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FIELD RIDGES IN NORTHERN HIGHLAND ECUADOR

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Introduction

In the course of field work in late 1983 in Pimampiro Canton, northern Ecuador, striking patterns of ridges were noticed in several areas on aerial photographs and also in the field. No description of the extent and form of these features has been encountered and archeologists and others who have worked in this area are either unaware of their extent or of their existence. One recent inventory (Gondard and López, 1983), however, has identified these features in one locality but does not attempt to date them or to speculate on their function. This paper describes the size, orientation and situation of these forms on the basis of close study of aerial photographs and limited field observation. Some preliminary suggestions are made about the possible age and purpose of these forms.

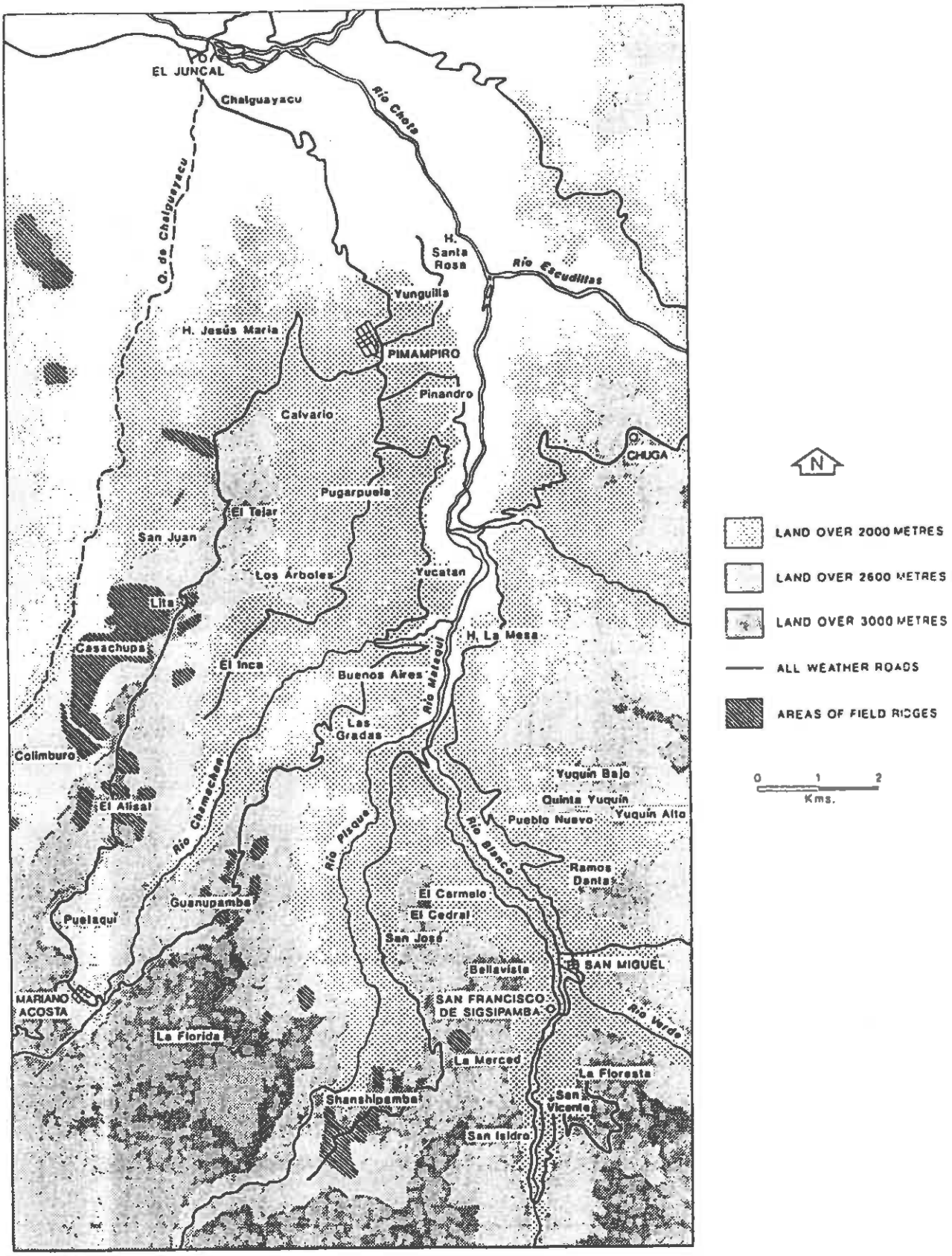
Description

The most surprising feature of the ridges is that they are aligned up and down the slope, by contrast with the several areas of terraces encountered in the same area. The ridges are probably less than one metre high between crest and trough, are 3-5 metres wide and about 300m long, although in some sites they are as long as 900m. They seem to be best preserved where the use of steel ploughs and tractors is unlikely. They are identified by a series of dark lines on 1:60,000 aerial photographs, possibly where the slightly deeper accumulation of soil in the troughs retains moisture for longer thus causing the soil there to appear darker. Aerial photographs were taken in February 1965, during the wet season, when the differences in moisture retention of the soil would be most noticeable. These features can also be identified on the most recent aerial photographs

(dated January 1978) but with greater difficulty owing to their poor quality.

The ridges are seldom straight and, although in some sites they appear truncated by boundaries such as tracks, in other places they appear to run from hillcrest to the bottom of the slope, such as in several localities in Casachupa (Map 1 and Fig.1). In many places the ridges disappear as they reach more level land, presumably as a consequence of recent ploughing. It would be unwise to deduce too much about the function from the characteristics of the areas where they have survived since they may be visible only where farming has not removed traces of the and they may have been widespread even on level land where no evidence is now visible.

The slope on which the ridges can be observed is moderate by contemporary agricultural standards. Ridge forms can not be identified on the very steepest cultivated slopes and are found predominantly on slopes of 15-20 per cent, although in a few places they occur on slopes as steep as 45 per cent. Although they occur on moderate slopes there is little sign that soil erosion and gulleying has developed as a consequence of surface rainwater flow being channelled along the furrows between the ridges. In a few isolated instances gulleying does appear to have occurred in ridged areas (for instance in Casachupa, GR 694383, Fig.1)[1] but such erosion may be more widespread since it would have removed all evidence of ridged field forms. Although perhaps 20 per cent of the ridged areas are currently in fallow, the majority are cultivated or grazed regularly. These areas are now mainly used for the cultivation of cereals and, in some cases, beans.



Location of field ridges in Canton Pimampiro, Northern Ecuador

Distribution

On the basis of the distribution of the ridges in this area it may be deduced that the ridges are characteristic of cultivated land with slopes as much as 35 per cent where irrigation is not essential for successful cropfarming. Although the ridges at Chaguarpamba are in an area with little more than 500 mm of rain their altitude allows limited farming at the present time. Rainfall further south, in Shanshipamba, for instance, is probably twice that amount.

The ridges appear in a number of localities in the area at altitudes varying from 2450-3000m, most frequently between 2700-2900m. (see Table 1).

Table 1. LOCATIONS OF FIELD RIDGES, CANTON PIMAMPIRO

Locality	Approximate area ha.	Altitude m.	Slope per cent	Grid Reference[1]
Lomas de Irumina				
(Chaguarpamba)	80	2450-2600	12-25	675452
	20	2375-2525	12-25	678435
San Juan	40	2400	12-25	697423
Casachupa-Lita	350	2600-3000	12-35	685395
Colimburo	40	2900-3100	12-25	667365
Guanupamba	90	2700-3000	12-35	710354
La Florida	20	2800-2900	12-20	716333
Shanshipamba	120	2800-2900	5-15	728314

The accompanying map (Map 1) indicates the distribution of ridges in Canton Pimampiro and two adjacent areas, on the basis of the study of

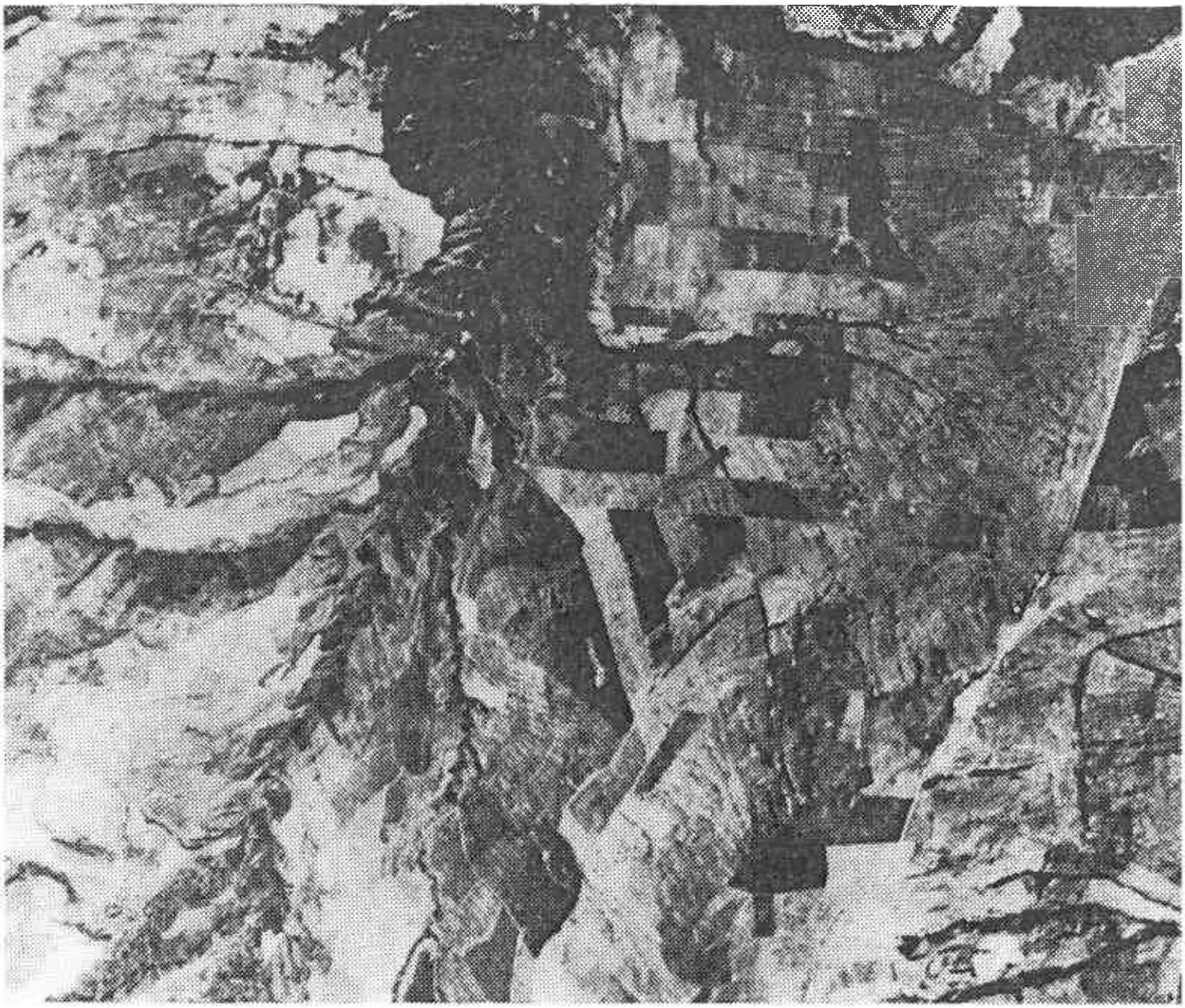


Figure 1. Field ridges near Casachupa

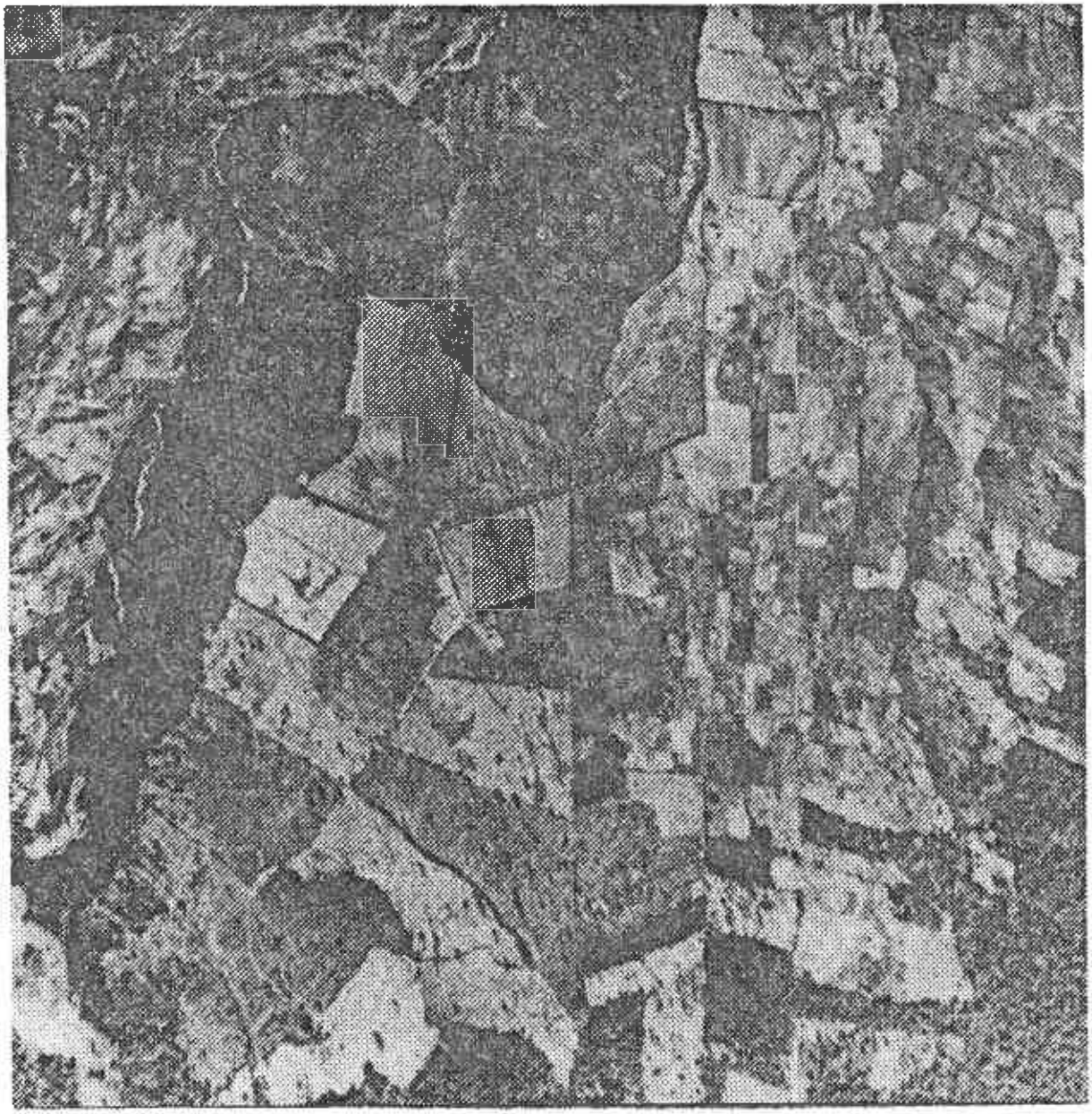


Figure 2. Field ridges near Shanshipamba

1965 aerial photographs. Quick survey of photographs for adjacent areas and for the area around Lake San Pablo, in the highlands further south did not reveal any other areas where these forms occur. The ridges occur on many of the higher cultivated slopes in the area studied but within a relatively narrow altitudinal range. In many cases they occur adjacent to areas where evidence exists of human occupation since prehistoric times, mainly since 1000 BP (Gondard and López 1983, Echeverría and Uribe 1981). This suggests that these ridge forms were created in association with an indigenous farming system. Since farming has been carried on for less than 50 years in the majority of localities in which these features exist evidence of previous farming systems will refer to the period prior to the late 16th century when dramatic population decrease occurred (Larrain 1980).

Possible origins

The only site where field ridges occur in close association with evidence of early settlement is in the vicinity of Shanshipamba. This site was noted by Gondard and López (op.cit.). However, possible house sites in two of three possible locations seemed to be circular rather than rectilinear suggested by Gondard and López (Fig.2). Since 16th century sources indicate that the characteristic house form of the native population in this area was circular, this is a further indication of the probability that these patterns are associated with pre-conquest land use (Paz 1582, 116 para.31). Ridges occur here on gently sloping land and appear to be shorter and narrower than in other areas.

In all the areas where ridges are identified agriculture has been re-established within the past century, although some of the areas near to the town of Pimampiro may have been used for grazing early in the century or even before. Until 1929, apart from some land adjacent to the town, the

entire area surrounding Pimampiro was owned by a single family, that of Nicolas Tobar and the pattern of land use of the outlying areas was extensive, for few people lived there and access was difficult. After 1945-46, as parts of the then sub-divided estate changed owners, more intensive farming commenced. In the western part (Hacienda Pinandro) farming was mechanised and larger fields were created to facilitate the use of machines; in the eastern area (former Hacienda Santa Rosa) farming was largely by sharecroppers, frequently townsfolk from Pimampiro. The southern highland zone, around what is now Mariano Acosta village, had by then been colonised by indian smallholders who crossed the mountains from Angochagua and La Rinconada in the second decade of the present century, invading land then claimed by Nicolas Tobar. From 1929 onwards the clearing of forest and settlement by non-indians from the neighbouring province of Carchi and from Colombia took place in what is now the parish of San Francisco de Sigsipamba.

The comparatively recent clearing of forest in the wetter highlands south of Pimampiro has thus revealed traces of previous land use systems that had been obscured by forest or scrub for at least 500 years. The short period during which farming has been carried on during this century has also slowed the removal of traces of earlier farming systems. The detailed account of this area in the late 16th century by the Pimampiro parish priest Padre Borja (Borja in Jimenez de la Espada 1964) suggests that population was concentrated in the vicinity of present-day Pimampiro and near Chapi, the location of which is uncertain. While Larrain (1980, 140) locates it in the actual area of Chaupi Guarangui, to the west of Pimampiro town, the relación of P. Borja says clearly that it is 'dos leguas delante deste [Pimampiro], al pie de la Cordillera de Los Quijos' (Borja op. cit., 128). It is more likely that it was located in the area south of Pimampiro, possibly in the area of Yuquín, perhaps on the terrace

overlooking the río Blanco where a new village is being built and where terraces and mounds suggest previous occupation (Pueblo Nuevo in Map 1).

It is probable that the ridge patterns are a relic of a previous farming system, but it is much less clear how they were formed. Farming at this altitude before the Spanish and Inca conquests would probably have been based on the cultivation of tubers, beans and grains. While the use of raised fields for cultivation in marshy areas has received increasing attention (Denevan 1982, Knapp 1983), field ridges associated with prehistoric cultivation appear not to have been described. In the absence of any detailed field investigation of these areas some preliminary suggestions are made about possible origins of these features.

The width of the land between the ridges suggests that each ridge may have been farmed by one household, the length of the ridge ensuring that danger from frost, hail and other natural hazards was evenly spread. Each household may have further minimized risk of crop failure by having access to strips of land on different hillsides which also ensured maximum environmental variety for their crops.

The pattern of ridge and furrow is likely to have been more than just an equitable form of land division for the micro-environment of ridge and furrow would have been sufficiently different that different crops would have thrived in ridges and furrows. The vertically-arranged ridges would have concentrated run-off into the depressions. If the depressions had themselves served as water runoff channels, erosion could have deepened them, eventually leading to gulleying. Only very limited evidence of this occurs in the Pimampiro area. We have already suggested that the dark lines identifiable on aerial photographs may be the more humid, deeper soils in the depressions: if this is so then clearly such depressions have

not served to concentrate soil erosion. This may be because the gradient in the depressions is slight and, if a dense cover of vegetation were maintained, runoff would be slowed and little erosion take place. Detailed field survey of the areas of field ridges is necessary to test such hypotheses.

Areas of crops, grown on ridges across the slope as part of the contemporary farming system, are also divided vertically or obliquely. Oblique channels are widely used now in the Pimampiro area to intercept water draining downslope and thus to restrict or avoid erosion and vertical channels are common on field margins (particularly where irrigation is used) for a similar purpose. Vertical oriented strips of some crops, in particular quinoa (chenopodium), are also used to demarcate land owned or used by different individuals in many parts of the Andes (Gade 1975, 155). A logical extension of this would be to plant different crops on ridges and in depressions according to the suitability of the crop to a particular micro-environment. Thus, ridges would be best suited to those crops that thrived on dry shallow soil (or those crops that were least prized) while the furrows would be planted with crops suited to deeper, more humid soils. Such hypothetical patterning of crops may have been purposely created, the result of the need to create different environments for crops on the higher, sloping croplands or alternatively such use may have occurred as a response to ridge and furrow topographic features that originated from the cultivation methods used by each household during the course of farming their own vertical strips. Since farming such slopes using either a mattock or a footplough would have resulted in a horizontal ridge pattern, as workers faced the slope while digging, it is unlikely that the ridge pattern would have been created inadvertently. Indeed, in a few locations in this area, signs of horizontal lines can be detected between the vertical lines in areas of field ridges. Several relict terrace sites,

identifiable from the aerial photographs show short terrace-like forms that are divided every 2-3 metres by verticals channels (in La Mesa and Chaupi Guarangui, (Map 1).

Conclusion

The large areas of field ridges are now visible in the Pimampiro area only because they have recently been exposed by new land settlement. These ridge forms were probably created by farming systems prior to 1500 AD. Although detailed field examination is necessary, it is likely that such forms reflect an attempt to create specific growing conditions suitable for plants customarily cultivated at these altitudes. The widespread nature of these patterns in the Pimampiro area suggests that they reflect a common farming practice evidence of which is seldom encountered because it is so easily removed by modern farming, both mechanised and non-mechanised.

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[1] Grid references are made to identify locations on the Instituto Geográfico Militar 1:25,000 topographic maps.