SAMPLING FOR CASSAVA PRODUCTION SURVEY - BRASIL

Object

To sample 50 municipios from representative cassava production regions
in Brasil. The sample to represent the frequency of cassava observed in
the various ecozones of interest. Each hectare of cassava in the chosen
regions to have an equal chance of falling in the sample. This allows
extrapolation from the survey data.

Method

Due to cost the survey was restricted to about 1000 questionnaires. For
operational considerations it was decided to divide these between 5
states and approximately 50 municipios. The sampling was made in a
number of stages.

STAGE 1

A map of Latin American cassava production 1:5,000,000 (previously
produced by AEU) was used to select major zones of interest within the
states of PARA, MARANHAO, PERNAMBUCO, BAHIA and RIO GRANDE DO SUL.

This selection was based on: (a) concentrations of cassava production,
(b) general climatic consideration, and (c) relative ease of access to
the whole area (ie, compactness).

STAGE 2

The limits of the chosen areas were transferred to the scale 1:1,000,000
and subdivided into rough regions based on an interpretation of climate
data from CIAT's databank[1] and soil data from FAO[2] (Carter 1985).

The following classes were used:

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[1] Jones PG (1981); [2] FAO (1970).

9p. engl., 4 refs.

Soil Restrictions

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-    NO RESTRICTIONS
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A    SOILS WITH ACIDITY RESTRICTIONS: Bf,Bc,Bd,Po,Ph,Fx,Fo,Fa,Fp,Ao,Ah,
                                      Af,Ag.
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B    SOILS WITH POTENTIAL DEPTH PROBLEMS:  Ap,Lp
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C    SOILS WITH ACTUAL DEPTH PROBLEMS:  Lf,Lc,I-c,I-b, fase petrica
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D    PERMANENTLY WET SOILS:  Gd,Ge,Gh,Gm,Ws
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E    SEASONALLY FLOODED/WET SOILS:  Je,Wd,We,Wm
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F    PREDOMINANTLY FINE-TEXTURED SOILS (VERTISOLS): Vc,Vp
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Climate Types

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1     Lowlands Tropics Humid
2     Lowland Tropics Seasonally Dry Semihot Tropical
3     Lowland Tropics Seasonally Dry Hot Tropical
4     Lowland Tropics Seasonally Dry Cool Winter Tropical
5     Lowland Tropics Semi-Arid
6     Tierra Templada Humid
7     Tierra Templada Seasonally Dry
8     Tierra Templada Semi-Arid
9     Low Tierra Fria Humid
10    Low Tierra Fria Seasonally Dry
11    Subtropical Humid
12    Subtropical Seasonally Dry
13    Arid
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Limits of these 84 agroecozones were digitized by hand and used to identify 1525 municipios falling within them.

Areas sown to cassava were obtained from the 1975 Brasilian census. IBGE (1979) and dot distribution map drawn over the selected areas taking one dot to equal 100 ha (See maps 1-4).

A second selection by inspection was performed, choosing four or more agroecozones per state, again ensuring ease of access and a range of climatic and soil characteristics.

STAGE 3

Selection from Stage 2 resulted in a final list of 320 candidate
municipios in 25 marked agroecozones. A random selection of 50
municipios was made, subject to the following constraints:

(1) The number of municipios sampled per climate class was constrained
to reflect the overall proportion of cassava sown in that climate class.

(2) Municipios within climate class were ordered by area of sown
cassava and divided on this basis into four or five classes. The number
of municipios sampled per class was made dependent on the proportional
area of yuca for the class within climate group. This ensured that each
hectare of yuca in the group sampled had equal chance of appearing in
the sample.

Results

Maps 1 to 4 show the major regions chosen in stage together with the
distribution of cassava. The subregions chosen in Stage 2 are shown
shaded and named with an acronym of four letters composed of the state
and sequence number. ie, 'BA37'. The municipios chosen in Stage 3 are
shown within the Stage 2 areas. Please note that in many cases the name
is displaced and a line indicates the true position of the symbol.

Table 1 shows the sampled municipios.

One sample point in Rio Grande do Sul was rejected for practical reasons
after the sampling (The municipio comprised merely 77 hectares of
cassava and was so distant from the other points that it was judged to
be not worth a questionnaire). To avoid bias the point was not
resampled. This results in 49 selected municipios.

Table 1. Municipios in the Sample

IBGE NO	LAT	LONG	MUNICIPIO	SAMPLE REGION	CASSAVA HECTARES	CLIMATE SOIL
15423	-1358	-3951	TEOLANDIA	BA16	1570	7A
14504	-1435	-4018	BOA NOVA	BA23	1490	8A
15124	-1229	-3862	TEODORO SAMPAIO	BA37	198	1A
15121	-1243	-3894	SAO GONCALO DOS CAMPOS	BA37	882	1A
15109	-1261	-3905	GOVERNADOR MANGABEIRA	BA37	1191	1A
14422	-1302	-3945	SAO MIGUEL DAS MATOS	BA37	1776	1A
14418	-1322	-3952	MUTUIPE	BA37	2544	1A
15112	-1276	-3892	MARAGOGIPE	BA37	3830	1A
14307	-1225	-3895	FEIRA DE SANTANA	BA37	3933	1A
15208	-1336	-3908	VALENCA	BA37	6109	1A

IBGE NO	LAT	LONG	MUNICIPIO	SAMPLE REGION	CASSAVA HECTARES	CLIMATE SOIL
3005	-244	-4480	BEQUIMAO	MAR4	1511	3A
3012	-207	-4479	MIRINZAL ·	MAR4	2510	3A
3016	-252	-4509	PINHEIRO	MAR4	5763	3A
3011	-309	-4504	MATINHA	MAR6	1882	3A
3205	-288	-4403	MORROS	MAR7	3775	3D
3021	-321	-4500	VIANA	MAR7	4209	3D
3606	-340	-4436	ITAPECURU-MIRIM	MAR9	4152	3-
3708	-354	-4394	VARGEM GRANDE	MA10	1060	3A
2308	-93	-4739	SANTAREM NOVO	PAR2	736	3A
2406	-113	-4763	IGARAPE-ACU	PAR2	2762	3A
2403	-105	-4678	BRAGANCA	PAR2	9278	3A
2407	-141	-4791	INHANGAPI	PAR3	1835	1A
2101	-196	-4820	ACARA	PAR3	5163	1A
2203	-177	-4745	IRITUIA	PAR3	7304	1A
1809	-188	-4878	MOJU	PAR4	4136	1D
2201	-153	-4801	BUJARU	PAR4	4692	1D
2206	-168	-4777	SAO DOMINGOS DO CAPIM	PAR4	7956	1D
10905	-915	-3668	BOM CONSELHO	PER3	461	8-
10917	-870	-3640	JUPI	PER3	3053	8-
11211	-878	-3583	MARAIAL	PER4	473	7-
10921	-865	-3591	LAGOA DOS GATOS	PER4	1352	7-
9904	-706	-3533	MARI	PER7	793	2A
9909	-709	-3522	SAPE	PER7	1717	2A
10704	-795	-3535	FEIRA NOVA	PER7	2444	2A
11220	-810	-3531	VITORIA DE SAO ANTAO	PER7	3799	2A
10712	-813	-3538	POMBOS	PE11	2844	5-
9706	-717	-3578	MACARANDUBA	PE15	877	8C
9801	-705	-3576	ALAGOA NOVA	PE15	2024	8C

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 IBGE   LAT   LONG   MUNICIPIO                SAMPLE   CASSAVA    CLIMATE
 NO                                           REGION   HECTARES   SOIL
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 32109 -2850 -5523 SANTO ANTONIO DA MISIOES   RGS1       543      12-
 32306 -2838 -5497 SAO LUIZ GONZAGA           RGS1      1212      12-
 32304 -2802 -5433 GIRUA                      RGS1      1678      12-

 31302 -2960 -5192 BOM RETIRO DO SUL          RGS2       895      12A
 31306 -2944 -5194 LAJEADO                    RGS2      1577      12A
 31410 -2960 -5217 VENANCIO AIRES             RGS2      3114      12A

 30816 -3008 -5101 VIAMAO                     RGS4      2922      12E
 30907 -2968 -5145 MONTENEGRO                 RGS4      3558      12E
 31508 -2994 -5170 TRIUNFO                    RGS4      4000      12E

 32514 -2766 -5362 REDENTORA                  RG11       251      11-
 32419 -2745 -5390 TRES PASSOS                RG11      2899      11-


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NOTES ON AGROECOZONES SELECTED

This zonation was made on the data available in a very short time, it is
not to be taken as a definitive zonation of these region for cassava but
merely as a tool to aid in this sampling.

Bahia

Zones: 7A 8A 1A.

It may be expected that the majority of cassava in these sample areas
will be on acid soils.

Zone 1A is termed Humid Tropics.   In this case it is a misnomer and
should not be compared with the 1A of PARA. The reason for this is that
to complete the task in time we had to use Koppen's simplistic
definition of a dry month (less than 60 mm precipitation). This gives
one or less dry months for region BA37. The high potential evaporation
rates of the region give the lie to this interpretation. However the
analysis does separate the regions from the drier areas around it and as
a tool for this sampling it is acceptable.

Maranhao

Zones: 3A 3D 3-

All zones are seasonally dry hot tropical, the main differences are in
the soils. Much of the area appears to be acid, with only MAR9 showing
no obvious soil constraints. MAR7 contains considerable areas of soils

with drainage problems. Present doctrine would have it that the cassava
is not to be found on this land facet, however, recent experience on the
Colombian Atlantic Coast has shown that this is not necessarily true.
The quantity of cassava planted in region MAR7 and PAR4 indicate that
this may be an important point for the survey.

Para
Zones: 3A 1A 1D

Seasonally dry hot tropical and hot humid tropics. This is true humid
tropics (See note under Bahia for the converse). Once more mainly acid
soils, but a considerable area of poorly drained (See note above re.
MAR7 and PAR4).

Pernambuco
Zones: 8- 7- 2A 5- 8C

Pernambuco is edaphically and climatically the most varied of the states
sampled. Climate and topography change rapidly in very short distances.
The zonation has attempted to minimise the variation within zones but
please bear in mind that with variation on this scale it is highly
likely that considerable variation will be found within municipios.

A wide range of climate types was selected:

    2 Lowland tropics seasonally dry - semi-hot
    5 Lowland tropics semi arid
    7 Tierra templada seasonally dry
    8 Tierra templada semi arid

All are drier climates.   Types 5 and 8 are the driest in the sample.
Zones PER3 and PER4 are likely to be different from BA16 and BA23 since
these zones in Pernambuco do   not appear to have serious   soil
constraints. PE15 is likely to be the toughest environment in the
sample with a semiarid climate and soil depth constraints.

Rio_Grande_do_Sul
Zones: 12- 12A 12E 11-

Rio Grande do Sul appears to be almost universally   subtropical
seasonally dry with a smaller area of subtropical humid climate.   This
apparent uniformity may be misleading and is almost certainly due to an
artefact of our classification system which necessarily overlooks finer
subdivisions of the subtropical climates. Even a cursory inspection of
the climate data for Rio Grande do Sul shows that there is considerable
temperature variation with altitude which, although surely important for
cassava, is overlooked by the classification.

Soils are mainly without major restrictions (RGS1, RG11) or are acid
(RGS2). Soils in RGS4 are mainly low lying fluvisols or planosols. The
should be excellent soils with adequate nutritients and base status but
are likely to have fine textures and drainage problems. The area shows
a large winter excess of precipitation over evaporation and care should
be taken in determining the exact position of cassava within the various
land facets.

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