government enforcement of a levy against rubber exports, supporting the whole program of upgrading planting stock, and the restriction of alienation of land for rubber planting between 1920 and 1947, exhibit political process. The contemporary program of government settlement projects, in which rubber tree planting so clearly dominates, is another manifestation of political process.

Historical process is evident in the case of the Corn Belt and the coconut landscape, though the pattern differs in the two areas. For the rubber landscape the historic process is a short-run matter only in which international circumstances have been of greater significance than local regional happenings. In the early history of the Corn Belt the technologic process clearly is evident in several different ways. The development of the steel plow which made easier the cultivation of grasslands is an illustration, and the well-known development of other machinery was part of the process. The very simplicity and historic continuity of technology required has been a factor in the growth of the coconut landscape in the Philippines, and changes in technology have not been significant to its expansion. Recent technologic change in rubber production on large estates has taken place in Malaya, but the very simplicity of the technology required has been a significant factor in the rapid spread of rubber among smallholders once they accepted the whole complex.

Basic economic processes have been so strongly at work in all three agricultural zones that we have been at no pains to demonstrate such commonly recognized issues. The economics of the "lazy man's crop," affecting coconut significantly and rubber to a certain extent, is different from that which normally has appealed to Americans. Nevertheless,

basic economic processes are responsible for the expansion of coconut and lies behind the appearance of the rubber landscape.

Agronomic processes slowly convinced farmers in the future Corn Belt that corn was a more suitable crop than wheat, though this issue is interlinked with economic processes. Agronomic processes eventually led to the filling in of blank spaces in the early Corn Belt that were at first too wet to yield good corn crops, and agronomic processes have had much to do with recent history of the Corn Belt. Agronomic processes have operated in respect to coconut production also, though these have been relatively minor in importance. Perhaps the failure of agronomic processes to conquer the diseases affecting abacá in the southern Philippines has redounded to the relative continuance of expansion of the coconut landscape. Agronomic processes clearly are behind the recent expansion of the rubber landscape in Malaya, and reliance upon them is in-

terlinked with psychologic and political processes in the very expansion of the rubber landscape despite the evolution of the industrial processes producing synthetic rubber.

We could not devise one all-inclusive format for the examination of the origins of the three agricultural regions. We consider the six categories of cultural processes only tentative and suggestive, to be verified, rejected, or amplified by substantive research on other regions.

The more effective recognition of cultural processes at work among agricultural populations may be of considerable utility to our understanding of the spread, elaboration, differentiation, and change in agriculture the world over. Geographers are concerned with the areal expression of agriculture, and its changing nature, on the face of the earth; and they may properly have equal interest in how and why such areal expressions originate and change.