

BOTANICAL REMAINS FROM PANCAN, PERU:
CHANGES AND CONTINUITY IN LATE EARLY INTERMEDIATE,
THE MIDDLE HORIZON AND
EARLY LATE INTERMEDIATE PERIODS

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PAPER PRESENTED AT THE 53RD ANNUAL
MEETING OF THE SOCIETY FOR AMERICAN ARCHAEOLOGY
IN PHOENIX, ARIZONA

MAY 1ST, 1988

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Consequently, their appearance may be linked to cultural preference, historical precedent or the environment. There are also a wide variety of wild plants found throughout the deposits, but their links to the cultural sequence has not yet been worked out.

Analysis so far has indicated that the time period in which the plant remains were found was a stronger influence than the context, that is, there was usually more likenesses within the same time period than there was between like contexts in different time periods, though there are trends within cultural contexts as well. Quantifications have been made both as frequencies, and as densities. Frequency here refers to the number of samples in which a taxon is present, divided by the total number of samples. Densities are the number of fragments per liter of site matrix. These categories were chosen as both treat each taxon independently. Density takes actual numerical occurrences into account, while frequency is strictly presence/absence. By looking at both I wish to avoid pitfalls that either method might be subject to if used alone. To best control for differential preservation problems of the different crops, I will make most of my quantitative comparisons within the same taxa, and not between them. Trends through time may also be subject to closer evaluation, as preservation may also be a function of time.

Level four, some 2 meters below the surface of the site is the oldest occupation layer excavated and dates to the late Early Intermediate period.

The overall frequency for maize in this level was the lowest, only 51% of the samples contained maize. Within this low amount of maize frequencies are higher inside the structures than they are for the surrounding patio.

LEVEL FOUR

	MAIZE	QUINOA	LEGUME	TUBER
LEVEL FREQUENCY (%)	51.5	89.9	2.9	6.52
AVERAGE LEVEL DENSITY	1.0	5.0	0.01	0.10
AVERAGE STRUCTURE DENSITY	0.5	6.5	0.02	0.032
AVERAGE PATIO DENSITY	0.7	0.8	0.0	0.034
AVERAGE INSIDE OCCUPATION DEBRIS DENSITY	1.0	33.7	0.03	0.15
AVERAGE OUTSIDE OCCUPATION DEBRIS DENSITY	0.6	0.9	0.0	0.0
AVERAGE FLOOR (INSIDE) DENSITY	0.6	0.9	0.0	0.0
AVERAGE SURFACE (OUTSIDE) DENSITY	0.0	0.2	0.0	0.0

Within the breakdown according to specific contexts the frequency data tell very little, with quinoa occurring in all contexts, and in almost all samples. On the other hand, the density data show wide variation with respect to contexts. The highest density by far comes from the occupation debris inside of structures. At over 30 fragments per liter it is six times the level average, and is also three times the average for the equivalent matrix out in the patio. The floor materials from the structures and patio show the same trend. Hearths and burials have densities and frequencies not unlike the average values for the level, indicating that the a few quinoa seeds may have worked their way into just about everything, even if it had been unintentional. This may in fact be said of the distribution of quinoa in general, though the strong differences between the densities in the floors and occupation debris between structures and patios, like that found for maize, suggest some type of activity or attitude that separates those two spheres within the site.

The other two main types of crops are the domesticated legumes, which consists mainly of Lupines, or Talhi, and a few Phaseolus. These two will be considered together along with fragments that could be identified only as "domestic legumes", as the latter are more common than either species is separately. These seeds are notoriously absent from many archaeological sites for some reason that may relate to cooking methods, the amount of use, or problems of preservation.

This is indeed the case for domesticated legumes in the site of Pancán. Legumes have a low overall density and frequency within the site, and the trend through time is not an appreciable increase through time like maize, nor is there an overall ubiquity such as there is for Quinoa. The average density for level four is the lowest

The third excavated level dated to approximately AD 690, and contained two clear structures and a patio area between them. This level offered a unique opportunity to evaluate the distribution of charred plant remains, as the larger structure, number twelve had obviously burned quite thoroughly. Yet, caution must be exercised when making generalizations about this level, as this burnt structure may skew results.

The frequency of maize remains in level three is 85%, more than level four, but less than the later levels one and two. The density, even excluding the burnt structure, is much higher than level four, and only slightly less than in levels one and two. The densities and frequencies of maize within the structures and patio show what might be expected. Structure twelve has far more maize than any other place in this level. Apart from this the other two structures 11 and 13 are next, and the patio is last. The floor and occupation debris inside the structures also contain more maize than the patio area. The high density of maize in structure twelve may indicate storage, or that remains in other unburnt contexts may be underrepresented due to preparation techniques such as grinding and boiling that do not leave identifiable charred remains. This may also be a reason for very low maize density in hearth contexts.

Quinoa is nearly ubiquitous in level three as it is throughout the site. It is found in over 90% of the samples, and at a density of about 6 fragments per liter. Of course the density in structure twelve is over twice the level average, and has the highest concentration. Structures 11 and 13 are a distant second, and the patio, again, has the lowest concentration. The floors and occupation debris in the structures and patios show the same pattern. As with

LEVEL THREE

	MAIZE	QUINOA	LEGUME	TUBER
LEVEL FREQUENCY (%)	85.1	92.0	12.6	12.7
AVERAGE LEVEL DENSITY	13.4	6.83	0.15	1.3
AVERAGE LEVEL DENSITY (WITHOUT 12)	6.4	3.4	0.12	1.3
AVERAGE STRUCTURE DENSITY	16.9	6.7	0.09	0.43
AVERAGE PATIO DENSITY	3.3	1.8	0.05	0.28
STRUCTURE ELEVEN DENSITY	4.0	1.9	0.04	0.0
STRUCTURE TWELVE DENSITY	32.9	16.5	0.26	1.37
STRUCTURE THIRTEEN DENSITY	13.9	1.9	0.0	0.0

LEVEL TWO

	MAIZE	QUINOA	LEGUME	TUBER
LEVEL FREQUENCY (%)	96.8	98.2	33.9	9.7
AVERAGE LEVEL DENSITY	5.9	5.8	0.21	0.04
ASHY MIDDEN DENSITY	33.8	26.9	1.0	0.0
MIDDEN FILLED PIT DENSITY	3.4	14.1	0.3	0.08
CHARRED LENS DENSITY	5.9	5.0	0.3	0.04

houses or patios in the adjacent levels. This may relate to the less straight forward trends in both legume and tuber deposition. Legumes show their highest density in ashy midden, while tubers are densest in a thin lens of charred material, again hinting at dumping and burning.

The uppermost level, number one, is dated to the early Late Intermediate period, at about AD 1000.

In this level maize has a frequency of over 90%. The mean density is similar to level two at 5.8 fragments per liter. The distribution within the level shows the highest densities in the structures, particularly numbers one and seven. Specifically, highest densities occur in the occupation debris built up inside the buildings, while the general debris outside contains less. Another context containing a lot of maize is primary midden, located in the patio, showing dumping events as in level two. Measurement of maize kernels in this level (S.Johannassen, pers. comm.) show that they are substantially larger than those in the first three levels, indicating the development of a more productive crop, that was at the same time being more widely distributed within the site.

At the same time, quinoa shows a frequency near 90% as it does in all levels, but its average density is about 3 times that of the others. This may represent crop intensification as it may for maize. Within this level the structures again show more dense quinoa remains, though midden in the south end of the patio is also locally quite dense. Structure floors and occupational debris again show denser concentrations than the corresponding patio contexts. Quinoa seems to mirror the maize distribution in that it also dense in localized places within patio midden, indicating dumping of trash.

LEVEL ONE

	MAIZE	QUINOA	LEGUME	TUBER
LEVEL FREQUENCY (%)	91.6	93.8	29.8	8.4
AVERAGE LEVEL DENSITY	5.8	19.0	0.20	0.04
AVERAGE STRUCTURE DENSITY	10.7	30.0	0.22	0.0
AVERAGE PATIO DENSITY	4.5	7.3	0.15	0.2
AVERAGE INSIDE OCCUPATION DEBRIS DENSITY	12.0	10.2	0.04	0.0
AVERAGE OUTSIDE OCCUPATION DEBRIS DENSITY	5.3	2.2	0.07	0.05
AVERAGE FLOOR (INSIDE) DENSITY	3.6	60.6	1.2	0.02
AVERAGE SURFACE (OUTSIDE) DENSITY	0.5	1.2	0.03	0.03

may have been dominant at an earlier time, when maize use was limited. Its highest density in the latest time period also points towards intensification of the agricultural economy. Legumes and tuber show somewhat opposing trends, in that tubers seem to have been more common during the first half of the occupation, while legumes are more common during the second half. While this does not represent a total replacement of one by the other, it may suggest that these two trends are related. Legumes may have been more productive in the area surrounding Pancán, or might have been more valued for prestige reasons. In either case, it appears that both legumes and tubers would have been secondary crops to maize and quinoa.

The other interesting trend is that the highest densities of maize, quinoa, and legumes are usually within structures during the entire Pancán sequence. Tuber densities are either the opposite, or are ambiguous. This would hint at different preparation techniques or locations, along with perhaps different attitudes about the root crops vs. grains.

These conclusions must be viewed as preliminary, as analysis is still underway and thoughts about the patterns are only beginning, and especially, because the Pancán botanical data must be integrated with changes and continuities in the other archaeological materials.