# CHAPTER VI

## STAPLE FOOD CROPS: MAIZE AND BEANS

Like all other Mayance-language populations and like a large segment of all Amerindian cultures, the Q?eqči? live in symbiosis with *Zea mays*. Beans, squash, chili, and meat are necessary complements to the staple, but they are profane while maize is sacred, and whatever is eaten at meals besides tortillas is *"š-tibel cua"*, 'meat' of the tortilla. The core of a study of Q?eqči? culture from any approach would have to include maize, its varieties, its cultivation, and its consumption.[1] From the point of view of ecosystems, not only is maize the kingpin of human nutrition and the annual schedule of activities, it is also the indirect cause of forest dysclimax through milpa clearing and through steady, selective extraction of firewood for two cookings of every dry grain: one boiling to shed the pericarp and a second heating of prepared food. Maize also supports large animal populations other than human, both domestic and not, while the forest edges and second-growth shrubbery of milpas open up habitats not found in climax tropical highland forest.

### Maize Varieties

The principal maize variety, planted by nearly every highland Q?eqči? in one part or another of his lands, is *q?an hal*, or 'yellow ear'.

From Table 10 the close fit of *q?an hal* to the race Olotón can be made out by comparison with Tables 2 and 3 in *Races of Maize in*

[1] Cf. McBryde, 1947: 379-381.

*Central America*.[2] Although Wellhausen, *et al.*, present photographs of Olotón from several localities and show collections of the race and its introgression with other races throughout the volcanic and limestone highlands of Guatemala (their Fig. 61, p.86), Alta Verapaz is still a special case. Considering the handicap imposed by limited sunlight and degree-days at high and cloudy elevations, *q?an hal* is a spectacular plant: it grows to 3 or 4 meters tall and produces occasional ears up to 42 cm. (16 ½ in.) long in a good year. On better soils — though without fertilization of any sort — the norm of ear length is around 35 cm. (14 in.) and the weight of grain per ear around 225 g. (½lb.).

TABLE 10

VARIETAL MEASUREMENTS OF MAIZE

| variety | ear: length (cm) | ear: diam. (cm) | ear: no. rows | ear: diam. peduncle (mm) | kernel: width (mm) | kernel: thick-ness (mm) | kernel: length |
|---|---|---|---|---|---|---|---|
| Q?AN HAL | 28 | 4.6 | 12.2 | 19 | 10.3 | 5.6 | 10.9 |
| Q?EQ WAXB* | 25 | 4.5 | 11.6 | 17 | 10.6 | 5.7 | 11.5 |
| KAQ LI:Č?* | 27 | 4.5 | 11.6 | 17 | 11.1 | 5.8 | 10.6 |
| K?AMBOB | 25 | 5.0 | 13.0 | 24 | 10.8 | 5.8 | 10.7 |

* Figures for these varieties based on samples of 5 ears; others on 10.

As stated above in the introduction, the maintenance of so imposing a variety of maize in conditions which would not appear to favor any grain crop was one of the reasons why Alta Verapaz and the Q?eqči? were selected for study. However, the Olotón of Alta Verapaz is not necessarily the most pure. Frequent appearance of twisted rows and a

[2] Wellhausen, Fuentes and Hernandez, 1957: 4,5; see also pp. 80-93.

tendency to spherical kernels may indicate introgression of Quicheño[3] while the frequency of sterile tips may indicate an even greater knob number from teosinte introgression than the very large number in the race as identified by Wellhausen, *et al.* The fact that a few branched ears are found in almost every harvest of this variety mayor may not relate it to Quicheño Ramoso;[4] such ears are called *pac?* and will be discussed below.

The second most common variety is *q?eq wax*, black maize. In terms of growing season and plant appearance, as well as size and shape of the ear and kernels, there is not much difference between this and *q?an hal* (see Table 10). Aleurone color and slightly less flinty grain seem to indicate a combination of *Olotón* with *Negro de Chimaltenango*, a case of introgression which Wellhausen, *et al.*, did not collect but for which they offer several analogues.[5] The "black" color is more intricate than appearance indicates, since dissection of a single grain can disclose either red or clear pericarp and yellow or white endosperm in addition to a dark purple aleurone layer. Standard Q?eqči? procedure with this variety is to harvest it slightly early, before the ears have dried on the stalk, and finish the drying process in storage over a smoky fire. Floury endosperm under a thin flint armor is perhaps the reason why weevil infesta-

[3] Cf. Wellhausen, *et al.*, 1957: Fig. 63, p. 88 and Table 4, p. 110.

[4] Ibid., 66-67.

[5] Ibid., 67-75.

tion can only be avoided with this special treatment. Neither this nor most other highland Q?eqči? maize have the tight, insect- and water-proof closure of husks around silks that is typical of lowland races like Tepecintle, grown by Q?eqči? migrants in the lowlands near Seból.[6] ***Q?eq wax*** and ***q?an hal*** are often planted in adjacent plots or properties; the motley intermediate ears which result merit a technical term (*šu?uy*) but are not planted as a variety.

The red pericarp mentioned above also appears sporadically in *q?an hal*. The color may be solid over every kernel or may take the form of stripes of variable width, originating at the silk scar (then termed *š-kik?el ax co?*, male bird's blood), with red glume and cob color associated but not strictly corresponding. One man claimed to have separated out the red ears for trial planting as a variety, but for unspecified reasons they failed him so he never tried again. My informants and I made the same test in each of the three areas where we planted and came up with a consistent harvest of red and non-red segregates in both cases where complete records were kept (see Table 11), with the red fairly well confined to the plot where it was planted within a whole field of *q?an hal*. Red pericarp is evidently a condition inherent in the parent plant and not so complex a variable as aleurone and endosperm colors, which have gradations of tone from nil to 100%, kernel by kernel. Red maize (*kaq li:č?*, red artery?) is maintained as a variety by very few

[6] Specimens and information from D. Greenwood, Baptist missionary, Cobán.

Q?eqči?, perhaps because its color is associated with envy and jealousy (*kaq š-č?:ol*). In my informants' experience, red ears appear not to be prone to weevil and moth infestation, though they are more than usually susceptible to mold either on the stalk or in storage. Presumably this variety reflects introgression by Quicheño Rojo, but the figures in Table 10 are based on only five ears and can only be taken as a general indication of similarity in variables other than color.[7]

TABLE 11

$F_1$ SEGREGATION IN MINOR MAIZE VARIETIES

| | | Number of Ears | | | |
|---|---|---|---|---|---|
| Site | Plot | red | other | fasciated | other |
| Koxila | 1 | 73 | 64 | | |
| | C1 | 69 | 56 | | |
| | 2 | | | 60 | 56 |
| | C2 | | | 58 | 128 |
| Saša?an | 1 | 98 | 91 | | |

[7] Cf. Wellhausen, *et al.*, 1957: Table 3, p. 5, and Figure 40, p. 63.

The third most abundant variety is ***k?ambob*** (=?ocelot/margay.[8] This is planted only in and around the town of San Juan; its features include a relatively short season (March - August) which is out of phase with the other major varieties, and an ear which approximates the race Nal-Tel with the expected admixture of Olotón.[9] However, pericarp color is totally absent and aleurone color in a few kernels is common, in addition to a number of other discrepancies, so that this variety is much more like Comiteco in both ear and plant characteristics (see Table 10).[10]

A less common though old and widely planted townsite variety is ***kok? hal***, little ear. This may be planted at any time of year, though usually in January so that fresh maize may be had in July. A complete mix of kernel colors is standard, but red ears are infrequent and did not appear in any harvest I saw. The combination of small kernels on a small ear does not exactly fit either of the races to which this variety might belong, Nal-Tel or Serrano, but small shank diameter and large altitudinal adaptability favor the former over the latter.[11] Unfortunately, measurement of a sample of ears and plants was completely forgotten in the course of keeping

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[8] Though translatable, this may be a corruption of Sp. *camból*, the name given an improved variety developed in the 1940s, according to description by Dr. Marciál Bárrios of the Ministry of Agriculture Experimental Station at Chimaltenango.

[9] Ibid.: Fig. 66, p. 91.

[10] Wellhausen, *et al.*, 1957: Tables 2 and 3, pp. 4-5.

[11] *Ibid*.: Tables 2 and 3.

track of cultivation of the major varieties. *Cu:l hal* (mountain ear) is a similar variety from Cahabón, distinguished by absence of tillering and up to four small ears per plant.

Three open-field varieties which reportedly were common fifteen or twenty years ago are now very scarce, at least around Chamelco. These were *čaq li:č?* (dry artery?), *č?ol hal* (native ear; cf. *č?ol wi:nq*, wild man of the forest), and *son* (dance). The first two were sufficiently like *k?ambob* that young Q?eqči? men confuse all three, but older informants insist there was no relationship beyond general similarity of the ear. *Č?ol hal* is described as having mixed black, white and yellow grain; it was planted on the first of April and harvested at the end of September, just like *čaq li:č?*, and the sunny spells that sometimes interrupt the winter rains were termed *čaqiobresinkil č?ol hal*, means for the drying of *č?ol hal*. The area south and west of Chamelco, presently in Ladino hands, was the place where great tracts of this variety once appeared. Some doubt as to the specificity of the name is raised by its appearance in the above-mentioned dictionary from the oldest lowland Q?eqči? community, Cahabón (initially *K?axbom*; “Chagbon” in Tovilla[12] and “Cahbom” in Cortés y Larráz).[13] Here it is described as “maíz criollo, nativo, antiguo, resistente”.[14]

*Son hal* is both a general term for any fasciated ear and the name

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[12] Tovilla, 1635: 197.

[13] Cortés y Larráz, Vol. 2, 1768: 20.

[14] Curley, 1970: 51.

for a variety characterized by that feature. All kernel colors are possible and acceptable in the variety, though I did not happen to see any all-black ears, and several ears of *son* regularly appear in harvests of *q?an hal*, *q?eq wax* and *kaq li:č?*. Fasciation is mentioned by Wellhausen, *et al.*, only in connection with *Quicheño Grueso* and *Quicheño Rojo*, and is explained only as a multiplication of row number.[15] Shelling and dissection of an ear of *son hal*, however, shows that fasciation is also the result of extreme helical condensation of the ear so that paired rows of kernels are at an angle of around 45° to the axis of the ear. The sight of a massive ear of *son* evoked appreciative delight in every Q?eqči? informant, and the only explanation for their reluctance to maintain the variety was a belief that, being ‘rowless’, it had no ‘trail’ (*ma:k?a? š-beh*) and thus could not be consumed fresh on the ear for fear of likewise losing one’s sense of direction.

Rather than being maintained for its magical properties, as Wellhausen supposes, this fasciated variety appears to have been slighted because of them.[16] A similar explanation appeared above to account for reluctance to maintain *kaq li:č?*.

My informants and I planted a plot of 405$m^2$ in seed from *son* ears. The subsequent harvest was equally divided between *son* and not-*son*, with the *son* ears sound and well-filled except for their characteristic bare tips and poorly filled butts (refer to harvest

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[15] Wellhausen, *et al.*, 1957: Fig. 39, p. 62; Fig. 42, p. 65.

[16] *Ibid.*: 66.

from plots 2 and control 2, Table 11). In each of three plots of 135 $m^2$ planted in *kaq li:č?* the same fifty-fifty result occurred. If the appearance of extraneous ears were to continue to be halved in the second and subsequent years then re-establishment of either of these varieties to within $(½)^N$ of purity would take only N years.

Exceptional, infrequent ear forms without corresponding varieties are highly prized but not consistently used for seed. *Ka?* (grind-stone) refers to ears which drop so many rows towards the tip that exposed strips of glossy cob surface show between rows. The name given this aberration reflects the belief that “it grinds much maize” and therefore is not to be stored with the rest of the harvest nor used for seed, though it invariably will be set on or suspended over the household altar. *Š-kuš kašlan*, chicken’s neck, describes very well those ears which go from female to male and back to a small ball of female inflorescence, sometimes followed by yet another bit of male. These also will go above or on the altar, but not into the seed bag. *Pac?* (swollen; synonym: *pa?at*, twins) refers to branched ears. These are usually well filled and can be even more massive and weighty than a good ear of *son hal*. They are immediately set aside during harvest as altar decorations and are prized for seed, presumably because their weight and multiplicity of branches have positive implications on the same magical order as the negative attributes of exposed cob, rowlessness, and red grain. My principal informant claimed to have established *pac?* as a variety in four years of selection, subsequently losing all his seed to moths, but in this he was not re-creating an accepted variety like *son hal*. All other informants who commented were emphatically in favor of including any *pac?* ears in the rest of their seed, but this sort of selection – no matter how avid – does nothing to increase the frequency of their appearance.[17] Ears without grain and grainless secondary axes among husk leaves are termed *š-kop hal* or *pok?ok?hal* (perhaps from *pok?*, to become annoyed, to go to ruin) but are of no consequence. *But?* refers to ball-shaped ears, the results of either physiological or genetic failure of the axis of the ear to continue beyond a few centimeters of elongation. These are put up as decorations and presumably shelled for seed in order to promote more of the same and more maize in general (*na-but?nal li ka-hal*: our maize ears do *but?*; compare *š-but? li ha?*, the water has flooded). *Kuk* ears are those with a curved cob, attributed to bird- or squirrel-caused damage (*kuk*, squirrel) to one side of the ear in early stages of its formation, but have no special significance.

A gradation of endosperm colors from deep yellow through white is found in the race Olotón so it should not be surprising to find a broad variety of tones on any one ear or in a bag of seed. However, Q?eqči?s make a distinction between pure yellow (*q?an hal*), intermediate (*saqi q?an hal*), and in a few cases maintain “pure” white (*saqi hal*) as a separate variety. In the harvest from a small plot of the latter color the five whitest ears were relatively small

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[17] Compare with the race *Quicheño Ramoso* in Wellhausen, *et al.* 1957: 66-67.

(mean length 26.4 cm.; mean diameter at mid-cob 4.26 cm.) and had a relatively low row number (mean 9.2), but the sample is too small for significant conclusions. Nal-Tel Blanco Tierra Alta would be the most likely race towards which these deviations from Olotón could point.[18]

## Cultivation Methods

The cultivation system used by Q?eqči?s in the highlands is more like *barbecho* than true swidden or *roza* in that some land is permanently cultivated and even fallowed land is not abandoned but continues to be the freehold property of one family or group of sibling heirs. Fertilization of the continuously cultivated soils, such as it is, consists of hoeing under the weeds which grow before and during the cycle of maize growth.[19] This system differs from that described by Carter for Q?eqči? migrants to the Polochíc Valley, but the differences are slight since most lowlanders are recent arrivals from overcrowded parts of the highlands.[20] However, the methods used in the ancient lowland settlements of Cahabón, Lanquín and Senahú have not been reported in the literature and may show major adaptive and idiosyncratic differences.

### Clearing

On level land in permanent cultivation, clearing involves pulling up the stalks of last year’s crop and hoeing under the weeds from

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[18] Wellhausen, *et al.* 1957: 39-40.

[19] Palerm, 1967: 34-35.

[20] Carter, 1969: 13-131.

the fallow season of mid-November to early April. Only the old stalks are burned and these are destroyed for pest control more than any other purpose. The prime parts of this class of land will often have been clean-weeded for a first crop of bush beans and the trash heaped and burned for planting *ik?oy* squash (both of which will be discussed later). These may not have ripened by planting time but the maize is simply interplanted and any reductions in yield of grain accepted for the sake of having all three foods. Clearing of slope land with four or five years' growth of trees and shrubs, the accepted minimum rotation time, and regrowth vegetation[21] involves work with machete and axe rather than hoe and the greater accumulation of trash necessitates burning, though the value of an ash dressing is also appreciated. Firebreaks are cleared along all forest edges of a milpa, usually on the day of firing, and the fire is first set along the highest margin both to avoid sudden ignition of the whole milpa and to widen the firebreak before lighting at the foot of the slope.[22] The usual firebrand is a dry maize stalk with empty husks left in harvesting. Protective clearing to save trees within a milpa is out of the question nowadays, since no second-growth tree except pine grows to sufficient size to be worth saving and no pine can be near a fire without its needles igniting. The depth of litter and heat of the fire are relatively small in any case, so most of the useful wood felled in clearing can be salvaged

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[21] without much attention to index species; cf. Carter, 1969: 33.

[22] *Ibid*.: 56-57.

at any time between burning and planting.[23]

Clearing of second-growth forest is infrequent in the vicinity of Chamelco, partly because it is valuable for fuel wood and lumber, partly for fear of felling a noteworthy number of trees without a permit but within range of the minions of government. Old-growth forest is presently felled only in remote settlements towards the southern margins of the *municipio*, but its attrition in the last twenty years has nevertheless been rapid.[24] In general, total deforestation appears to be most prevalent where relief is low, Ladinos are absent, and distance to the seat of municipal government is great. However, the *municipios* of Cobán and Carchá are almost completely denuded throughout their highland parts, while the greater elevation and relief combines with local patterns of land ownership (Indian vs. Ladino) and rural population density to leave a few more forested patches in the adjacent municipalities of Chamelco, Tactíc, San Cristóbal and Santa Cruz. The patterns visible from the air and the fragmentary statistical publications from the 1964 census data are, unfortunately, incommensurable.[25] Occasional observation of milpas near Chamelco where large trees had been felled indicated no major differences from lowland *roza* as described by Carter, except for the unique place of č*?ut* (tree fern) as a protected species.[26]

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[23] *Ibid*.: 46-47.

[24] Dr. Louis O. Williams, personal communication.

[25] Dirección Generál de Estadística, 1969: 25.

[26] Carter, 1969: 43-60.

Whether on flat or sloping land, the standard unit of area corresponds closely to what one man can clear in one day. The unit is a *k?a:m* (Spanish: *cuerda*), a term applied interchangeably to an area of about 440 square meters, or one side of that square as measured by 13 arm-spans (reduced by many Q?eqči? at present to a standard of 25 *varas* or more nearly 12½ spans), or a special rope made to that measure, or the natural equivalent of a rope: any vine-like thing. The *cuerda* is a somewhat elastic measure, in at least two senses, and around Guatemala that term is applied to many other numbers of *varas* of 33 inches – more or less.[27] When a Q?eqči? claims to have a certain number of *k?a:am* in a given crop he may be lying but he is not kidding: his esthetic or traditional adherence to rectangular field boundaries laid off in rope-lengths and fractions thereof holds fast well beyond the point of absurdity. The karst topography of Alta Verapaz is anything but rectilinear in its fine details, but nothing is more striking in airphotos of the region than its fine reticulation by linear fields and fencerows.

The main ceremonial occasion associated with milpa comes at the very start of clearing and is called č*apok k?al*, to take hold of *milpa* (compare č*apok k?ula?al*, *compadrinazgo* or godparenthood). The procedures include individual lighting of candles and saying of prayers in the municipal church, and pilgrimages to that cave which relates to the locality where clearing is to be done so that "per-

[27] Cf. Carter, 1969: 42-43, and Gillin, 1951: 13(fn.); also Appendix B.

mission" may be had to do violence to the flanks of that god-mountain for the sake of a crop of maize. The latter may be undertaken individually or, where complete traditions survive, by the elders as agents for a whole community, ordinarily an ***aldea*** or *k?aleba:l*. The etymology of the Q?eqči? term is illuminating, since it apparently adds a plural and a generalizing suffix to the word for milpa, *k?al*. The exact texts and procedures used for these rites were not collected, not through any oversight but because they proved disproportionately difficult to collect. The general form to be expected in them can be seen in Carter's excellent documentation.[28] In the neighborhood of Chamelco, at least, there was no sign of the center-of-the-field cross and ritual reported by Carter in the Polochíc Valley,[29] and pre- and post-planting food and sexual taboos were not described by my informants as being or having been anywhere near so elaborate.

Planting

Clearing occupies the main part of the dry season, from February to mid-May, with firing timed on the eve of planting if possible. Weather observations show the period April 2-May 11 to be the main period for firing, judging by the smog obscuring those days, while the first showers of the rainy season fell later in the week of May 11. Given the close association of firing and planting in the calendar, this sequence implies that the timing of planting, at least

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[28] Carter, 1969: 36-41 and 71-76.

[29] *Ibid*.: 75.

in 1969, could scarcely have been more perfect.

On the eve of planting day seed maize is placed in sacks or baskets before the household altar and each container decorated with a lighted candle in its center. Ears from which the seed was taken, with butt and tip kernels still in place, will usually be found hanging on the walls and will remain there for several months to come, until their progeny are past most of their hazardous times and another crop is assured. On the altar itself the ingredients of a ceremonial meal are set before the “image”, which may be anything from a color print of the sacred heart to an antique carved statue of a saint. The food will usually include leaf-wrapped maize-meal dumplings, a whole chicken ritually prepared,[30] and a special preparation of raw, coarse-ground and unsweetened cacao – undrinkable, and not intended for drinking. This “green cocoa” (*raš kakau*) is sprinkled over the seed and altar, and on the outside front wall of the house. Whether intended or not, that dampening of the grain may serve as a pre-soaking to hasten germination. The aspersion is preceeded and followed by a censing of house, altar and seed with *kopal pom*, and in most households the remainder of the night will be spent in vigil and drinking *box*.[31] Further aspersion and ritual may be done on the morning of planting, when planters may eat *saq či:k* (*atól* and beans) but not meat.

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[30] See Chapter VIII, Domestic Animals, pp. 186.

[31] *Box* is consumed at every social occasion, ritual or not; its manufacture is presented in Chapter XI.

Maize planting is one of the few events in a year which gathers Q?eqči?s to work co-operatively in an exchange of labor denoted by a term that also serves for “pair” or “matrimony”: č*i sumsu*, or *sum*. Part of planting’s attraction is the custom of providing unlimited refreshment to all participants in the form of *box*, and part of the motivation comes from the knowledge that whatever labor one’s family contributes will be returned in like numbers when planting day comes at one’s own household. Despite creeping inebriation as the day wears on, Q?eqči?s maintain an astounding ability to keep up a dibble hole spacing of about 1.3 meters in a square, even on slopes up to 300. A planting crew moves in line abreast at about ten dibbles in 2½ minutes, keeping up a constant flow of abusive wit and falsetto whoops. The direction of the rank of planters is without regard to slope except in extreme cases, when the direction of progress is always across the slope, but whether on the flat or slope it is very bad form to lose the place in the line of planters which one held at the start of the day. However, towards the end of a long day the ranks begin to thin and straggle as “casualties” accumulate and only the most hardy (or abstemious) carry on; the rest, even including the host himself, lie box-soaked and sometimes rain-soaked where they fall.

The most difficult feat for a beginner, apart from keeping constant spacing, is to pick out the standard number of grains at first grab in the seed pouch and then hit the mark with all of them, so as to lose no time bending over. The number of seeds may be seven, six or five, depending on the planting patron’s preference and his judgement of the site, seed and season. Seven, however, is held to be the traditional figure. Since the ‘mark’ to be hit is a dibble hole only a few centimeters in diameter, beginners do a lot of stooping and are the butts of much banter. Making the dibble hole itself is fairly simple, the only trick being to rock the stick back and forth after driving it to a depth of 10 to 15 centimeters so that all the seed is not packed together in the conical hole left by the tip of the dibble stick.

Dibble sticks (*auleb*) are made on the way to the fields if they have not been prepared by the host or “proprietor of the planting” (*ax e:čal auk*) and at the very most they will be used for planting two or three fields in one season.[32] The choice of woods is fairly wide: *q?an ca?ax* is preferred, *šubuti?* is probably the most common, and alternates include *ca?ax*, *q?anaiš*, *mesče?*, *oqob, r-o maš*, *c?unex če?*, *xi*, *baqče?* and *yuš*.

Experts in the planting party are assigned, or take up, the positions in the planting line farthest from the borders of the milpa: *re če?*. Here the straightness of rows will depend on the calibrated eyeball of the planter and his ability to place his dibble stick along an imaginary line regardless of topography. Younger and less able planters get the edge of the weeds, *re pim*, for their guide.

Planting is always a one-day affair for each household, whether for the practical difficulty of gathering and feeding many workers

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[32] Carter, 1969: 80. Carter reports up to three years' use.

or for superstitious reasons or both. More important, planting in each neighborhood is completed in as few days as possible so that everyone's crop will reach each stage of maturity at nearly the same time. Here the reason is emphatically practical, since all the hungry mice, rats, squirrels, raccoons and birds in the woods will descend on the milpa of that man whose maize is even slightly out of phase with his neighbors'. Differences in elevation and their temperature effects on growing season are the main obstacles to uniform timing of planting throughout the whole municipality of Chamelco and beyond. However, in the environs of a nearby community with both Poqomči? and Q?eqči? population (Tactíc) the agricultural year appears to be substantially different. The dimensions of the "neighborhood" in which simultaneous planting is or needs to be approximated should roughly correspond to the residential, political and religious unit, the ***aldea***. In ***Aldea*** Chamisun, for example, there are two distinct traditional planting dates: the 31$^{st}$ of March and the 25$^{th}$ of April, without distinction as to varieties. Though the centers of ***aldeas*** are easily defined, their boundaries are common knowledge only to the people who live in them.[33] The best that can be offered as a rough mode of area for ***aldeas*** of San Juan Chamelco would be around 4 $km.^2$ Having twice made the mistake of starting experimental plots of carefully hoarded seed before the accustomed planting time I can testify that ruin comes swiftly and totally to him who is out of step.

[33] cf. Hunt and Nash, 1967: 259.

The only crop likely to be planted along with maize is the scarlet runner bean, *lol*, and often this will only be planted in a few spots since its vines may interfere with growth and yield of the stalks on which it climbs. Multiple cropping as described by Carter[34] is practically confined to the immediate vicinity of a house, whether in town or in the *aldeas*.

Differences in season among maize varieties add complications to the planting schedule in many cultures,[35] but not for the Q?eqči?. Both of the short- and off-season varieties are restricted to town-lot sites where they can better be guarded – not only against wild animals but from light-fingered neighbors and passers-by. Isolation of maize varieties through differences of flowering time is thus bound up with further isolation through disjunct location, but at the same time the probability of pollen exchange among varieties in one location is increased.

Re-planting of all fields is traditionally done fifteen days after first planting; it may take an hour and a few grams of seed or several man-days and kilos of seed to restore the desired number of plants per hill in a milpa, depending on weather and birds and the soundness of seed after storage. However long re-planting takes, this sort of solicitous care is completely at variance with the attitude reported by Carter.[36]

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[34] Carter, 1969: 77.

[35] Johannessen, Wilson and Davenport, 1970: 408-411.

[36] Carter, 1969: 85.

<u>Weeding</u>

No more attention is given for four weeks after re-planting; then comes the first weeding. The technique of this job takes some mastering as it involves skimming a thin, weed-covered layer of soil and flipping it weed-side-down in a pile around each group of maize plants. Since the sprouts are small and the hoe is sharp, broad and heavy, good aim is needed if plants are not to be cut or crushed as a ‘hill’ is built up. Stamina is needed in addition to skill *if* the standard assignment of one *k?a:m* per man per day is to be completed.

A man will hire help for weeding but rarely is there a labor exchange of the sort found in planting. The going wage at present is around 40¢ per day without meals, or 25¢ to 30¢ if the employer provides lunch. However, since everyone is weeding at about the same time and since those few men with time on their hands are in demand, people who are known to keep dusty throats well dampened with box have a much easier time finding help.

A second and in some cases a third weeding follow at four-week intervals, with a small celebration in each household marking the end of cultivation chores. That Carter should have been told five weedings were needed during the growing season in Alta Verapaz is hard to understand, unless his informants were from the northern and eastern lowlands in the Department. At no point does he specify just where the Chichipate settlers came from, except that “a sizeable portion (37 per cent) of the migrants came from a single highland estate ….”[37] Certainly from 1400 meters elevation upward the growth of weeds, obnoxious as it may be, is at a rate appropriate to the limits placed on all plant growth by modest mean and maximum temperatures.

The principal weeds of milpa are *aq*, *aš*, *ik pim*, *kaqi pim*, *lokab*, *š-sok iboy*, *sun*, *šubay* and *c?ima?ax*, and obviously these grow most luxuriantly on the flats where maize grows best – if spared their competition. *Kaqipim* (red weed) is a recently arrived grass which is much rougher to hoe than the grass it displaced, *š-sok iboy* (armadillo’s nest). The latter is now found only on slopes. *Aq* grass is useful for thatch but its tough stems and rhizomes are the bane of much prime land, along with the fast-growing and perennial composites *aš* and *sun*. *Ik pim* (chili weed) and *šubay* are by far the most common composites, but they and the other weeds are relatively pleasant to tackle.

While maize is growing a number of more-or-less ritual prohibitions are in force. If a woman steps over a fallen maize plant, or even over a grain lying on the ground, the *tiošil* (god-ness) of all of that variety and household seed maize will be lost and it will not sprout the following year. If any basket is placed over the mouth of a household water jug (*kuk*), squirrels (also *kuk*!) will eat up the maize in the fields. Any maize plant growing from seed scattered in harvesting or spontaneously growing at any time in any place is not pulled up or weeded out, though in every case birds

[37] Carter, 1969: 93; quotation from p. 2.

will peck out the ears even before they form silks. The precise rationale behind this instance of reverence for maize was not established, but its general content is obvious: kill one maize plant and you have insulted all maize.

The terms in Table 12 cover the stages of maize growth as described by my informants. They are in descriptive phrases rather than unique and unanalyzable roots and add only detail to the equally comprehensible list provided to Carter.[38]

TABLE 12
STAGES OF MAIZE GROWTH

1. *kok? klauš* (<Sp.: little nails) / *na-xucluk* (it is sprouting)
2. *ka?auwik* (time of replanting, lit. 2nd planting, at 15 days)
3. *š-čamo li kok? wax* (the little maize has become tall) / *š-moč li ka?au* (the second planting has joined [the first], 30 days)
4. *cakal r-aq?inkil li qa-wax* (our maize is ready for its weeding, 40 days)
5. *cakal š-ka?aq?ink li qa-wax* (ready for second weeding, at 90 days)
6. *cakal naqk s-nume? š-ka?aq?ink* (past second weeding, at 90+ days)
7. *š-naqk c?utux* (appearance of tassels) / *š-naqk oč* (appearance of ear initials)
8. *š-naqk q?ansax rubel li qa-hal* (appearance of yellowing of lower leaves below our silked ears of maize; often due to weeding at time of flowering or later; the whole plant deteriorates and yield is reduced)
9. *yo či bolok li qa-hal* (our maize ears are in the process of filling out)
10. *anaqwan š-tubla čixunil li qa-hal* (now all our maize ears have piled up)
11. *š-ok či q?eqok li r-ismal li qa-hal* (the hair [silks] of our ears of maize have begun to blacken)
12. *či se:b na-ok či q?anok li qa-hal* (soon our ears will begin ripening)
13. *š-čaqik li qa-hal* ([time of the] drying of our ears of maize)
14. *okqe či q?olok* (we begin harvesting [today or within the week])

[38] Carter, 1969: 18.

<u>Harvest</u>

Given the calendars of weather and agriculture, harvest time for highland Q?eqči?s is likely to be wet, cold, and not at all suited for ripening and drying of maize on the stalk. Nevertheless, Q?eqči? maize sets records for length and weight of ear, if not for grain weight, and harvesting is a delight thanks to the appearance of huge ears, and “bearpaws”, and brightly colored ears out of the drab husks.

No use is made of the pre-harvest folding of stalks reported from Yucatan and other parts of Mexico outside the Maya area,[39] even though this procedure ought to be ideal for Alta Verapaz conditions. To a Q?eqči?, however, a stalk bent over is a stalk harvested. Only stalks from which ears have been stolen are left standing as thorns to the consciences of thieves, though robbed stalks may also be cut, stacked with two thorny sorts of weeds (*wara k?iš* and *tokan*), and sprinkled with ash as a more emphatic expression of resentment tinged with witchcraft termed *k?išinkil li r-uq?*, the thorning of his hand.

The traditional method of harvesting is to designate some outstanding plant as a marker (*r-etalil tu:b*) and let each worker toss ears to the pile (*tu:b*) from wherever he chooses to pick. When the pickers and the pile are too far apart (ten meters or so) another marker is chosen. If the weather happens to be good and dry, spots in a milpa where tall plants indicate large ears will be harvested

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[39] Redfield and Villa R. 1934: 45; see also Carter, 1969: 106-107.

selectively so that a maximum of potential seed ears can be taken in prime condition. While a few men continue to pick others will gather up 45-kilo netloads of maize from the piles and use their tumplines to carry these to the house where they are to be stored. As often as not this cargo will have to be toted four or five kilometers so that effective picking is limited to the morning and most of the afternoon is spent in packing.

Picking technique involves gripping the shank end of the husks with one hand and using the other to bend and break the shank within the husks, about two thirds of the way up its length. This saves on husking, as the outermost leaves are left behind. The tips of the husk leaves are then split back with a husking pick of bone or wood and the ear checked for condition (see Table 13). Full, unripe ears will be partly shucked and tossed to the pile for immediate use in foods that can only be made with green corn. Full, ripe ears will be husked down to four or five leaves which are pulled back over the shank in preparation for tying prime ears into bunches for storage. Poorly filled or rotted ears will be completely shucked whether ripe or not for use in various sorts of immediate consumption. Rotted grain from these ears goes to the household fowl, ripe grain into the next days' meals, and unripe grain into the above-mentioned dishes or toasted on the ear as *k?uš* (see p.136, below).

A day of picking is usually called to a halt in mid-afternoon not only to carry the proceeds home but to leave plenty of time and daylight for the final job of tying the sound ears in sets of five, and seed ears in sets of six. Considerable discrimination is applied during the tying process and it is based on standards so universal and habitual that no instructions are needed, even by hired workers. Ears in a set are matched as closely as is convenient for size, varietal purity, color purity, degree of filling, and degree of rotting. Ears are laid three and two, or three and three, on either side of one’s knee and the opposite husks reduced to a bulk small enough to be tied in a square knot. The loose tips are tucked back into the knot before tightening it as a point of esthetics.

TABLE 13

GRADES OF QUALITY OF MAIZE EARS

1. TULUŠ: poorest-filled ears, often unripe but not necessarily small
2. MURUK: second-poorest grade, both small and poorly filled
3. KOK?BIL / Š-K?OT HAL (shitty ears): fairly large but not filled out
4. Q?ULUM: good ears, but not quite full or sound or large enough to merit leaving husks on and tying in sets or *le:k?*
5. NI:MQI HAL (big ear; *hal* applies after silking; *oč*, before): top quality, though not all would qualify for seed (*iyax*), and tied in *le:k?* for storage over rails along the walls of the house

Harvest work appears to be more widely shared among friends, neighbors, compadres and family than is weeding, partly because it is more enjoyable work (except in the worst weather) and partly because more generosity is possible when maize is plentiful. Even hired labor is better paid at this time. For example, my informant hired three men for his 1968 harvest, giving them 50¢ for each day plus two meals, snacks of *k?uš*, *box* to drink, and several knotted sets of ears to take home. Every worker not in the immediate family is given several sets of five ears from the harvest, though in no case in my experience was hired labor paid off in maize.[40] Since it was not purchased this maize would be acceptable for seed should it happen to be superior to other seed ears on hand, or of a different variety, and in this way every Q?eqči? has occasional access to seed of every sort. But these gift ears are not prime sets of six; the more usual procedure for replacing or upgrading one’s seed is to request it from a well-to-do acquaintance or *compadre*, paying with maize out of one’s own store or from the subsequent harvest. For instance, my principal informant needed additional seed to plant land purchased in 1969: his request for twenty pounds was readily granted by a prosperous man living in the same *aldea* (Caxaneb) with no conditions except that it be compensated with an equal quantity of grain – even maize purchased in the market, but not money. My informant was only a casual acquaintance of the man in question, with whom I happened to have harvested the year before and in whose harvest I found the largest, most beautiful ear of all.

The last operation of harvest is to stow the piles of loose ears and knotted sets on a rack of saplings over the rafters of the house (*kaq?l*: Sp. *tapanco*), then maintain a low fire until all the ears are thoroughly dried and smoke-coated. The test for dryness is a clicking rather than a squeaking sound as an ear is twisted, or a click rather than a thud when two ears are tapped together. Ears which fail to dry completely through the cob are termed *ačto:n*. In

[40] Cf. Carter, 1969: 107.

these the grains remain under tension and readily pop out of the cob, as well as tending to rot at the base.

During storage the notched log stairs (*e:b*) to the loft must be rotated to leave the steps below (*hupub li e:b*) so that the "spirit" of the maize (*š-muhel li išim*) will not escape. So that the stored maize will last a long time, either in terms of losses to pests or as a mystical delay in consumption, eight toasted *tuluš* ears are tossed, in pairs, into each corner of the storage loft before the first harvest load is placed there. This little nicety was performed by my informant's mother and would have escaped notice had I not stayed around the house to measure maize ears rather than work all day with the men at harvesting.

No equivalent of the harvest ritual reported by Carter[41] was observed, but subsequent collection of texts by my informant confirms the continuity of these traditions throughout the Q?eqči? region. As for harvest being limited to a specific phase of the moon, trees are cut only in the last quarter but maize harvest is not explicitly limited by the moon. Our 1968 harvest was in the third quarter, but in 1969 we harvested from the 8th of November onward or in the fourth quarter – mainly on account of a timely spell of dry weather. Neighboring fields went unharvested while their owners spent the dry days crushing sugarcane to make supplies of *box*. Early harvest of green maize did not appear to have the moon regulation noted by Carter; the ears taken early were mainly those

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[41] Carter, 1969: 101-104.

already damaged by animals, and the only curious procedure was the deliberate slashing of the stalks from which they were taken.[42] This was said to be an indication that the ears had been picked by the legitimate owner and not stolen, though it would seem that thieves might easily mock such a custom by slashing the stalks themselves.

Pests and Diseases of Maize

Table 14 lists the animals which prey on maize at each stage in its growth and in storage. Defence against these is also listed, but the success of defenses is a function of the vigor of attack rather than exertion of the defender. A few people prefer to store at least some varieties of maize with the husks on, but this choice is said to increase the danger of weevil infestation; on the other hand, huskless maize is plagued by moths despite the varnish of smoke residues on every kernel. Nothing like the construction of in-the-field granaries reported by Carter and others is practiced around Chamelco, nor is the use of lime as a repellent.[43] If the year is particularly abounding in field mice some of the best ears, including seed, may be massed around a rope hung from the rafters but without much hope of stopping desperate rodents from finding ways to get at the hoard.

The most common disease of maize plants and ears is smut, and even it is not particularly common. The Q?eqči? name is *kape*, obviously from Spanish *café* although the proper Spanish term is

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[42] Carter, 1969: 101.

[43] Carter, 1969: 109; Wisdom, 1940: 108.

TABLE 14

ANIMAL PESTS OF MAIZE, AND DEFENSES AGAINST THEM

Insects: no general field defense

K?OSK?ONON (moth, Spanish *palomilla*): main pest of stored ears and shelled grain; no method of control except smoking before storage

MOK?OK? / Š-MASIL IŠIM (corn's weevil, Sp. *gorgojo*): attacks dry maize in the husk, whether in the field or in storage; control by timely harvest and huskless storage; also attacks beans in storage

Š-MOC?OIL K?AL (milpa's worm, Sp. *gusano cogollero*): bores down through new leaves at stage 3, Table 12, and eventually kills apical meristem; controlled by digging out or crushing the worm if it has not gone too deep, and occasionally by spraying aldrine in suspension

TEKEN (leaf-cutter ant, Sp. *zompopo*): attacks leaves of maize, not by preference but only when it grows near a large colony

Birds: general defence is SAN K?A:M, a string decked with bits of cloth

Č?IWAN (melodious blackbird, probably): pulls up sprouts and pecks at ripe ears

Č?EXEX (bushy-crested jay, Sp. *xaara*): pecks out ear initials and strips husks from ripe ears

AX TO:NQ (ocellated quail, Sp. *codorníz*): digs up new sprouts and seed

C?OQ (great-tailed grackle, Sp. *sanate*): guilty of all the above

YUYUM (oriole, Sp. *chorcha*): pecks at ripe ears

...Continued

TABLE 14 (Continued)

Mammals: no general field defense

AX OU (raccoon, Sp. *mapache*): present around Chamelco but considered a minor pest of maize, though able to do damage at all stages of the crop year; no specific defence and very little general hunting

KUK (squirrel, Sp. *ardilla*): which of the three local varieties does the most damage is not clear, but squirrels are major destroyers of young maize at stages 6 and 7, Table 12, chewing through stalks apparently to get at the sweetish pith; sporadically hunted but ‘controlled’ mainly by circling milpa with a censer of *kopal pom* when it becomes evident that squirrel damage will be serious in a given year and place

Č?O (rat, mouse; Sp. *ratón*): within this general class are Q?AN C?UY Č?O (yellow squeak mouse) which gnaws at lodged maize and climbs standing plants to get at ears opened by birds, and KOK? Č?O (little mouse) and AX UC Č?O (opossum mouse) which are non-resident and resident pests of households with stored maize, respectively; only the very last is possible to control, being skewered with a wire-tipped pole when it is heard rustling through the roof thatch where it resides

Note 1: for zoological identifications see appropriate vocabulary in the appendices

Note 2: compare insects with Carter, 1969, Table 15 (p.98), and mammals and birds with his discussion on pp. 91-92; note that there is no customary watch on ripening milpa around Chamelco either by day or night, perhaps because the weather at that time is usually foul; see also Wisdom, 1940: 108-109.

*carbón*.[44] No other disease of the plant appears frequently, though there is a rare and not easily identified abnormality termed *c?ul oč* which is symptomized by narrow, abortive-grained ears at almost every node on the plant. Those ears with very loose or short husks, or with husks partly opened by animals, will often be found partly

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[44] Ullstrup, 1967: 50; the pathogen is *Ustilago maydis* (D.C.) Cda.

filled with water at harvest and more often yet will be slimy and foul-smelling from one or another form of rot. All of these are subsumed under the phrase *š-q?e:lo li hal*, the ear has rotted. Surprisingly, rotted grain is not discarded and appears not to be distasteful since it is readily eaten by chickens and may even be sold in the market at 1¢ per pound for use in cooking of *šep*, *cu?ux*, and other dishes. Since stored grain usually goes through the above-mentioned smoking and drying process it rarely develops fungal infections unless this process has been sloppily done; however, alien varieties which I attempted to grow were very susceptible to the local fungi regardless of drying or treatment with a mercury-based fungicide.

While insect-damaged and fungus-killed kernels remain edible, they will not germinate. In an ordinary year, according to several informants, roughly half the grain set aside for seed will be lost to insects, mice and molds by planting time. Bulk losses to stored maize are more variable and not so easily ascertained, but from the number of cases in which total loss of seed of one variety was mentioned it can be assumed that losses to consumable maize might reach or exceed half the harvested amount.[45] In terms of excess land that must be cleared and labor that must be expended to cover storage losses, these losses are a key factor in the ecology and economics of Q?eqči? maize cultivation. In the 1969 crop planted by myself and informants, the proportion of rejected grain (by weight) in seed

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[45] Cf. Carter, 1969: 105.

ears of black, yellow and red varieties was 56%, 25% and 54%, respectively.

Seed Selection

Seed selection has two phases: first, as ears are picked and then tied together for storage, and again when they are shelled at planting time. The first phase is based on appearance and weight of the ear, and may indirectly relate to vigor in the plant (see p. 100, above); the second is a grain-by-grain scrutiny of every ear that shows signs of insect damage or concealed rot at the bases of the kernels over parts or all of an ear. At butt and tip are the most likely places for water to enter and to collect if it enters, and these are the likely places to check an ear for the dark plumules or burst pericarp that indicates rot-killed kernels. Pericarp (*sol*) burst on top of the kernel is not considered serious; in fact, it is often encountered on sound ears at harvest time (at which point it is mystically credited to the women of a household having nipped at the grain being soaked in lime water for the meals of planting day, this being a customary way to check that the pericarp has come free). However, if there is discoloration in split pericarp around the germ then *š-q?e:l r-al li išim*, the child of the maize has rotted. If the germ is simply dry or dark-colored, *q?an li r-al, ink?a? ta-moqk*, its child is yellow, it will not sprout.[46] Bug-ridden ears are very time-consuming to shell and some kernels with

[46] Carter, 1969, gives a much-simplified picture of seed selection on p. 76.

immature larvae always slip by and must be picked out right in the midst of planting, a very annoying chore when one is trying to work rapidly.

Small but sound ears of minor varieties like *son* or *kaq li:č?* will be used for seed if no others are available. Size is no matter in this case since some large ears always appear in the subsequent harvest and the pursuit of larger ears can be carried on from there.

At present all sound grain from a seed ear is shelled; if butt or tip kernels are left behind it is because they are dead. Still there is consistent acknowledgment of a tradition of leaving butt and tip kernels as part of the routine of shelling, and departure from this is excused on the grounds that nowadays land and maize are no longer so abundant as to allow such elegance. Whether through greater conservatism or greater wealth in land and therefore milpa, or through both, this custom is still followed in *Aldea* Chamil and presumably elsewhere at a similar distance (12 km.) from San Juan Chamelco.

The actual shelling of seed ears takes place only a day or so before planting. A crew of as many men as can be mustered easily, or ideally a man and his grown sons, gather on benches with large reed mats before them and piles of seed ears behind or at the side. Shelling is begun with the same bone or wooden awl used in harvest husking (and for many other jobs) and carried forward row by row with the thumb or, when that digit becomes sore, with a fragment of cob. *Box* is usually fresh, sweet and in abundant supply at this time, and the inquiring foreigner who volunteers to help with shelling has his work cut out to stay sober enough to walk home, especially when he has to impose equal temperance on his informant in the teeth of their host's insistent generosity. The only ritual custom followed during shelling is for men to loosen their belts as they work. This is done so that in the subsequent harvest there will not be an abundance of tough-rachised, hard-to-shell ears (*ax piš hal*; cf. *piš*, knot or tomato; and *ax piš*, tightwad).

The effect of perennial selection in favor of length of ear and soundness of grain, abetted by automatic rejection of all genotypes which fall short for whatever reason, is obviously a preservation of a recognizable and genetically purified race of maize. That this sort of mass selection did in fact create a race like Olotón out of some pre-existing race is a more doubtful proposition. Selection of the largest, longest ears for seed is equally prevalent where the upper limits are far lower than those reached by Olotón,[47] so that the real effect of selection is to keep phenotypes as close as possible to the upper limit set by genotype. All that can be asserted with certainty is that realization of any increased genetic potential for ear length, whether through mutation or hybridization, will be rapid. This, in a way, nullifies the argument that Indian cultivators were not plant breeders “in the sense of visualizing a new type of maize and selecting toward it”.[48] Indians – perhaps peasants and tribal cultivators in general – seem to have standards of ex-

[47] Johannessen, Wilson and Davenport, 1970: 405.

[48] Wellhausen, *et al.*, 1957: 29.

cellence which are open-ended, extending beyond what is achieved at any one time, and they are certainly aware of, and on the lookout for, oddities like branching, fasciation, and spectacular coloration. Few ‘modern’ techniques apart from direct genetic manipulation are more sophisticated than these.

## Labor Inputs and Grain Yields

With seed once more ready for planting and the land cleared, another yearly round begins. The conjunction of shelling and planting, both of which may involve exchange of labor among a man and his kin or neighbors and both of which must be done in as few days as possible, leads to instances in which certain individuals may be working (and drinking) for sixty hours at a stretch. But when all the man-days needed to bring in an adequate amount of maize for a small family for a year are added up the total comes to less than two hundred, so that in actuality a part of each year is slack time. However, since many families do not have access to enough prime land to produce all the maize that they might one could speak of “free” slack time and “forced” slack time. In either case most members of a family who are above age ten to fourteen keep busy at one or another of the crafts described in Chapters IX through XII, and grown men may also go off to do migratory labor (for statistics on activities and demography in one sample population and *aldea* area, see Chapter XIII). While net income from migratory labor is unlikely to exceed zero, if one ignores the hazard that a man will return ill and unable to work his milpa then there is a net gain from outside work simply in terms of conserving the household supply of maize. For reference, the annual calendar of fixed and alternative activities is given in Figure 2.

Collecting numerical data on maize yields and other topics directly from people who do not keep written records, and who evaluate what they do reckon in terms of survival rather than rates of production per unit of area or labor, is close to impossible. In fact, it is only within the last decade or so that a stranger could approach rural Q?eqči? households without their inhabitants fleeing into the woods.[49] But by participation in the production of a crop and by keeping records to suit academic purposes a more solid anchor can be set in reality and verbal information can be interpreted with an approximation of accuracy.

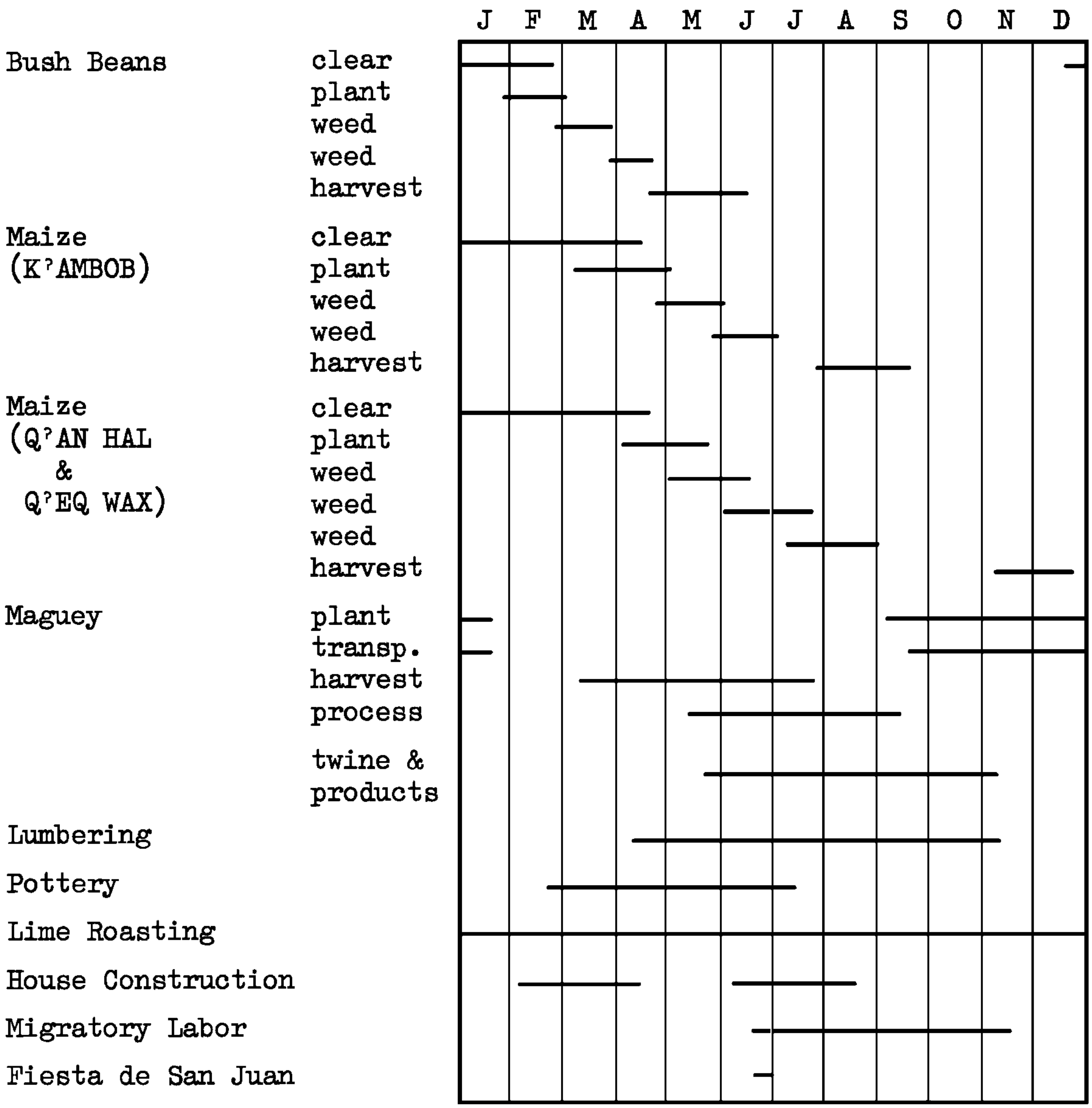
Cultivation Sites

Through plan plus lucky accidents three plots in widely separate areas were open for cultivation in 1969 by myself and informants: in Koxila, Čaxaneb, and Saša?an (on topographic maps, Cojila, Chajaneb, and Saxa'an). My principal informant's wife inherited some 80 cuerdas (4.2 ha) in Koxila from her adoptive grandparents; she and her husband lived there before moving into San Juan Chamelco and continued planting there every year. My informant purchased 30 cuerdas (1.4 ha) adjacent to the *ermita* in *Aldea* Chajaneb with savings and a salary advance. He also was bequeathed the use for one year of

[49] Cf. Edgar Anderson's experience in the southern highlands, 1947: 441.

FIGURE 2

ANNUAL CALENDAR OF FIXED AND ALTERNATIVE ACTIVITIES



about 5 cuerdas (0.27 ha.) in Saša?an by a man to whom he gave medical care. Since Koxila was chosen as the sample area for intensive study, cultivation there in the company of my informant and his family and friends helped demonstrate this crazy gringo’s harmlessness as well as helping calibrate economic data, so that compilation of a census late in the year was made easier and more likely to be valid.

Map 5 Shows the general location of these three sites and Figure 3 shows the interlocking calendar of activities in them during 1968 and 1969, including activities other than cultivation of milpa. Although no numbers can be offered as evidence, I believe that the fragmentation of our “holdings” is representative of the situation of a majority of present-day Q?eqči? households. Now that land is not to be had for the clearing of it, at least not in this part of the highlands, the rule of equal inheritance among siblings combines with the union of husband’s and wife’s inheritances and purchases to produce increasing dispersion of smaller and smaller plots. Since the main investment sink is land and the main route to wealth the attachment of land given as collateral for usurious loans, whether by Q?eqči? or Ladino lenders, the greater one's wealth the greater the fragmentation of his property, too. The principal result is an increase in travel time at the expense of working time, in our case 1:15 hours each way to and from Čaxaneb, 1:00 hours to and from Koxila, and 0:30 to and from Saša’an, plus equal amounts of travel time by one or another of the female members of my informant’s

# Map 5

## GENERAL LOCATION OF MAIZE CULTIVATION

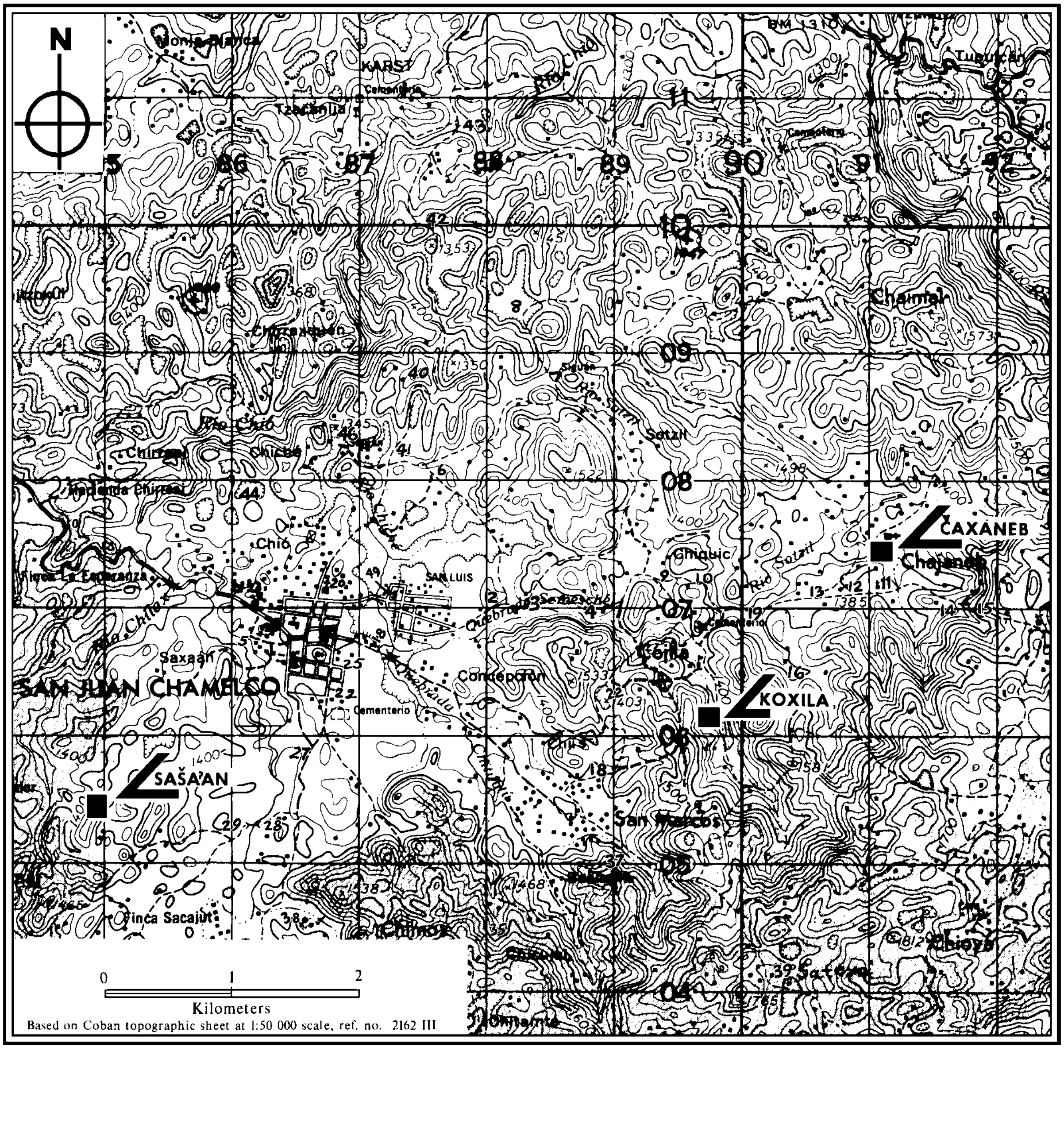
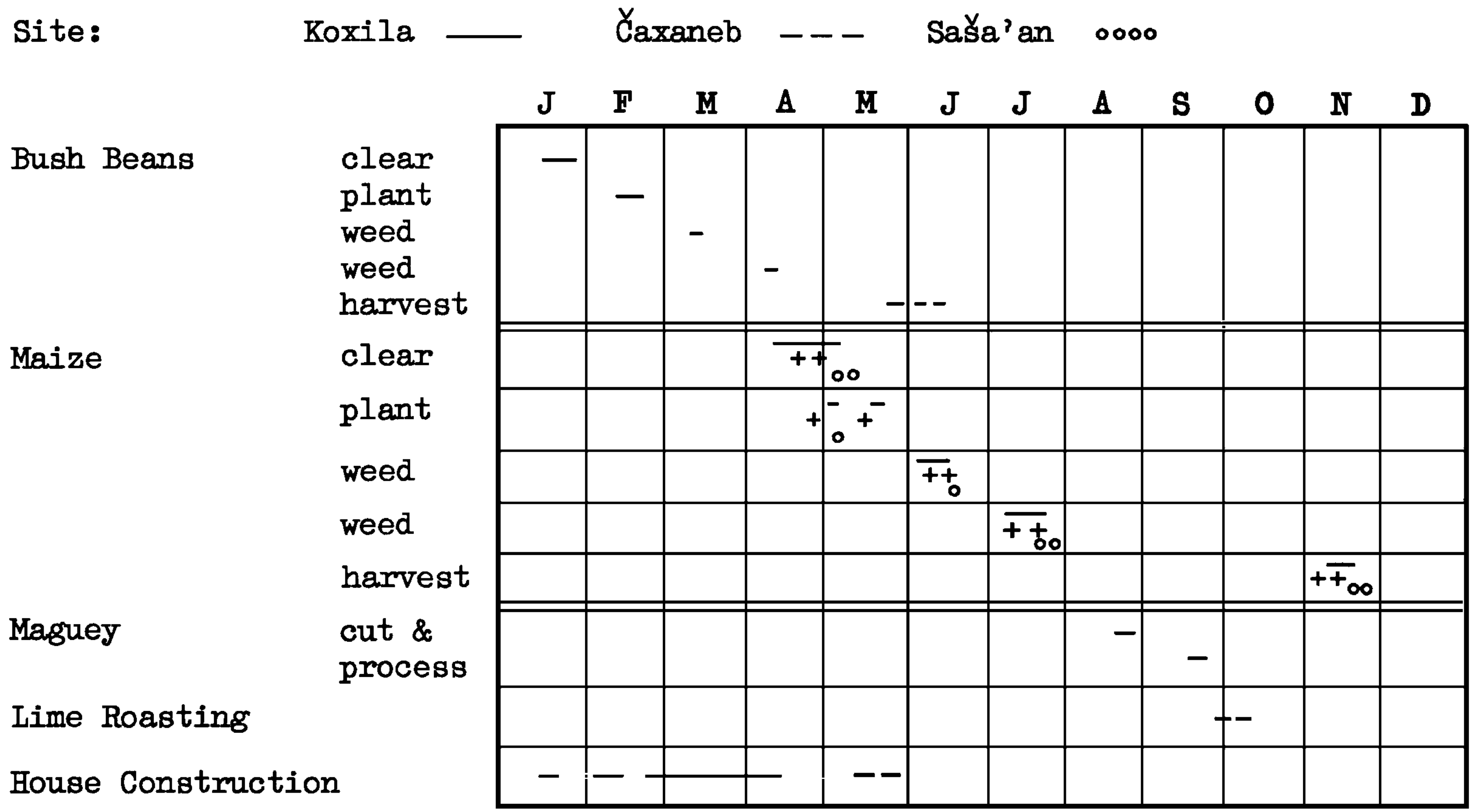


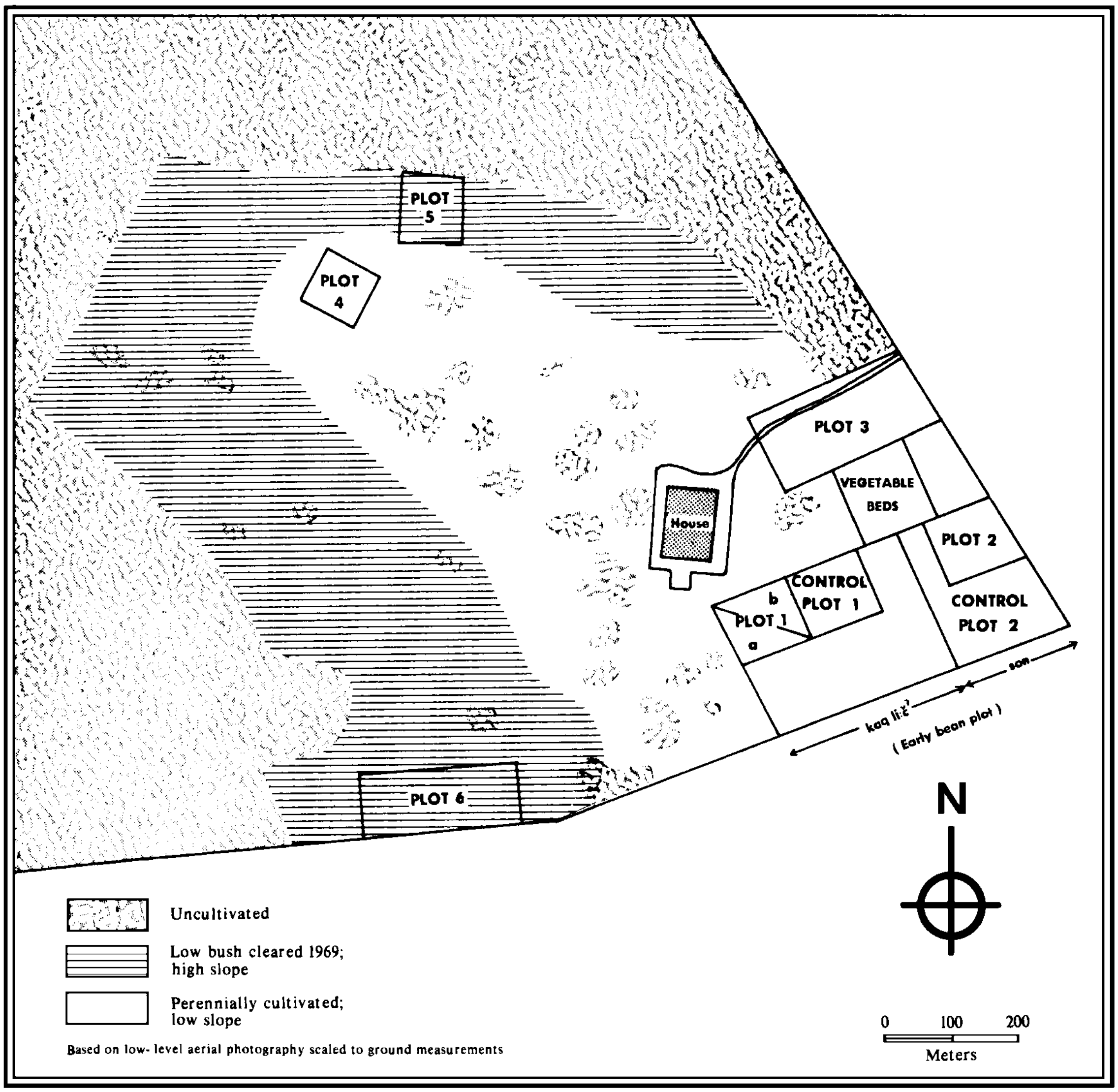
FIGURE 3

CALENDAR OF ACTIVITIES IN THE THREE CULTIVATION SITES

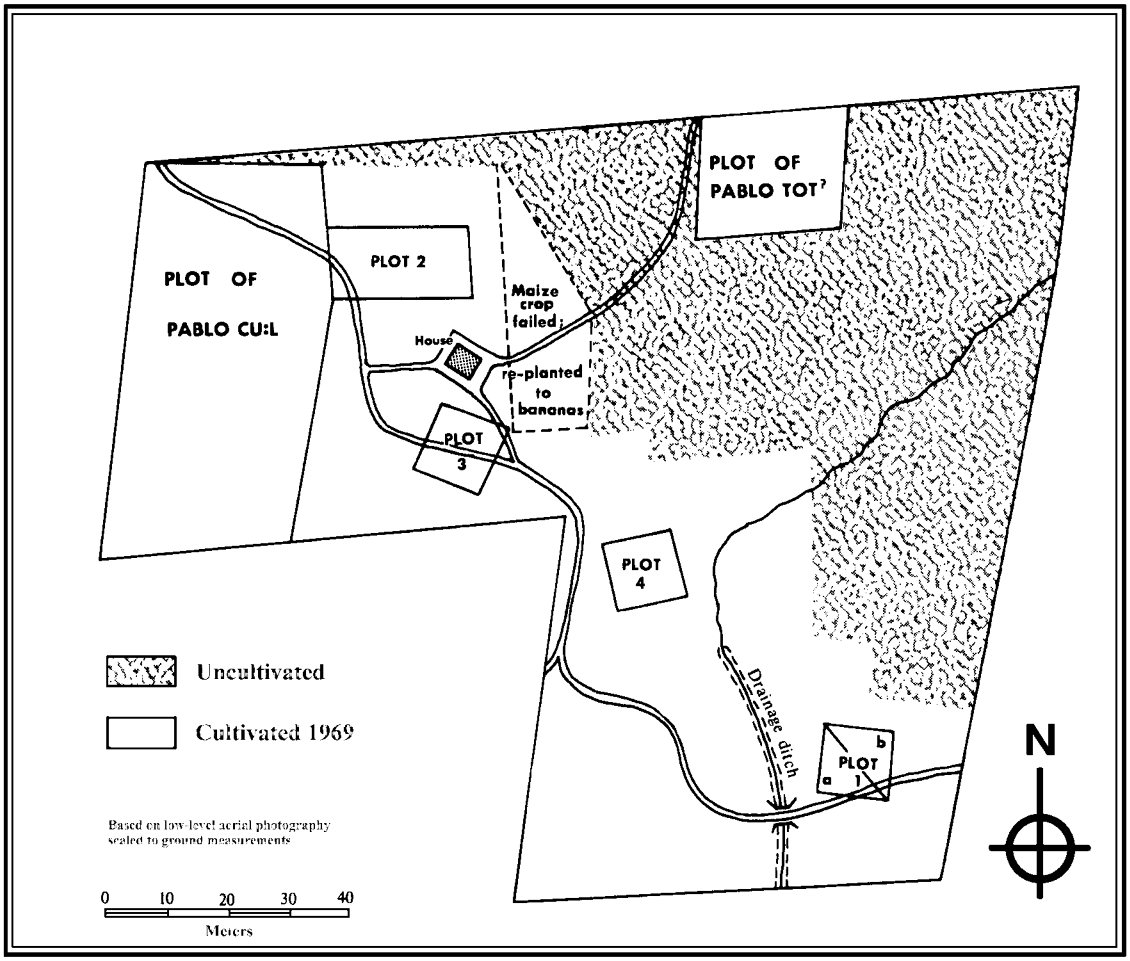


**Map 6**

**KOXILA FIELD SITE**

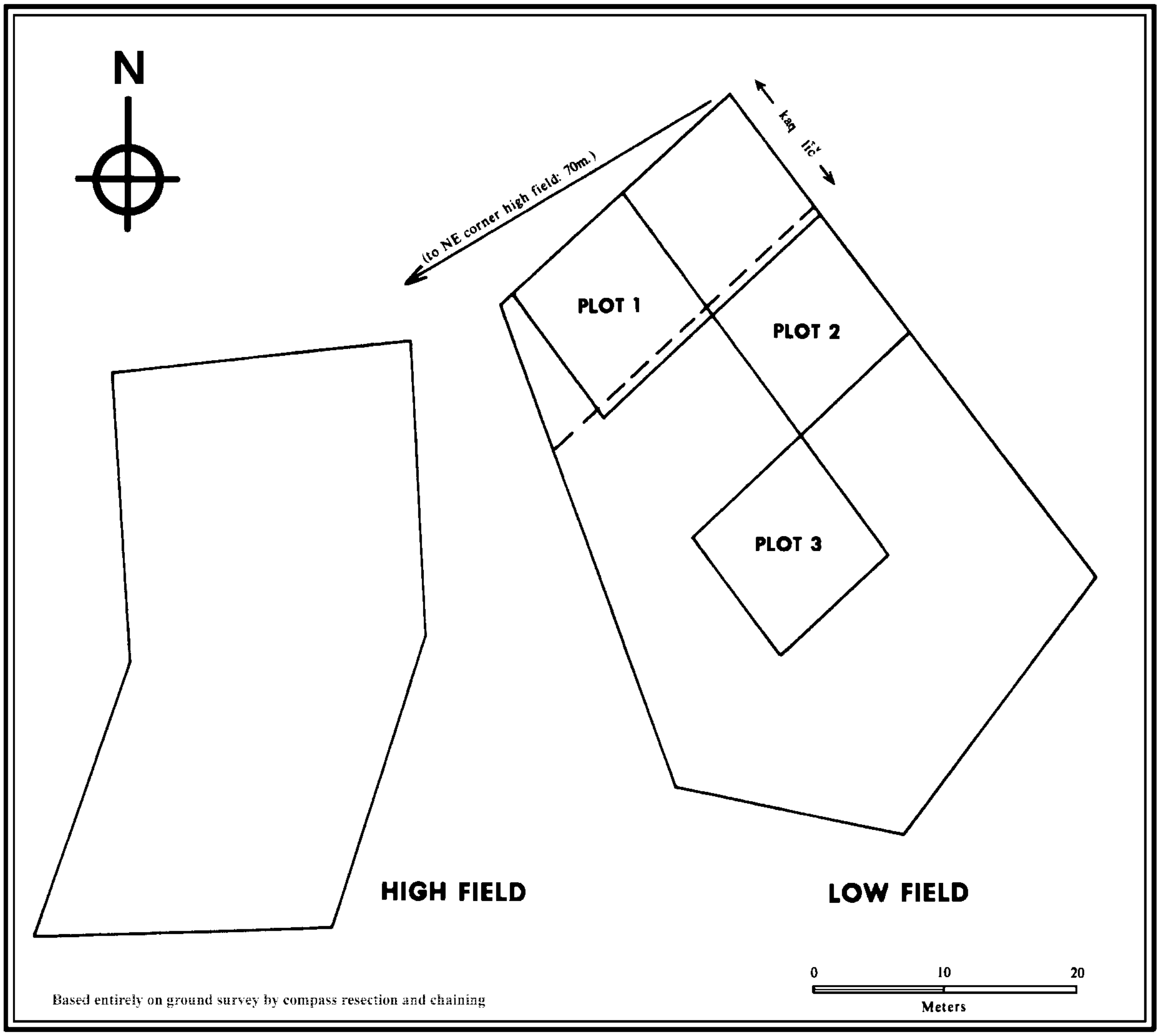


**Map 7**
**ČAXANEB FIELD SITE**



## Map 8

## SAŠAˀAN FIELD SITE



household on every day when the mid-day meal had to be carried out to a site.

Labor and Yield Data

The plot details for each site appear in Maps 6, 7 and 8. Each of these is followed by labor input and maize yield in dry grain weight in paired tables within Table 15. The following points require explanation beyond what can be deduced from the tables: (a) choice of plot locations, (b) calculation of man-days, (c) application of chemical fertilizer to selected plots, (d) separation of ears into classes by per cent filling of grain, and (e) calculation of dry grain yield from samples of standard number but variable size.

Fivefold replication or better would be necessary for statistical inferences on data from each type of plot and differences in means among types of plots, but the combination of topographic-edaphic intricacy with unsystematic land use frustrated any attempt at full replication. Each test plot was, in the end, almost *sui generis*. Plots were made ¼ *cuerda* in area since that was a convenient compromise in ease of measurement, speedy processing, and uniformity of most conditions of maize growth; two plots were halved diagonally into “a” and “b” to try out two applications of fertilizer versus one, and three plots were doubled to ½ *cuerda* to check for drastic variation of yields with size of plot. In every case plot location was constrained by the need to avoid extraneous fruit trees, maguey plants, rock outcrops, etc., while still conserving uniform conditions of slope and soil and previous land use as well as uniformity

TABLE 15

COMPARISON OF INPUTS AND OUTPUTS IN MAIZE CULTIVATION

| Inputs | (Koxila) | (Čaxaneb) | (Saša?an) |
|---|---|---|---|
| area (ha) | 0.784 | 0.649 | 0.249 |
| (cu. at 26 v.) | 14.5 | 12.0 | 4.6 |
| (cu. at 25 v.) | 17.8 | 14.7 | 5.7 |
| operation (man-days) | | | |
| clear | 18 | 13 | 7 |
| burn | 2 | 0 | 0 |
| shell seed | 3 | 1 | (surplus) |
| plant | 7 | 5 | 1.5 |
| weed (1) | 21 | 11 | 5 |
| (2) | 15.5 | 12 | 5 |
| harvest, etc. | 10.5 | 7 | 8 |
| total | 80.0 | 50.5 | 26.5 |
| seed maize | | | |
| damp wt. (Kg) | 13.9 | 8.8 | 5.1 |
| dry weight (Kg) | 12.7 | 7.4 | 4.5 |

| Outputs | (Koxila) | (Čaxaneb) | (Saša?an) |
|---|---|---|---|
| total yield (Kg) | | | |
| damp wt. | 394.1 | 225.5 | 194.8 |
| dry weight | 331.0 | 189.4 | 163.6 |
| net yield (Kg)* | | | |
| damp wt. | 366.3 | 207.9 | 184.6 |
| dry weight | 305.6 | 174.6 | 155.0 |
| yield summary (net) | | | |
| mean per ha | 389.8 | 269.0 | 622.5 |
| mean per man-day | 3.82 | 3.46 | 5.85 |

*Net yield equals total yield less twice the weight of seed to allow for losses in storage to the following planting of maize variety in the current crop.

Labor was calculated in man-days rather than man-hours since work is organized around days or half-days and since lost time for distractions, diversions and short errands is an integral part of every working day. Children’s help was reckoned at half of adult effort; my own situation as a learner and a note-taker reduced my contribution to that of a child. The only job done by women was to bring lunch to the worksite on all but a few days, an essential task but one which has been omitted from the tables. Workers’ travel time is also left out so that site-to-site comparisons remain simple.

Comparison of inputs in Table 15 with Carter’s Table 16[50] shows how much different (and simpler) milpa-making is in highland conditions. To convert his man-hours per manzana to my man-days per hectare, multiply by 0.111.

Chemical fertilizer was applied to plots 1 through 4 in Caxaneb and plots 1 through 5 (excluding control plots) in Koxila according to the schedules, amounts and composition in Table 16. The purpose of this test was to see whether or not synthetic fertilizer would be a reasonable addition to the Q?eqči? technologic inventory and what sort of increase in yield, if any, might result from its use. Comparison of fertilized plot yields with unfertilized and with yield rates from the general harvest brings out some of the variability which faces a student of indigenous cultivators’ crops, shown in Table 17. For example, in Koxila, the highest yield per unit area and the highest rate of lodging appeared in unfertilized control

[50] Carter, 1969: 135.

TABLE 16

APPLICATION RATES OF FERTILIZER

| site | date (1969) | plot* | wt.(Kg) | composition |
|---|---|---|---|---|
| Koxila | June 13 | 1 | 0.454 | 20-20-0 |
| | June 14 | 1 b | 0.454 | 20-20-0 |
| | July 16 | 2 | 1.814 | 16-20-0 |
| | | 3 | 1.814 | 16-20-0 |
| | | 4 | 0.907 | 16-20-0 |
| | | 5 | 0.907 | 16-20-0 |
| Čaxaneb | June 4 | 1 | 0.907 | 20-20-0 |
| | July 14 | 1 b | 0.454 | 20-20-0 |
| | July 16 | 2 | 1.814 | 16-20-0 |
| | | 3 | 0.907 | 16-20-0 |
| | | 4 | 0.907 | 16-20-0 |
| Saša?an | no fertilizer applied | | | |

TABLE 17

YIELD COMPARISON OF FERTILIZED AND UNFERTILIZED PLOTS

| site | plot* | grain/m$^2$ (g) | gr./ear (g) | m$^2$/ ear | stalks/ ear | stalks/ m$^2$ | %lodged stalks |
|---|---|---|---|---|---|---|---|
| Koxila | G.H. | 39 | 59 | 1.53 | --- | --- | --- |
| | 1 | 109 | 95 | 0.90 | 1.51 | 1.68 | 28 |
| | (1 a) | (51) | (74) | (1.44) | (1.96) | (1.35) | (20) |
| | (1 b) | (69) | (104) | (0.66) | (1.30) | (1.97) | (35) |
| | C 1 | 107 | 94 | 0.89 | 1.32 | 1.48 | 36 |
| | 2 | 101 | 62 | 0.62 | 0.98 | 1.58 | 33 |
| | C 2 | 38 | 69 | 1.83 | 1.64 | 1.38 | --- |
| | 3 | 76 | 72 | 0.95 | 1.33 | 1.40 | 8 |
| | 4 | 119 | 104 | 0.88 | 1.21 | 1.39 | 11 |
| | 5 | 2 | 3 | 11.25 | --- | --- | --- |
| | 6 | 59 | 45 | 0.76 | 1.03 | 1.35 | 0 |
| Čaxaneb | G.H. | 26 | 63 | 2.40 | --- | --- | 0 |
| | 1 | 51 | 51 | 1.00 | 1.75 | 1.76 | |
| | (1 a) | (47) | (47) | (1.00) | (1.91) | (1.92) | |
| | (1 b) | (55) | (54) | (1.00) | (1.59) | (1.60) | |
| | 2 | 71 | 77 | 1.08 | 1.41 | 1.31 | |
| | 3 | 28 | 55 | 1.96 | 2.41 | 1.23 | |
| | 4 | 69 | 69 | 1.00 | 1.57 | 1.57 | |
| Saša?an | G.H.(hi) | 22 | 10 | 2.08 | --- | --- | 0 |
| | G.H.(lo) | 89 | 72 | 0.81 | --- | --- | |
| | 1 | 148 | 105 | 0.71 | 1.23 | 1.72 | |
| | 2 | 96 | 83 | 0.87 | 1.52 | 1.76 | |
| | 3 | 102 | 99 | 0.80 | 1.58 | 1.85 | |

*Note that C designates unfertilized control plots and G.H. designates general harvest outside of all plots; for plot sizes and locations refer to Maps 6, 7, and 8.

...Continued

TABLE 17 (Continued)

Yield Comparison Summary

| site mean for: | | grain/$m^2$ (g) | grain/ear (g) | stalks/ $m^2$ | stalks/ ear | $m^2$/ ear |
|---|---|---|---|---|---|---|
| Koxila | site ............ | 72 | 70 | --- | --- | 0.94 |
| | all plots ....... | 76 | 71 | 1.46 | 1.29 | 0.87 |
| | fert. plots* .... | 93 | 76 | 1.48 | 1.21 | 0.82 |
| | cant. plots (C1+C2) | 77 | 81 | 1.43 | 1.48 | 1.36 |
| | kaqlii:č?(1+C1) . | 108 | 95 | 1.58 | 1.41 | 0.90 |
| | q?an hal (3+4) .. | 98 | 97 | 1.40 | 1.27 | 0.91 |
| | son hal (2+C2) .. | 69 | 66 | 1.48 | 1.31 | 1.23 |
| | saqi hal (6) .... | 59 | 45 | 1.35 | 1.03 | 0.76 |
| Čaxaneb | site ............ | 50 | 60 | --- | --- | 1.61 |
| | fert. plots (all) | 55 | 63 | 1.56 | 1.78 | 1.26 |
| Saša?an | site ............ | 92- | 92+ | --- | --- | 1.05 |
| | all plots (unfert.) | 115 | 144 | 1.78 | 1.44 | 0.79 |
| | hi ½ ............ | 22 | 10 | --- | --- | 2.08 |
| | lo ½ ............ | 109 | 89 | --- | --- | 0.80 |
| | kaq li:č? (1) ... | 148 | 105 | 1.72 | 1.23 | 0.71 |
| | q?an hal (2+3) .. | 99 | 91 | 1.81 | 1.55 | 0.84 |

*See Table 16

plot number 1, though neither datum was far from the figures for adjacent and twice-fertilized plot 1(a). Only two explanations seem likely: either that general part of the milpa enjoyed superior conditions regardless of application of chemical fertilizer, or a major part of the nitrogen and phosphorous applied to plot 1(a) was washed down into control plot number 1. In general, the intrinsic quality of soils at each site was a more powerful factor than the heaviest application of fertilizer attempted: the mean yield per unit area of all fertilized plots in Čaxaneb was less than half the mean yield from the three unfertilized plots in the low field at Saša?an, which had superior soil conditions to begin with (see soil analyses in Chapter XX).

In Table 13, above, the Q?eqči? categorization of maize ears is given. This was not completely explained to me until harvesting and data collection were underway and I had already devised a similar (though not equivalent) system in order to better evaluate the quality of the total harvest of ears and to refine computation of dry grain yields. Where the Q?eqči? system aims to sort ears according to size and degree of filling simultaneously, I chose to sort strictly on percentage filling regardless of size. The percent limits of categories were chosen with ease of estimation in mind and for no other reason; my informants had little trouble conforming to it since there is a fair correspondence between class 4 (71-90% filled) and *q?ulum*, class 3 (41-70% filled) and *kok?bil*, class 2 (11-40% filled) and *muruk*, and class 1 (0-10% filled) and *tuluš*. The main difficulty came in sorting animal-damaged ears since these appeared in all classes yet originated in higher classes. Records were kept of the number of animal-damaged ears which fell in each class of filling, but no data were compiled which might allow a precise estimate of the total amount of grain lost in this way. The major loss inflicted by animals of all sorts came through damage to plants and ears even before silking took place, in any case, so that an estimate of mature grain lost to animals would in fact be incomplete and misleading.

Since calculation of dry grain yield was based on samples drawn from each class of loose ear plus a sample from class 5, the ears tied by their husks, the final figures for yield are extrapolations and not absolute measures. Also, since the time available for processing harvested ears was limited by the hazard of unintentional but irreversible jumbling of ears from different plots and sites in their common storage places, fixed numbers of ears were taken to be shelled for grain weight sampling rather than a fixed percent sample based on the total number in each class. As a result, sample percentage sizes range from 92% (class 2, plot 3, Saša?an) to 1.6% (class 1, general harvest, Čaxaneb), with a mean of 26%. Shelled sample ears, with their cobs, were kept in paper bags and their damp weight taken as soon as possible after harvest; however, some samples were not even taken until the stored ears were well along in the smoking and drying process so that comparison of weights before forced drying is not possible in all cases. On the other hand, comparison of weight losses following drying from various points in the harvest and storage procedure is possible. Mean weight loss for grain as harvested was 16%; properly smoked grain showed no significant further loss of moisture when subjected to drying over a forceddraft kerosine stove. The apparatus used for drying consisted of a large basket supported at slightly less than one meter above a kerosine-fueled cooking stove of the type in common use throughout Guatemala and Mexico, with circular wicks enclosed in annular ducts Presumably there is some moisture content in the hot exhaust from such a combustion arrangement, so the ‘dry’ weights given probably do not represent the degree of moisture exclusion which might have been achieved in an oven-type dryer. Weights were measured with a pan balance and set of brass weights of the sort used in all the markets of Guatemala. A stack of ten centavo coins came very close to equaling one ounce; with them, weights could be taken to within an error no greater than +1/10 oz. This means that when converted to metric measure the individual sample weights were accurate to ±3 g. at best and cumulative weights accurate to a multiple of 3 g. corresponding to the number of additions or to the factor of multiplication.

Plot-by-plot and class-by-class details of sample sizes, grain weights, and weight losses after drying appear in Appendix C. Weights and weight losses for cobs from the samples also appear there, and these are the basis for comparison with shelled/unshelled ratios mentioned in Carter’s study.[51] He uses a ratio of 55/100, cited from other sources, and this compares rather poorly with my figure of 72/100. The latter ratio was calculated by summing dry grain weight per ear and dry cob weight per ear in each five-class sample so that an approximate reconstruction of dry ear weight was

[51] Carter, 1969: 136.

made; this is a sum of means rather than a mean of sums, but still fairly close to reality. The sum of dry grain weight per ear was divided by this synthetic ear weight within each five-class sample from plots and general harvest in each site, and the mean of the resulting ratios taken. The range of shelling ratios was only from 64/100 to 79/100, nearly half of them falling between 70/100 and 74/100; had the poorly filled ear classes been excluded the range and mean would have been raised by roughly 3/100, but not much more.

Several explanations for the above discrepancy are plausible. Since cobs retain much more moisture than grain, ratios derived from damp ears would be considerably lower than 72/100; the same would be true for ears stored with some husks left, as is the practice in Chichipate.[52] Also, the shelling ratio will obviously vary with differing races of maize. But it is surprising that Olotón, with its cannon of a cob and buckshot kernels, should have a ratio better than that of Tuxpeño and Tepecintle even though these and other lowland races do have thick cobs along with their deep grains.

<u>Maize in the Maya Context</u>

The principal ecologic relationships between highland Q?eqči?s and their habitat are tied to maize: yearly production of crops of maize to feed an increasing population leads to increasing areas of dysclimax vegetation, alteration of wild faunal habitats, and presumably to increased (though not drastic) rates of topsoil movement and frequency of earthflows. Conversely, the level of living in each Q?eqči? household is very much a function of local weather and soil

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[52] Carter, 1969: 108.

conditions, and it is completely dependent on continued possession of a variety of maize which produces fair grain yields in cool, damp, cloudy conditions throughout the latter part of its growth.

The principal varieties of maize planted in the highlands of Alta Verapaz are derivatives of a basic type which well deserves the race name given it: Olotón. A few apparently elder varieties, such as *k?ambob*, *č?ol hal* and *kok? hal*, are closer to the supposed ancient race Nal-Tel so that some support exists for the idea that Olotón is an introduction (from South America ?) and of no immense antiquity in Guatemala.[53]

Agricultural methods used by these highland Indians are distinct from those used by the same language group in the lowland parts of their homeland, but not entirely different. Terminology and tools remain very similar despite some differences in their application and number which result from radical differences in the habitat. The most striking part of cultivation is the effort put toward simultaneity of planting, dictated more by practical problems with animal pests than by weather or ritual, though it must be admitted that no farmer’s son would find this at all remarkable.

Personal involvement in cultivation of several fields by local methods provided a familiarity with these methods and their implications which could not be equaled through interviews and other non-participatory kinds of study. The resulting quantification of inputs and outputs includes a range of uncertainty or “error”, but not nearly so great as when numerical information is elicited from

[53] Wellhausen, *et al.*, 1957: 21-22; 85.

informants whose precision is almost never calibrated against reality. On the other hand, this kind of intense involvement prevents wide-ranging observation so that a large measure of doubt remains when the time comes to generalize about distant parts of a chosen region. All the same, none of the previous studies of indigenous agriculture in the Americas with which I am familiar[54] include or refer to any equally detailed documentation of the content of an ordinary Indian maize harvest.

Comparison of Table 15, which presents labor invested in our three milpa sites, with tables such as Tax's No. 27 and Carter's No. 16[55] shows that there is no tremendous difference in labor inputs per unit area as recorded in many places by various authors, whether in highlands or in lowlands. But this does not imply that the returns to that labor are equally constant, and the lack of reliable grain weight figures based on comparable conditions (especially as regards moisture content) make comparisons of available figures useful only at gross orders of magnitude. This in turn means that comparison of production and consumption accounting is unreliable, especially when the figures used must be derived by multiplication from doubtful base estimates.

## Maize Consumption

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[54] Cook, 1921; Cowgill, 1962; Beals, 1946; Bunzel, 1952; Carter, 1969; Castetter & Bell, 1942; Cook, S.F., 1958; Dozier, 1958; Dumond, 1961; Hester, 1954; Higbee, 1948; Kelley & Palerm, 1952; LaFarge & Byers, 1931; Morley, 1946; Oakes, 1951; Pennington, 1963; Redfield & Villa R., 1934; Lundell, 1937; Reina, 1966 & 1967; Stadelman, 1940; Urrutia, 1967; Steggerda, 1941; Wilson, 1917; Wisdom, 1940; West, 1948.

[55] Tax, 1953: 274; Carter, 1969: 135; Kelley & Palerm, 1952: 121.

Unfortunately, concern with production details and with other topics precluded the keeping of detailed maize consumption records for a typical Q?eqči? household. Neither of my principal informants' households could be considered typical, since my wife and I were often fed at one while the other was disrupted by the wife's illness and death, a daughter's marriage, and then a disastrous second wife.

At one time I was given an estimate of 11.34 kg. (25 lbs.) maize consumption per three days by my principal informant's family, including roughly ten chickens and an immature (but growing!) pig. Extrapolation of this figure over a year would give 1,369 kg. (3,025 lbs.), which is within 573 lbs. of Carter's figure and closer yet to Erasmus' 1,300 kg.[56] Allowing the equivalent of 4.8 adults in this household (two parents, five children, and assorted livestock and guests) the correspondence with Carter's and others' figures is remarkably exact, considering all the likely sources of error. However, this standard of life was apparently supported on purchased grain since the total harvest from our milpa – more than half of which was not available to my informant prior to 1969 – was only 684 kg. or about half of total consumption. The only factor which would bring our pitiful harvest closer to what could be expected from so much land and labor is moisture content: my yield figures are based on force-dried grain, but my informant's wife's estimate of 25 lbs. is based on grain at ambient humidity and that is rather high. Applying the 16% mean weight loss on drying mentioned above on p. 128, annual consumption of dry grain would be only 1,150 kg. or 466 kg.

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[56] Erasmus, 1965: 295; Carter, 1969: 138.

above our harvest.

Not included in the harvest total were two *sitio* crops of *kok?hal*, and though the yield from these was not measured it was significant and would go a long way toward making my informant's household maize budget coincide with the norms of yield and consumption mentioned above and partly documented in the economic part of the census of my sample *aldea* (see Chapter XIII).

The impact of artificial fertilizer on yields was not visible, and at a retail cost around 8¢ per pound (Q3.00 for the 35 lbs. used; slightly less in 100-lb. bags) there would have to be a clear-cut doubling of grain yield since the local market value of maize is usually less than 4¢ per pound. Granted, application dates and methods might be improved over my uninformed choices. But these were intended to simulate the lack of sophistication of Q?eqči? cultivators and the lack of active assistance from the understaffed and under-motivated agricultural agency of the Guatemalan government. In addition, Q?eqči? maize has not been bred for optimum use of heavy fertilization: a large part of the impact of fertilizer is absorbed in vegetative growth, and this only increases susceptibility to lodging. Plot 1(b) in Koxila offers the best illustrative case. Plants on this half of the plot were definitely taller than in the once-fertilized half, and many more of them were toppled in the windstorm of 24 September-35 as opposed to 15, or 35% of stalks in the plot as opposed to 20%, and 10 lodged ears as opposed to 5. In the Čaxaneb plot with similar treatments there was no lodging; the only contrast was a 9% difference in grain yield with a double number of class 5 ears favoring the twice-fertilized half.[57]

Serendipitous Observations

Daily work and walking in fields of maize brought up a number of clues to problematic topics. Since these problems are mainly products of *a priori* reasoning about the domestication of maize it would be ironically appropriate if their solutions should grow out of the following simple *a posteriori* observations.

There is at least one patch of *Tripsacum* in the area of study; it flowered late in January. Many non-flowering clumps of “teosinte” (*tal*) can be seen in houselots, but these have been brought from lower elevations and usually are *Euchlaena* spp. Absolutely no maize plants were in flower in the neighborhood at this time, though now and again off-season plants from grain scattered at harvest time might be within pollination range and could constitute a route for gene flow. But experience confirmed my informants’ assertion that without exception the ear initials of those maize plants are pecked out by birds. Maize pollen may affect the gene complement *of Tripsacum*, but the reverse does not happen at present. Given the existing agricultural schedule the strong tripsacoid characteristics of local maize varieties cannot have come from hybridization in this part of Alta Verapaz.

A supposed proof of the completely man-dependent condition of maize is supposedly lethal competition among all the many plants germinating from a single ear.[58] One plant with a large, full ear

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[57] Refer to Tables 16 and 17.

[58] Weatherwax, 1954: 119-140.

toppled during a September gale and provided a fair exception to that ‘proof’. Most of the husks and most of the grains were stripped from the ear by birds and rodents, but the remaining kernels grew in a mulch of decomposing husks, hidden and kept damp by the cob. With further mortality as birds plucked the occasional plantlet – and they invariably do – the final clump of competing maize plants would have included no more than the usual three to five successful individuals expected from seven planted grains.

One possible argument against first use of maize as popcorn is the assertion that grains would pop off the cob and scatter if this were attempted. Q?eqči? maize is too flinty to pop when dry, but no delicacy is more avidly sought than toasted half-ripe ears (*kuš*), and grain on the riper of these ears will pop. Ears taken for this use, however, are not the fullest but the poorest – under 10% filled. With so much elbow room and a tough brand of rachis, popped kernels more often stick with the cob than fly around the room. If, in its earliest phases of human use, maize had less than complete fertilization of every ear as well as the other qualities shown by archaeological specimens,[59] then popping would have long continued to be the most dramatic, easy, fast, and tasty method of processing. Incidentally, unripe kernels which fail to pop still take on the flavor of popcorn, but moist and sweeter.

<u>Maize Preparation</u>

Tortillas (***wah***, food) are the main form in which maize is consumed by the Q?eqči?. Even when ground at a motorized mill the lime-

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[59] Mangelsdorf, MacNeish and Galinat, 1964: 539-540.

soaked, boiled grain gets a final grinding by hand between *mano* and *metate* (*ka?*) before being patted into discs slightly smaller and thicker than Mexican tortillas. They are cooked only by toasting on a ceramic griddle (*k?il*) and must be eaten immediately. Fresh tortillas are tender and have a subtle flavor; old, cold, or re-heated tortillas resemble cardboard.

Many other ways of preparing maize are used less frequently but just as widely as the tortilla. The regular trail ration of travelers, for instance, is the *cu?ux* (Sp. *tayuyo*): a small, thick cake shaped around a core of beans or bean paste. These taste good, keep well, and are easily re-heated beside a campfire. The simplest member of the *tamale* family is a *poč*, made of maize dough wrapped in a leaf and boiled. When beans boiled with salt, onion and chili are added to *poč* they become *šep*. When the dough is boiled with lard the resulting pudding makes *oben* when wrapped and boiled. Without elaboration these are *pukbil oben*, but when spiced with black pepper, cinnamon, sesame, squash-seed paste, and dry chili, and filled with pork bits dipped in a sauce of tomatoes, tree-tomatoes (*če? piš*), annato (*šayau*), bread crumbs and salt, then they are *šorbil oben*. Green-corn tamales or *poč is wa* are made with unripe maize ground to mush, flavored with sugar and cinnamon, and boiled in a tidy container made by cutting a green husk from the shank of a maize ear and folding over the tip end of the husk. The same dough patted into a thick tortilla and toasted beside the fire is a *pom q?em is wa* (“smoke-dough-wrapper-food”), or the dough may be made into a patty on a leaf and toasted on the griddle (leaf-side-up, at first) to give *raš ke?*.

The general term for maize-based drinks, *uq?un*, parallels the English derivation of noun from verb. Maize meal diluted with hot water (*raš uq?un*) is the common drink during field labor; the shock of a cold drink in a “hot” body is sensed to be harmful to health. Salted *uq?un* becomes *k?oyim*. The same drink made from unripe maize is termed *mac?*, or *muš ax* if the grind is very coarse and the maize still green enough to be sweet. Left to ferment, *uq?un* becomes *č?am-bul*. *Saq či:k* is made by straining *uq?un* through a special basket and boiling it until the starch thickens to white pudding. This drink alone is served at principal ceremonial occasions such as funerals and the morning of planting day, and the only allowable additions to it are powdered or whole petals of *muk* and a topping of beans boiled in very salty water.

Nutritional Value

The details of nutrition and diet were not pursued in this study, but the literature on nutrition in Middle America provides estimates of the main variables. Total Calorie intake per consumer unit (de-fined by the National Research Council as equivalent to a moderately active adult man) per day averaged 3,000 in the 1940s,[60] a level slightly exceeded by Ladinos and not quite reached by Indians. Maize provided 2,280 Cal. in the Indian intake, or 76% of the total.[61] Supposing that the calorie value of all maize varieties used to make tortillas is roughly similar, then at 63 Cal. per 30-gram tortil-

[60] Reh and Flores in Goubaud C., 1964: Table 2, p. 103.

[61] Ibid: Table 4, p. 105.

la,[62] each consumer unit would consume 36 tortillas (or their equivalent) per day, or a weight of 1.09 kg. of maize per meal. This weight is larger than the 0.79 kg. per consumer unit per day calculated from the three days' consumption estimate mentioned above, but the 26% increase may be explained by greater water content in tortillas than in market grain. Unfortunately, the citation for tortilla weight says nothing about moisture content.

In the absence of actual measurement of production and consumption of all the products of Q?eqči? activity in terms of Calories, crude but useful equivalences may be calculated and used to convert units like Quetzales and man-days into corresponding weights of maize. Since maize sells for about Q3.75 per 100 lbs. (45.4 kg.), each Quetzál is 'worth' 12.1 kg. in maize; one man-day of work paid at Q0.50 brings in the equivalent of 6 kg. of maize. In order to minimize the error due to uncertainty about moisture, one may use half the 26% (0.3 kg.) discrepancy mentioned above to adjust the ratio of Calories to grams from 63:30 to 63:26.5. Each kilo of maize at ambient humidity then translates to something like 2,375 Calories and each Quetzál to 28,500 Calories in terms of grain prepared as food.

If the Q?eqči? have any nutritional problems they probably follow from shortage of protein and vitamins rather than from lack of calories. While the level of protein consumption is nearly the same for rural Ladinos and Indians (some 77 grams per consumer unit per day versus 70 grams), for Indians two thirds of the protein came from

[62] Church and Church, 1970: 12.

maize and most of the rest from beans, squash seeds, and other plant sources; animal proteins made up only a small part of Ladino intake but the Indian proportion was half of that![63]

Early Bush Beans

Beans and squash seeds provide the steady sources of protein in Q?eqči? diets since meat is reserved for festive occasions and, numerous as these may be, few individuals are in a position to attend frequently. In any case beans have a firm place in eating habits; even when and where their cultivation is barely economic or even flatly impossible, beans are still eaten as a staple food.[64] When all the costs are reckoned it appears that bean cultivation around San Juan Chamelco is only marginally profitable, yet nearly everyone plants a few *k?a:m* every year.

Varieties

The distinction of pole from bush beans is not clear-cut in terms of growth habit, but there is no doubt that varieties which depend on support are less widely planted and consumed in Alta Verapaz, whether or not they yield well or poorly relative to the more popular types. The names of the climbing beans, with number of sub-variants in parentheses, are: *be ke:nq?*(2), *če? ke:nq*, *č?uš* (4), *kakau ke:nq?*, *q?anacak*, *lol*, *nun* (2), *sib ke:nq?*, and *š-šu:quy mama?*. At least four *Phaseolus* species are represented. Most of these varieties are sown simultaneously with maize if they are grown at all but ripen later than it does so that harvesting dry, brown pods among dry, brown leaves tends to be tedious and inefficient. A plant or

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[63] Reh and Flores in Goubaud C., 1964: 97.

[64] Carter, 1969: 69; see also McBryde, 1947: 381-386.

two may be grown near the house, especially perennial *lol* and *nun*, but almost never a whole garden of pole beans.

Bush varieties of bean, in contrast to pole beans, trail somewhat but do not require support.[65] They are planted annually by nearly every family on the flattest, richest plot available in the *aldeas* and in nearly every town *sitio*. The bush bean varieties include (number of variants in parentheses): *kok ke:nq?* (rare); *q?un iš ke:nq?* (2); *mama? ke:nq?*; *q?eqi ke:nq? / rabinalil ke:nq?* (3); *saqi ke:nq?*; and *tapakal* (4).

Cultivation

Clearing for bean planting begins with the New Year and planting ends with February. In contrast to clearing for milpa on similar sites, the trash on bean plots is carefully piled and burned so that it serves for planting *ik?oy* squash (see Chapter VII). Planting is with the dibble and in no way differs from the handling of maize, except that there is no elaborate pre-planting ritual; there certainly is *box*, however. The first appearance of cotyledons above ground is termed *mok?lok*, a form of ‘to sprout’ applicable only to beans.

Two weedings are given at three or four week intervals; harvest comes three to three-and-a-half months after planting, depending on weather and variety. Harvesting is the ultimate in simplicity since the minor roots rot away by the time the pods have dried: whole plants are lifted from the ground and piled for processing. That is where the real work starts, and as with most light but tedious effort it ordinarily falls to the womenfolk. Each plant has all abort-

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[65] In planting trials at higher latitudes, up to 52°N, the commonest varieties climbed furiously and produced up to quadruple weight yield.

ive pods, excess stems, remaining leaves, and green pods pulled off. The latter go into a basket for use as snap beans, which is also a common end for the entire harvest of one variety – *q?un iš ke:nq?*, “soft skin bean”. Handfuls of stripped bean plants are tied into bundles (*yox*) which go into the loft to be dried and smoked over the kitchen fire. If the bean field is several kilometers from its owner’s home, he may drive four poles into the ground and tie them together so as to make a ‘box’ that is then filled with bean bundles stacked sideways, bases interlocking, and carried away upright using a tumpline.

On a convenient and preferably sunny day a few weeks later the bundles are brought down from the loft, put in a gunnysack, and beaten with a stick to thresh beans from pods.

Economic Returns and Their Limitations

From the accounting summary in Table 18, which is based on a trial plot of two *k?a:m* of *rabinalil ke:nq?* in Koxila, it is clear that the investment in seed and labor alone very nearly equals the market value of the harvest. Lower, warmer and drier localities appear to offer superior conditions for production of the principal varieties of bush beans. As indirect evidence of this, there is a steady import of both black and white *P. vulgaris* varieties to the Coban, Carchá and Chamelco markets from the Salamá-Rabinál Valley area, and import of *P. coccineus* (*lol*, Sp. *piloy*) from mid-elevation settlements northeast of the above-mentioned tri-city area.

The Q?eqči? are well aware of the problems which preclude bean cultivation in the wet season, at least so far as bush beans are concerned. Even in the regular February-May season a rainy spell may lead to chlorosis (*suxeu*) or to premature opening of ripe pods and sprouting of beans in or out of pods. We lost at least 1.5 kilos per *k?a:m* from this cause. In addition, beans grown in the rainy season proper are subject to infestations of a small, varicolored beetle (*ax se:l šul*, the gourd animal) which feeds on the leaves.

For a detailed and specialized study of bean cultivation and varieties throughout Guatemala, refer to Shill, 1969. Alta Verapaz may not be the focal point of the Middle American center of diversity of cultivated beans, but it certainly can compare favorably with any other part of the region.[66]

[66] Cf. Sauer, 1952: 66.

TABLE 18

ACCOUNTING SUMMARY FOR CULTIVATION OF BUSH BEANS

Weight samples

1. 100 pods – 451 beans
2. 100 pods – 458 beans: 144 sprouted, no weight diff. of sound from sprouted (100 ea.); 108 g. total
3. 100 pods – 457 beans: 147 sprouted, no weight diff.; 108 g. total; 22.7 g./100 beans (four trials identical)

combined weights from 2+3: 142 g. sound, 68 g. sprouted (32% ratio)

(Note: weights by pan balance corrected to 1/10 oz. using ½ lb. brass weight set and five Q0.01 coins at 1/10 oz. each, converted to grams by slide rule)

Dry yield equivalent for green beans

18 kg. X 100 pods/0.454 kg. X 0.108 kg./100 pods = 4.3 kg.
(hence weight loss on drying and shelling = 76%)

Harvest components

4.3 kg. green + 17.1 kg. sprouted + 36.4 kg. sound = 57.8 kg.
(hence 28.9 kg./*k?a:m*; assuming 5% loss on ground, add 1.5 kg./*k?a:m*)

Labor cost per *k?a:m*

| | | |
|---|---|---|
| clearing: | 1.0 man-day | Q0.50 |
| planting: | 1.5 " | .75 |
| weeding: | 2.5 " | 1.25 |
| harvest: | 4.5 " | 2.25 |
| | 9.5 man-days | Q4.75 |

Storage losses (to weevils)

113 g. at first sunning + 57 g. at second = 170 g. total
(0.3% of harvest)

Net return per *k?a:m*

| | | | |
|---|---|---|---|
| debits: | labor | Q4.75 | |
| | seed | 0.50 | (2.3 kg. X Q0.22/kg.) |
| | | Q5.25 | net seed: 26.2 kg./cda. |
| entries: | | Q5.75 | (28.9 kg. X Q0.20/kg.)* |
| net profit: | | Q0.50 | |

*Note: price of beans is higher at planting than at harvest; if true market prices of green and sprouted beans were used rather than converting these to dry-bean equivalents, the "profit" would probably disappear even though these components are no less useful in the household than are dry beans – they simply have to be consumed immediately

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