AG/ETH/82/010
TECHNICAL REPORT 1

MASTER LAND USE PLAN

ETHIOPIA

ANNEX 1

POPULATION SUPPORTING CAPACITY ASSESSMENT

SUMMARY OF RESULTS

Report prepared for
the Government of the Peoples
Democratic Republic of Ethiopia

based on the work
of
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UNITED NATIONS DEVELOPMENT PROGRAMME
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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This technical report is one of series of reports prepared during the course of the projects identified on the title page. The conclusions and recommendations given in the report are those considered appropriate at the time of its preparation. They may be modified in the light of further knowledge gained at subsequent stages of the project.

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AKNOWLEDGEMENTS

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2.07 ETHIOPIAN BIRR = 1.00 US DOLLAR

1. INTRODUCTION

1.1 Background

This annex contains a summary of the results of the population supporting capacity analysis outlined in Technical Reports 1 and 2, the Master Land Use Plan (MLUP) and the Agricultural Economics Consultancy report of the MLUP. For ease of comprehension, a specific request in the terms of reference of the MLUP, extensive use of graphics has been employed in this annex.

1.2 The population supporting capacity (PSC) model

A brief outline of the principles involved in the PSC model are provided here for convenience, but for a full description of the model and the conclusions and recommendation resulting from the analyses contained in this document reference should be made to Technical Reports 1 and 2.

Food production is on a subsistence scale for 95% of the population in Ethiopia and is assumed to remain so in the time frame projected by this study. The PSC model looks at the land area required to provide the basic nutrition and fuel needs of a typical farm family and the area required to maintain their draught oxen. Additional land must also be set aside by subsistence farmers in many areas to meet Government grain quotas. Surplus grain purchased by the AMC at fixed prices is used to supply urban food demand. Thus, the minimum area of land from which a farm family can subsist is calculated in the model for each Awraja, taking into account the above requirements and the production characteristics of the farming systems employed. Quantification of the farming systems identified was determined from Ministry of Agriculture farm surveys. The model further calculates the disposable income of farmers from grain sales to AMC, open market sales of surplus grain production and, where applicable, from coffee sales to the CMC.

Population supporting capacity is dependent on the productivity and amount of potentially arable and non-arable land available to meet the crop, fuelwood and livestock requirements of the population in each Awraja. The area of arable and non-arable land in each Awraja was determined from the land resources data available in the LUPRD (FAO 1984). Land not suitable for crop production (non-arable land) is considered in the model as suitable for livestock grazing and fuelwood production, the per ha levels of production calculated according to the environmental characteristics of the Awraja. If the amount of arable land limits the projected population's food supply, the model

determines the extent to which the Awraja is over or under its supporting capacity by ratioing projected and supportable populations for each year examined.

Where available arable land exceeds the requirements of a population constrained by insufficient non-arable land for its fuel and livestock requirements, land capable of supporting crop production is reclaimed in the model for these essential purposes until such time as a balance is struck between the competing needs of the land use system. Fuelwood and forage production on arable land are generally much higher than on non-arable land, thus serving to increase the population supporting capacity of the area at significantly greater rates than for an equivalent non-arable area. An optimizing technique was incorporated into the PSC model to determine the increased number of families which could be supported under these circumstances.

1.3 Structure of this report

The first section of Annex 1 provides details of the rural population in Ethiopia, both at present and projected forward to 1995 and 2010. Following this, the results of the base model population supporting capacity analysis are presented, together with a description of the assumptions involved in its derivation. This particular assessment assumes that all potential constraints are and will remain limiting to the use of land for rainfed agricultural production, up to 2010. It provides the most pessimistic assessment of those examined of the ability of the land to support the present and projected human population. Those Awrajas which are strictly pastoral in nature, due to severe restriction in moisture availability for rainfed agricultural production, are excluded from the population supporting capacity analysis because of the extreme difficulty of finding reliable information on nomadic human and livestock populations. This accounts for only 5 Awrajas in a total of 102 in Ethiopia.

Subsequent analyses presented examine the population supporting capacity with respect to assumed interventions of some kind, such as reduced fuelwood consumption, increased forage production and so on. There are 6 such scenarios presented in addition to the base model analysis. The first 5 demonstrate the influence of removing only one of the major constraints on the ability of the land to support the present and projected human population. The last simulates the combined affect of removing the previous 5 constraints up to the limits prescribed in each case. This final run of the population supporting capacity model therefore presents the most optimistic findings of the analysis. The comparative advantage of each intervention and that of achieving all improvements simultaneously is also included in later in Annex 1. In addition to the results of the 7 PSC model runs, details of disposable incomes from AMC, open market and coffee sales are presented for the base model.

It is again emphasized that this document presents only a graphic summary of the population supporting capacity assessment. No in depth attempt is made in this document to interpret these findings. As indicated previously, analyses of this type can be found in Technical Reports 1 and 2.

1.4 Interpretation of the charts in this report

Most of the results presented in this report are in the form of bar graphs. In the case of the rural population data, the length of the bar graph is proportional to the present or projected rural population. The projected population in each of the years 1985, 1995 and 2010 is hatched according to the legend at the base of the graphs.

The population supporting capacity and disposable income charts follow a slightly different format, but are equally easy to interpret. The projected situation for the years, 1985, 1995 and 2010 are again indicated by the hatching at the base of the charts. However, the charts are divided on the y-axis into positive and negative values of the 'PERCENT CAPACITY AVAILABLE'. Values above the line indicate capacity remains available within the Awraja for increased numbers of families. Values below the line indicate that the supporting capacity has been exceeded in the year concerned. The percent available or exceeded is determined from the values on the y-axis.

The final series of graphics in this annex are exploded pie charts. These require special interpretation, although this is not difficult. The size of each 'slice' of the pie chart indicates the relative advantage of removing the labelled constraint, up to the levels defined. One slice of the pie chart represents the effect of combining all interventions at the same time. For the combined removal of constraints, the nutritional requirements of the population have been raised to the minimum recommended by FAO (220 kg grain equiv./per caput/annum). This tends to reduce the expected benefit from the simple addition of individual benefits. The overlapping influence of one constraint on another may further limit the gain to be had by removing all of the proposed constraints. The figures in parentheses in these charts represent the relative advantage, on a scale of 100, to be had by removing a single or combination of the constraints. More details concerning the interpretation of these charts are provided later in this report.

2. RURAL POPULATION

2.1 General

The graphs in this section provide information on the rural population in Ethiopia. Present and projected population numbers for the years 1985, 1995 and 2010 are presented by Region for each of the 102 Awrajas in the country.

The figures plotted are derived from Technical Report 2, Appendix C, where full details of the methods used to project population numbers over the period to 2010 are given. They projections are mainly based on data contained in the 1984 national population census of Ethiopia (CSO 1984). In Technical Report 2 two different population growth rates are assumed possible between 1995 and 2010, 2.4% (medium growth) and 2.9% per annum (high growth) respectively. The requirements of space limited the number of data points for each Awraja to 3 and so only the 1985, 1995 and 2010 high population estimates are presented in the graphs in this section of the report.

3. THE POPULATION SUPPORTING CAPACITY BASE MODEL

3.1 Background

The base model of the population supporting capacity analysis provides a measuring stick against which the relative worth of various interventions can be gauged. It represents a reasonable approximation to the existing situation in many parts of the country with the possible exception of fuelwood consumption and Vertisol use. Dried cattle dung and crop residues, such as sorghum roots, are used as substitutes in areas desparately short of fuelwood, accounting for up to 50% of the per caputa fuelwood requirement per annum. This occurs with a subsequent penalty to the nutrient status of the soils in the localities where such practices are widespread. Some move is also taking place in the rural sector with respect to the farming of Vertisols, the heavy black clays occupying what is known locally as 'Koticho' land. These soils have special management problems, such as seasonal inundation and high draught requirements, which currently limit their use for rainfed crop production. In areas of the country where population pressure is extreme, farmers are experimenting more widely with rainfed crop production on these soils which are traditionally used as a dry season grazing reserve for livestock. Without careful management, however, there are major problems for successful and sustained crop prpduction on them. Details regarding these and other development constraints are dealt with in MLUP Technical Report 1.

3.2 Assumptions in the base model

The following assumptions are contained in the base model:

a) Assumptions regarding the definition of <u>arable land</u>.

- A dependable growing period (DGP) of >90 days or ie a GP >90 days is expected 8 years in 10.
- All soils with a depth of >25 cm
- All soils <u>not</u> exceedingly stony. ie < 50-90% surface stone cover.
- Soils with serious toxicities not considered.
- Vertisols not available for cultivation because of management difficulties.
- Land over 30% slope discounted by 20% area to allow for a high level of conservation structures and pockets of stoniness and shallow soil depth.

b) Assumptions regarding the definition of marginally arable land.

- Available moisture of between 60 days median growing period (MGP) and DGP of < 90 days. Production is expected to fail 5 years in 10 in such areas. The land area is discounted by 50% in the base model arable land assessment to approximate the 50% failure of crops in this marginally arable zone.

- Soils and slope conditions are the same as for the arable land definition.

c) Nutritional requirements of the human population.

- A total requirement of 162.6 kg of grain equivalent per annum is specified. This approximates to .... calories per annum.

d) Nutritional requirements of livestock.

- A total of 2280 kg of dry matter per annum is specified.

e) Fuelwood requirements /caput/annum.

- The consumption of fuelwood is assumed in the base model to be 1.3 cu.m./caput/annum.

f) Tsetse and trypanosomiasis.

- The presence of tsetse and the associated disease, trypanosomiasis, is considered limiting for crop production in those Awrajas where it is known to occur, because of its deleterious effect on draught animals. Malaria is also prevalent in the same areas. However its extent is more generally pervasive, also occuring along river valleys and in the vacinity of water bodies in otherwise dry areas. All areas of Ethiopia below 1800 metres elevation are considered susceptible, but it was not possible to define closely enought its exact extent for the purposes of the population supporting capacity analysis and so it has not been considered as a limiting factor outside the areas also affected by trypanosomiasis.

4. 50% FUELWOOD SUBSTITUTION

4.1 Background

Fuelwood availability was tested independently for its influence on the capacity of the available land resources in each Awraja to support the present and projected population. This was achieved by holding all other factors constant in the base model and reducing the demand for fuelwood to 0.7 m^3/caput/annum. The standard fuelwood comsumption adopted in the base model is 1.3 m^3/caput/annum. This scenario most closely resembles the actual situation in Awrajas with a serious shortage of fuelwood. The burning of dried cattle dung and selected crop residues have been estimated to supplement the fuelwood requirements of families in such circumstances by up to 50% (AACM 1987). All assumptions regarding arable and non-arable land remain as defined in the base model. For details on the current situation with respect to fuelwood availability, taking into account the annual estimated annual production of natural vegetation, see MLUP Technical Report 1, Annex 3.

Significant differences in population supporting capacity in a number of Awrajas are apparent when fuelwood consumption is reduced to 50% of that required. Details are discussed in Technical Report 2 and summarized in Technical Report 1.

5. 50% INCREASE IN FORAGE PRODUCTION

5.1 General

The base model was again altered with respect to one parameter, the amount of forage available for livestock. The objective of this run of the model was to determine if an increase in forage production, without prejudice to other levels of productivity in the base model, could make a significant difference to the population supporting capacity. The results clearly indicate this to be the case in a number of Awrajas. This is discussed in detail in Technical Report 1.

All assumptions regarding arable and non-arable land remain as defined in the base model. For information regarding the current availability of forage for livestock, see MLUP Technical Report 1, Annex 3.

6. VERTISOLS FULLY UTILIZED FOR CROP PRODUCTION

6.1 General

The model was again modified to test the influence of Vertisols on population supporting capacity in Ethiopia. Vertisols are the heavy black clay soils widespread in the bottomlands of the Ethiopian highlands and along the Sudan/Ethiopia border. Their occurence is quite extensive, occupying as much as 8% of the land area of the country. However, the high proportion of Vertisols occuring in growing period zones suitable for cropping increases their relative worth as potential arable land.

The farmers' preferred use of Vertisols, a large proportion of which occur on communal land, is currently for dry season grazing reserves. This results from their tendancy to inundation during the peak of the wet season and complications related to their heavy clay texture. They are extremely difficult to cultivate during the dry season because of a high draught requirement, and again in the wet season because of saturation and similarly high draught requirements. They do, however, have a relatively high natural fertility and an exceptionally high water holding capactity. Where population pressure is high, farmers have begun to cultivate both tef and wheat on Vertisols, but generally along footslopes where gentle slopes assist drainage. ILCA and ICRISAT have been experimenting with techniques to enable full utilization of these soils and thus make a substantial contribution to the amount of arable land available in Ethiopia.

This run of the model is intended to indicate the impact on PSC of cultivating all available Vertisols, rather than using them primarily for forage production. The PSC increase in some Awrajas is very significant, as the graphs in the following pages demonstrate. A detailed discussion of the results is contained in Technical Report 1.

7. TSETSE CONTROL

7.1 General

The presence of Tsetse (Glossina sp) in many areas of western Ethiopia has provided a natural barrier for the westward expansion of cultivation for centuries. Tseste flies carry the disease trypanosomiasis which is fatal or debilitating for cattle, the essence of draught power for cultivation in the highlands of the country. The species of flies known to carry human sleeping sickness have also been identified in Ethiopia, as has the disease itself (Schaller & Kuls 1972). However, livestock trypanosomiasis is far more widespread and is serious in Gomo Gofa, Gojam, Ilubabor, Kefa, Sidamo and Welega Regions. It is generally confined to altitudes below 1800 metres. These Regions all have substantial land area below 1800 metres with the associated high humidity necessary for survival of the Tsetse flies.

In the base model the areas affected by Tsetse have been eliminated from consideration as arable land, because sustained production of food crops under the current animal draught systems cannot be guaranteed. In this run of the PSC model Tsetse is assumed to have been eradicated, or at least controlled. The differences noted in the population supporting capacity of the land are drammatic and provide ample evidence for the need to control Tsetse if expansion of cultivation into areas affected is intended in the future. Details of the impact of Tsetse control are discussed in Technical Report 1.

8. 50% INCREASE IN CROP YIELDS

8.1 General

The objective of this run of the PSC model is to demonstrate the influence of the currently low yields and the high food demand of the rapidly increasing population on the supporting capacity of each Awraja. Yields were assumed to increase without predudice to other factors, all other variables in the model assuming the values used in the base model.

The outcome of this run of the model indicates that a 50% increase in yields would have a very significant effect on the population supporting capacity in many Awrajas. A 50% yield increase is intended to be indicative of what might be achievable over 25 years at the subsistence level, using biological improvements such as legume technology and improved conservation measures. An analysis of these results can be found in Technical Reports 1 & 2.

9. ACHIEVABLE OPTIMUM

9.1 General

This run of the PSC model reflects the combined effect of simultaneously introducing all of the improvements treated independently in previous runs of the model. It reflects what might be realistically achievable over the next 25 years if appropriate development policies can be implemented in the near future. The most difficult of the desired improvements to make is that of providing an alternative fuel to wood, while at the same time achieving biological improvement in the nutrient status of soils. The established practice of drying and burning cattle dung in areas where there is a deficiency of fuelwood has a negative feedback on crop yields, since dung used as fertilizer is an important component available for improving the nutritional status of soils. There is clearly competition for the same limited resource and so an alternative energy source is desparately required if the achievable optimum is to be reached by 2010. This and other aspects of the achievable optimum model are included in Technical Report 1.

9.2 Assumptions in the achievable optimum model run

A summary of the levels of each of the variables altered from the levels used in the base model follows:

- 50% reduction in fuelwood requirement per caput.
- 50% increase in forage production per ha
- all Vertisols available without constraint for crop production
- tsetse eradicated in those Awrajas affected
- 50% increase in per ha yields.
- improved human nutrition - 220 kg of grain equivalent per caput per annum from grains, pulses, tubers and enset.

All of the above were assumed to occur in concert to produce the outcome shown in the following section. The results are discussed in detail in Technical Report 1.

10. DISPOSABLE INCOMES LESS FIXED COSTS

10.1 General

Incomes are expressed as disposable income (in Eth. Birr), rather than gross margin as disposable income provides a more appropriate indication of the cash availabile for consumer goods for rural families. Also, in the light of the many assumptions that have been made, disposable income is more appropriate than gross margin.

Income from crop sales are assumed composed of:

- sales to AMC
- open market sales
- sales from coffee

All sales from coffee are assumed to be conducted throught CMC and incomes computed accordingly. Fixed costs are deducted from the disposable income to a total of EB 34.00, comprising:

- EB 20.00 per household poll tax
- EB 5.00 fees
- EB 9.00 depreciation of tools.

Details of the method of calculation and interpretation of results of the disposable income analysis are contained in Technical Report 2. This is further summarized in Technical Report 1.

11. COMPARISON OF THE RELATIVE IMPACT OF SELECTED INTERVENTIONS

11.1 General

An Awraja based presentation of the relative impact of each of the interventions proposed:

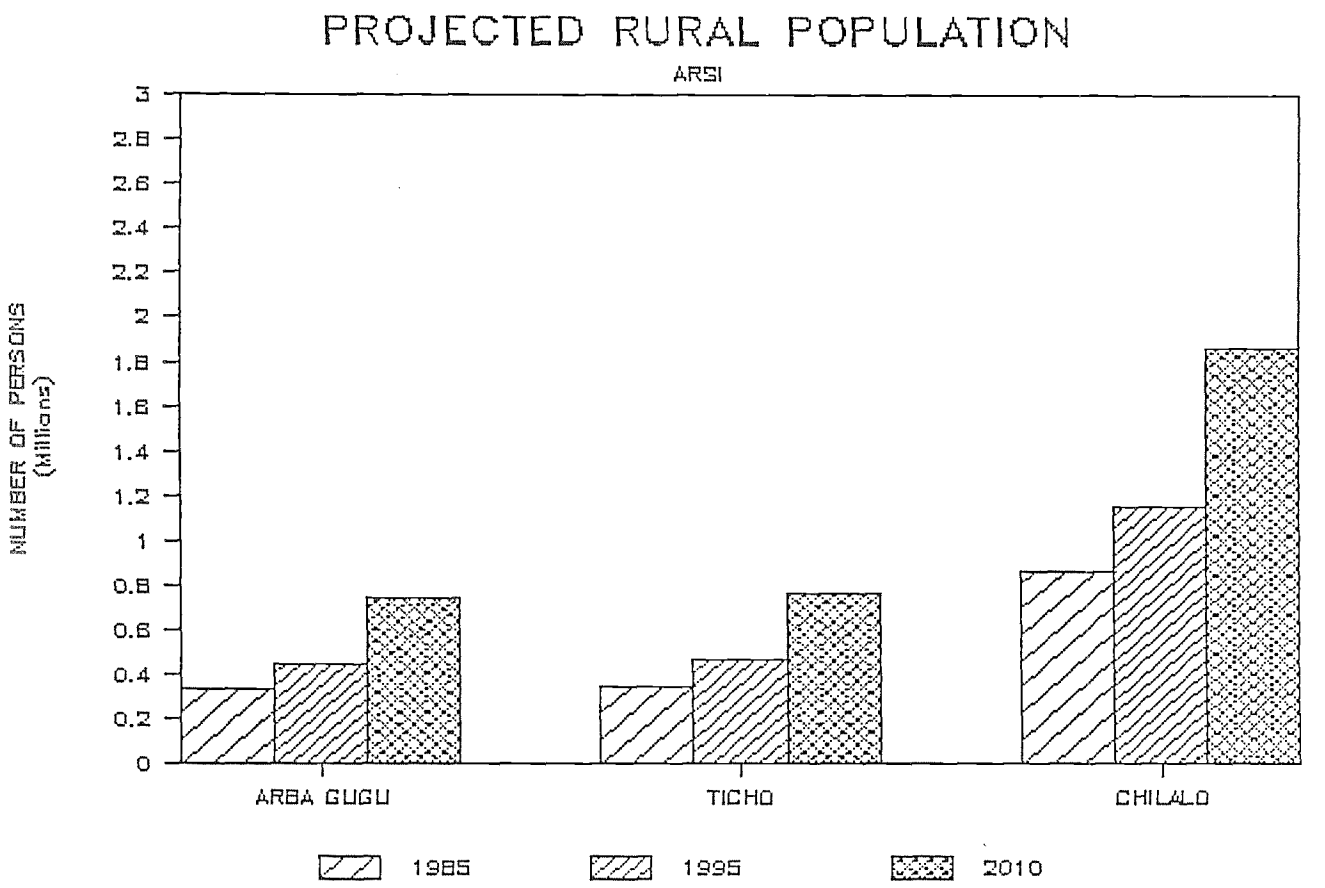
- 50% fuelwood requirement,
- 50% increase in forage production,
- cultivation of Vertisols,
- eradication of Tsetse,
- 50% increase in per ha yields and,
- a combination of the above, but improved human nutrition,

is given in the following pages. The results of the simulation are only presented for 1995, since the trends are similar for 2010.

It must be emphasized that these results are not a reflection of the current state of resources such as the availability of fuelwood and forage, but of the possible optimum PSC if certain constraints to production are eliminated. Since the model assumes that the optimum use of arable and non-arable land will be made within an Awraja, a very different picture with regard to the possible distribution of resources may emerge in the PSC analysis once certain or all of the constraints are overcome.

The charts included demonstrate the relative advantage in percentage terms, therefore, of eliminating each constraint listed, and of theeffect of elimination all of the constraints listed at the same time, together with improved nutrition, on the maximum population supporting capacity in each Awraja. The numbers in parenthesis in the charts thus indicate the relative advantage on a scale of 100 which each intervention might bring. The influence of improved nutrition (from 162.6 to 220 kg grain equiv./caput/annum), together with the possibility of some constraints overlapping in space, such as Tsetse occuring in Vertisol areas, causes the relative advantage in the optimum case to appear somewhat less than expected from the simple subtraction of one constraint at a time in many Awrajas. This may indicate that the total elimination of constraints is likely to yield only a small gain in population supporting capacity over the elimination of one or perhaps two major constraints. This fact ahs important economic implications for obtaining the maximimum improvement for the minimum cost.

RURAL POPULATION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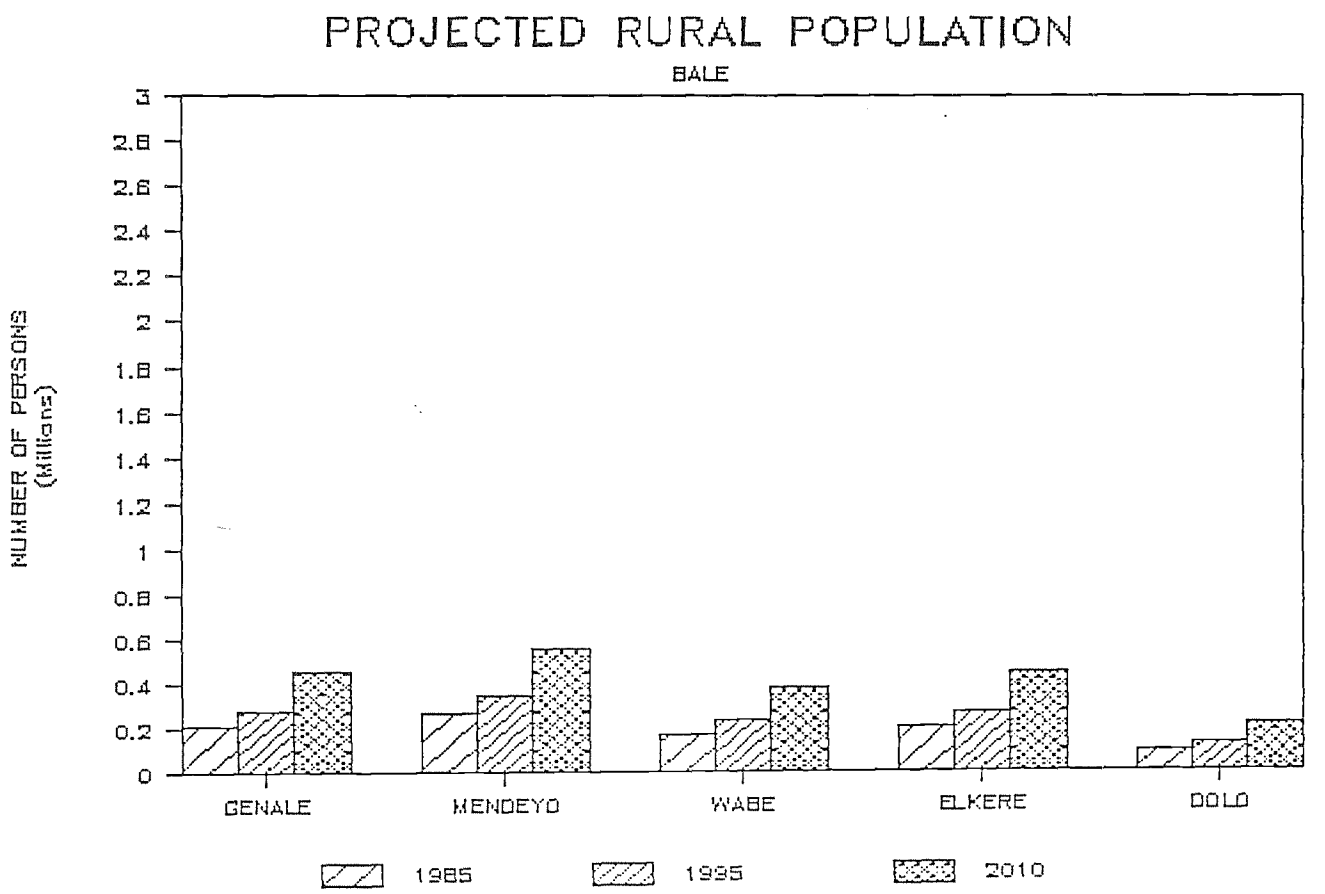
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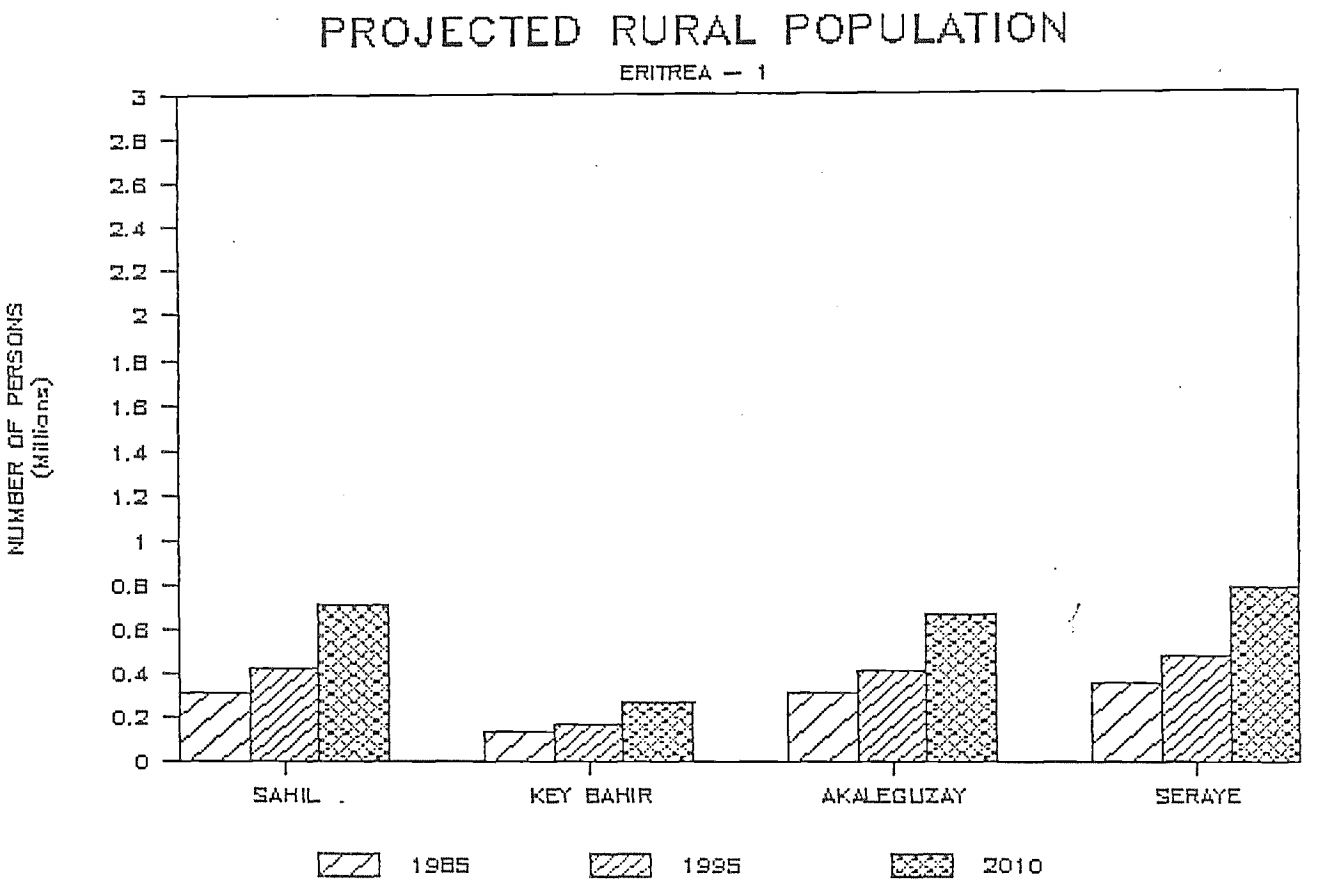
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NUMBER OF PERSONS (Millions)
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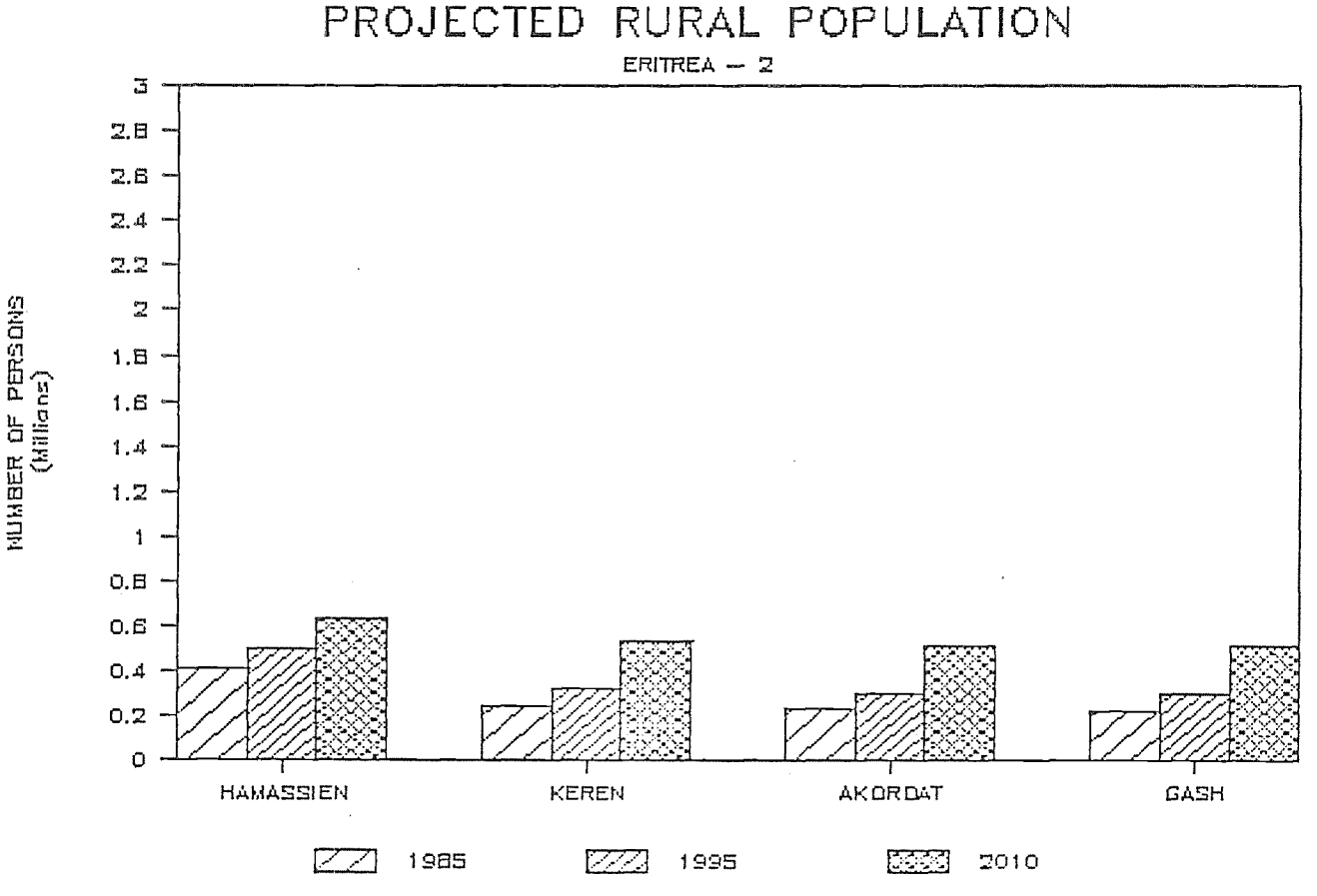
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NUMBER OF PERSONS (Millions)
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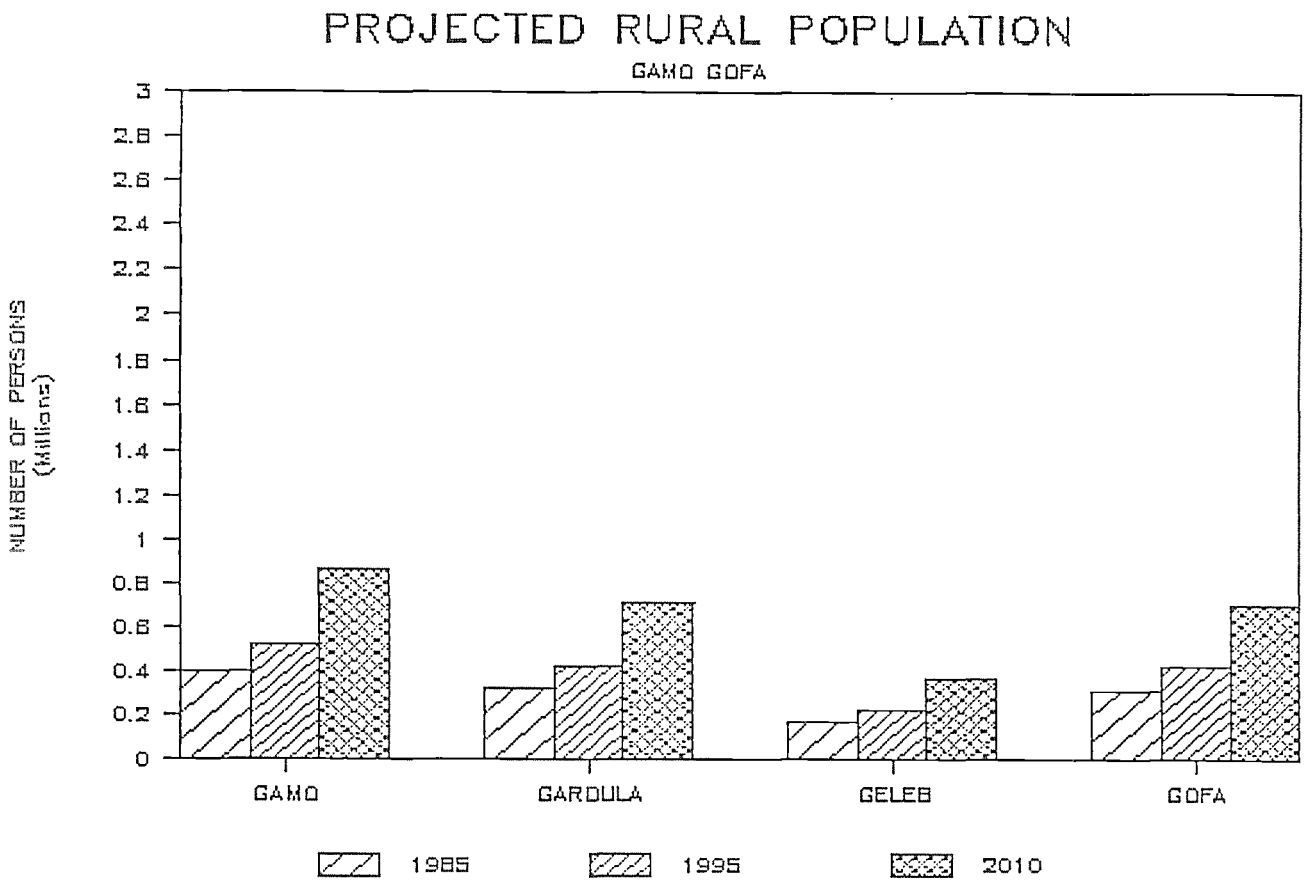
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NUMBER OF PERSONS (Millions)
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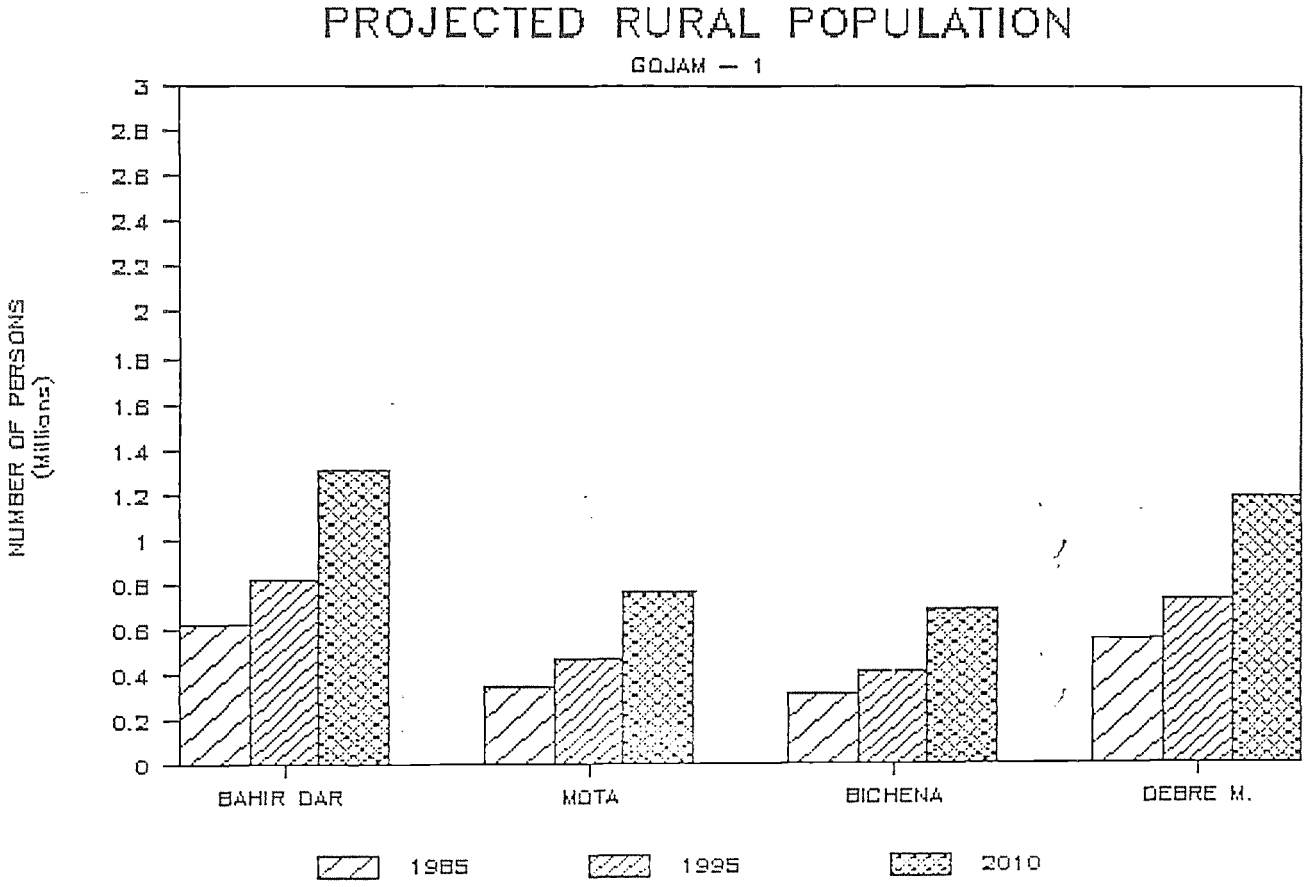
PROJECTED RURAL POPULATION
GOJAM — 1
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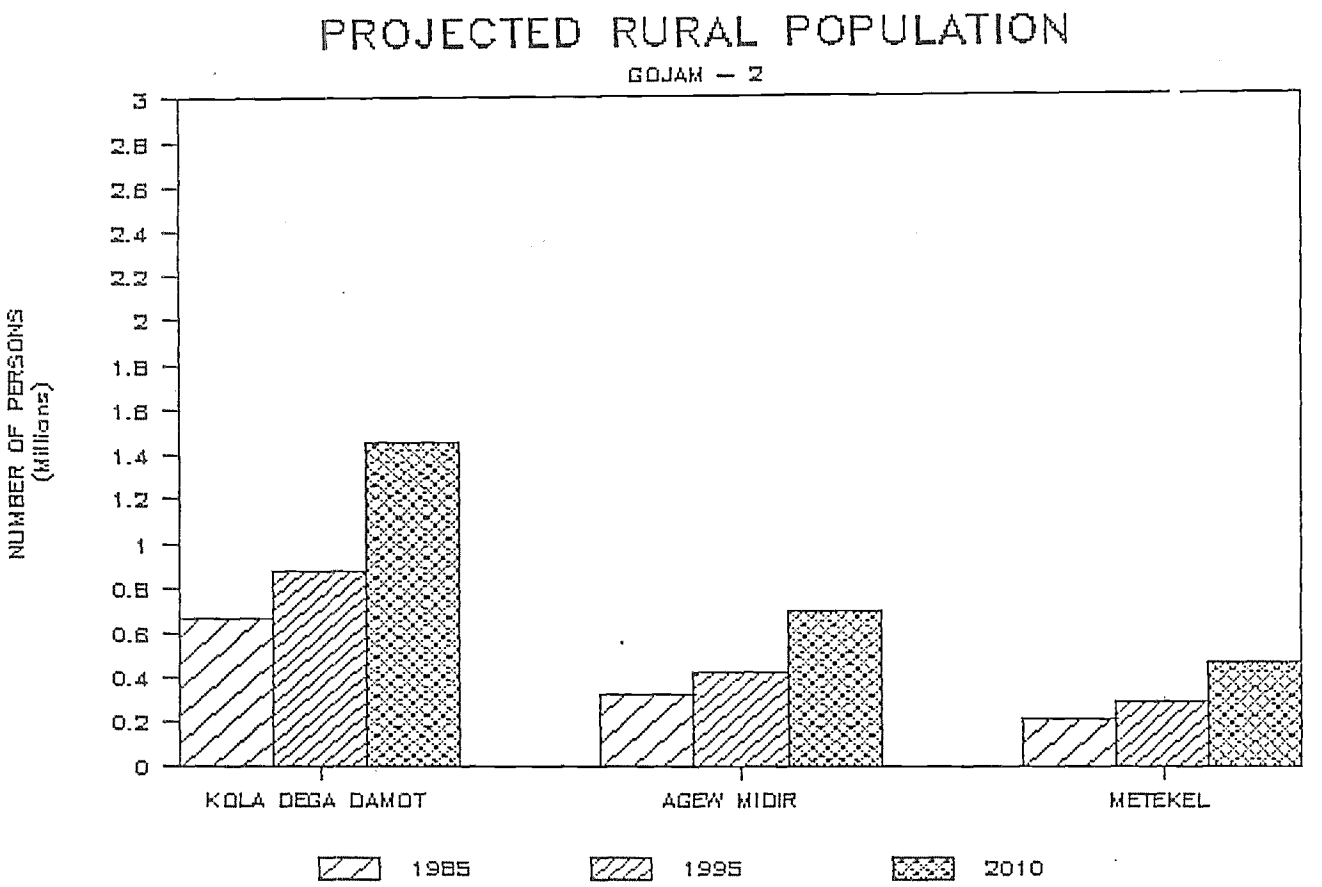
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GOJAM — 2
NUMBER OF PERSONS (Millions)
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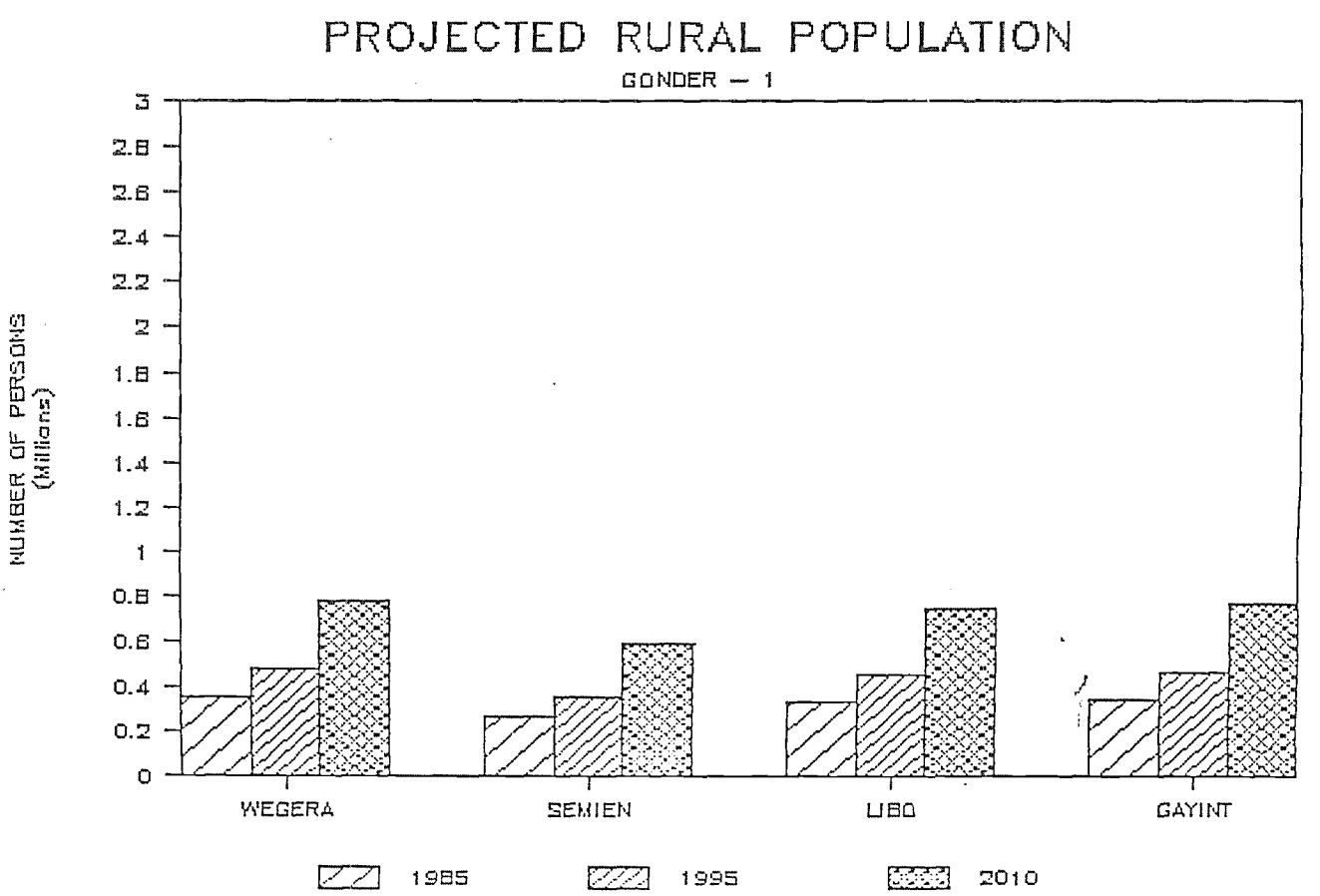
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GONDER — 1
NUMBER OF PERSONS (Millions)
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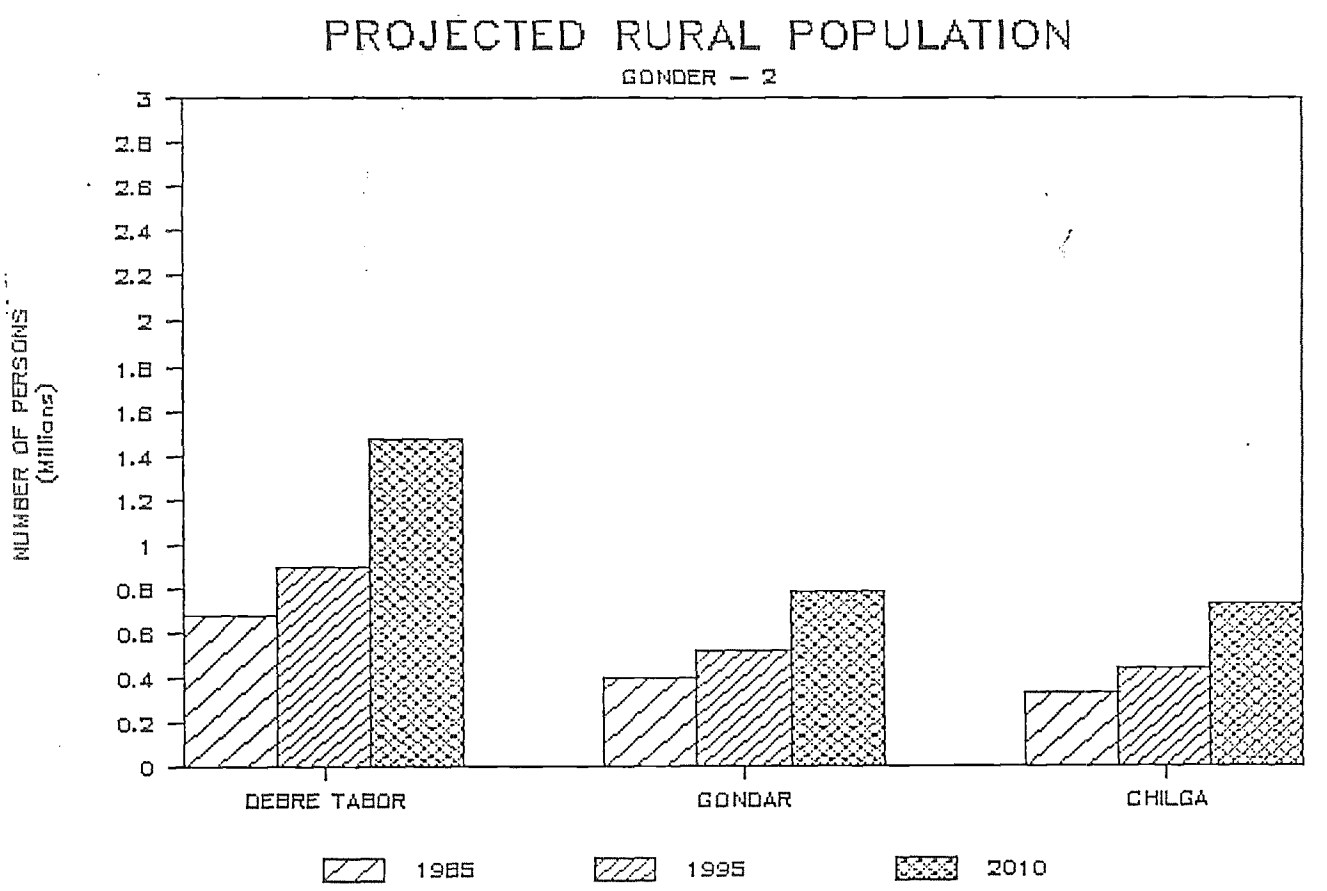
PROJECTED RURAL POPULATION
GONDER — 2
NUMBER OF PERSONS (Millions)
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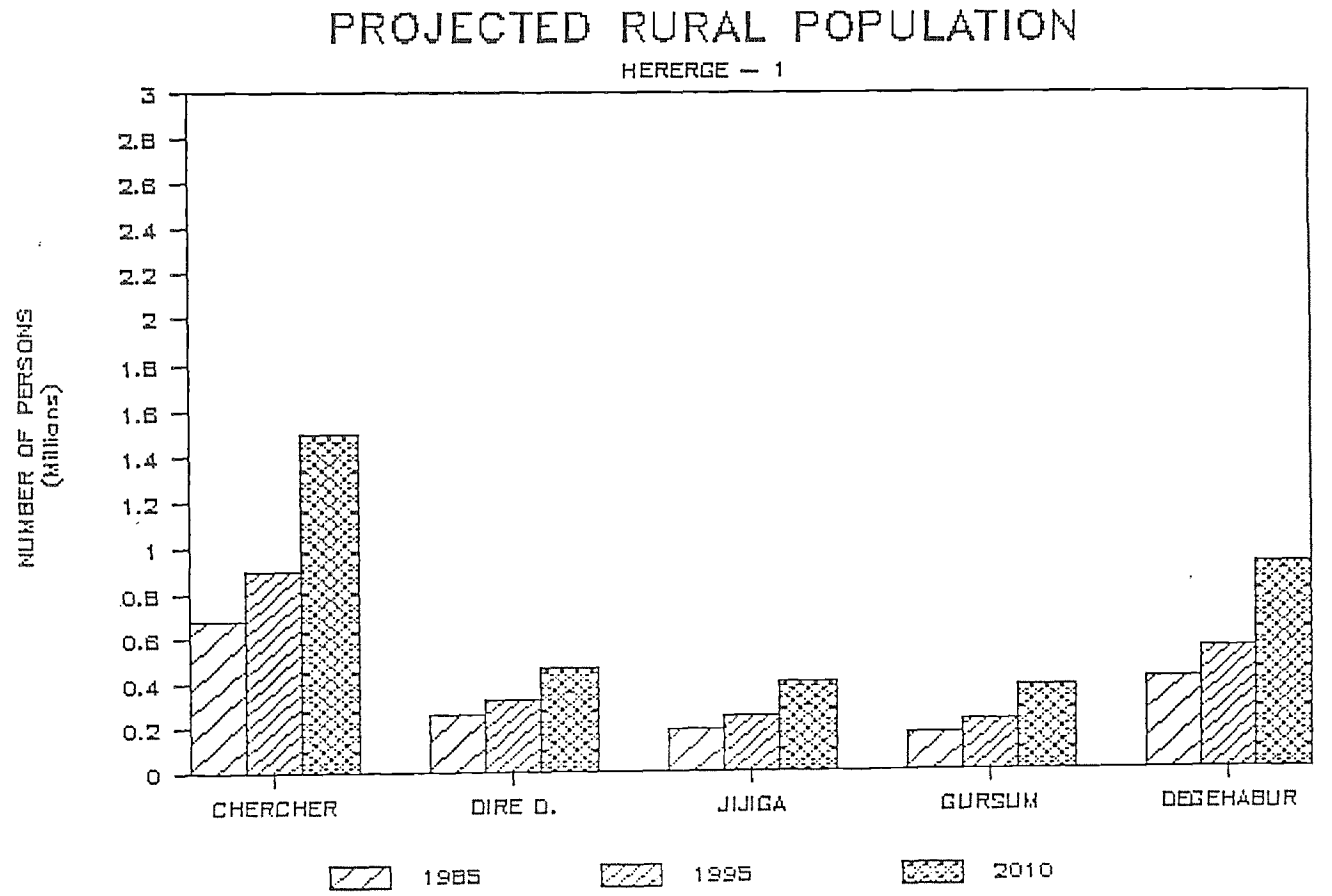
PROJECTED RURAL POPULATION
HERERGE — 1
NUMBER OF PERSONS (Millions)
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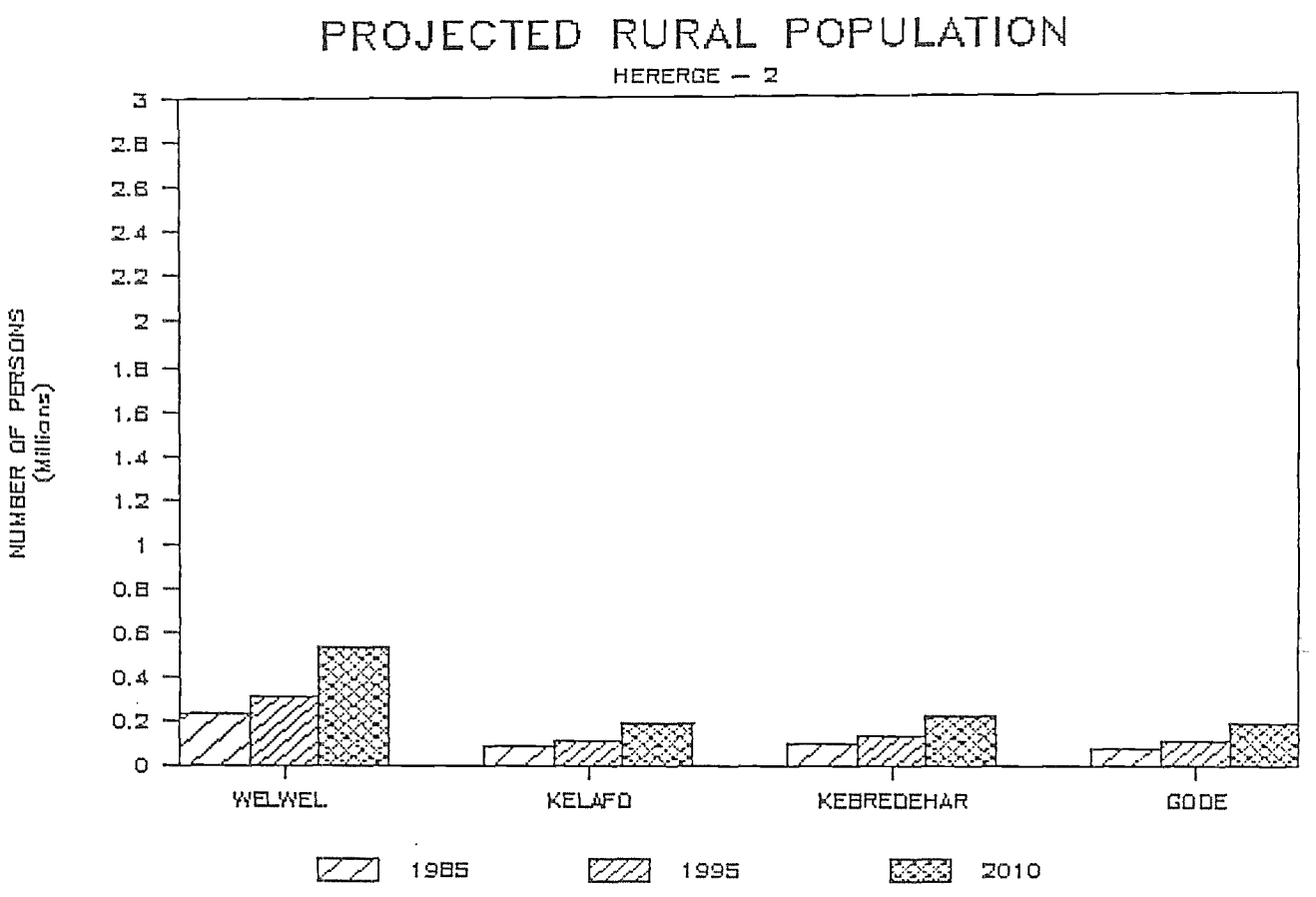
PROJECTED RURAL POPULATION
HERERGE – 2
NUMBER OF PERSONS (Millions)
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2.4
2.2
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1.6
1.4
1.2
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0.4
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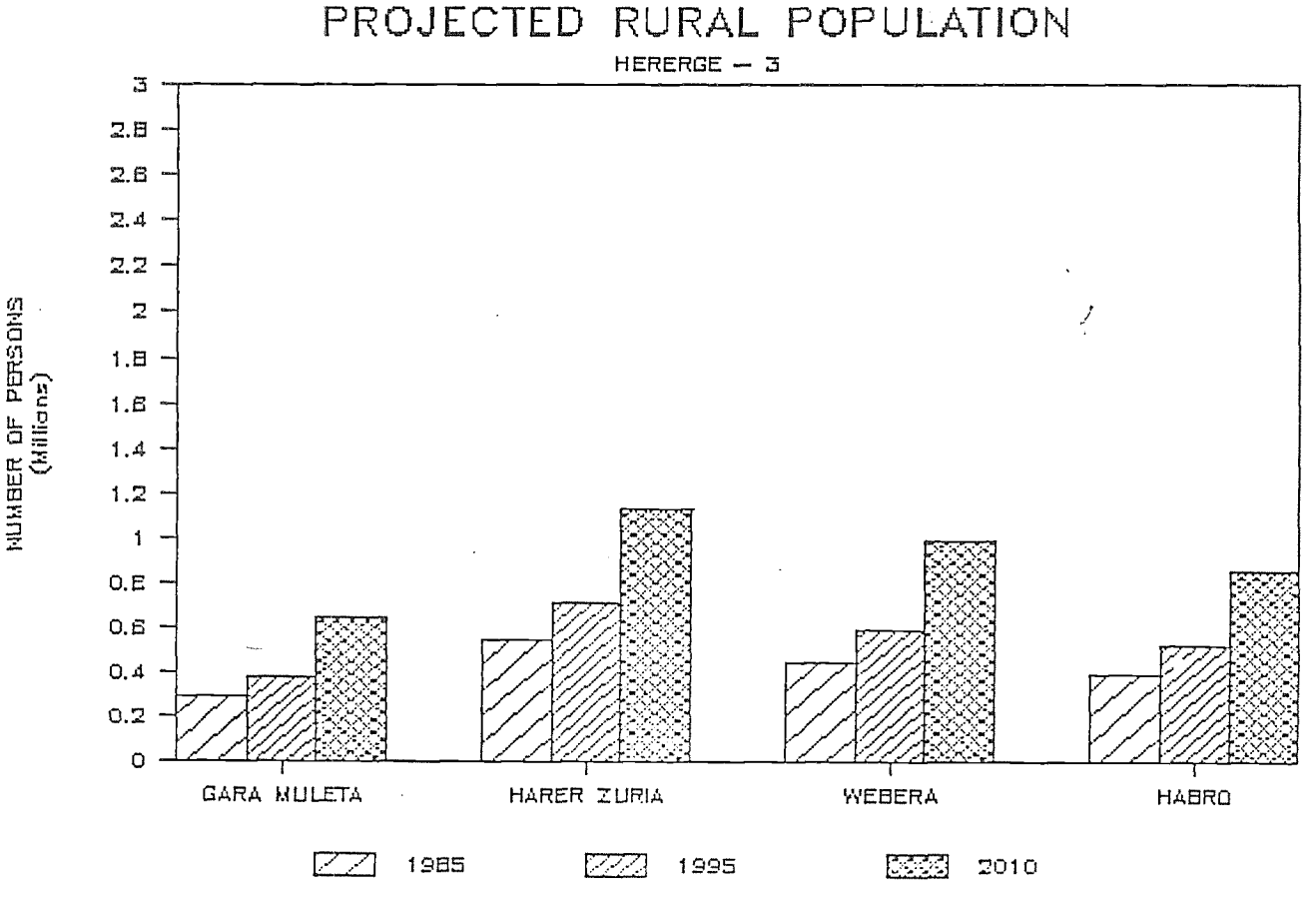
WELWEL
KELAFO
KEBREDEHAR
GODE
1985
1995
2010


PROJECTED RURAL POPULATION
HERERGE – 3
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
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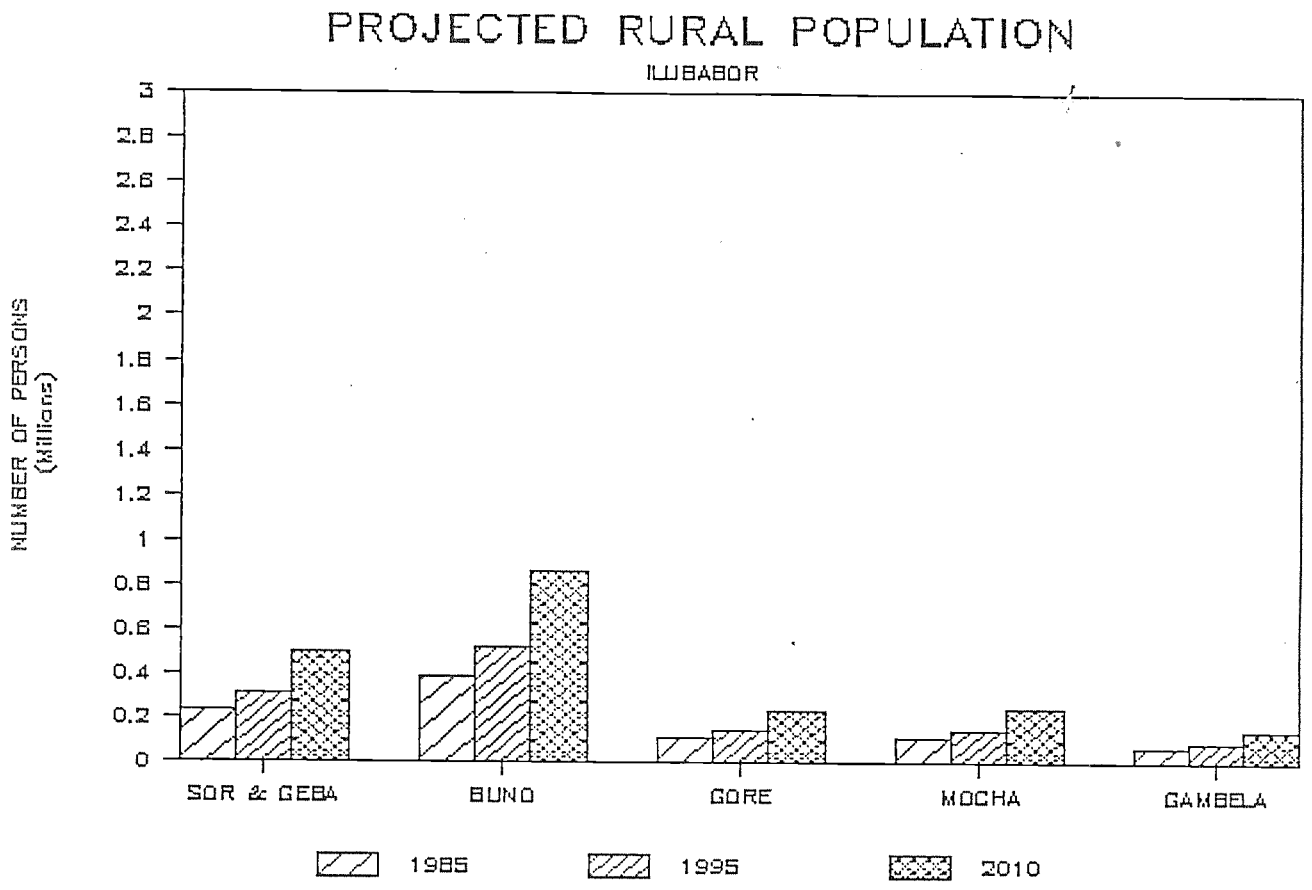
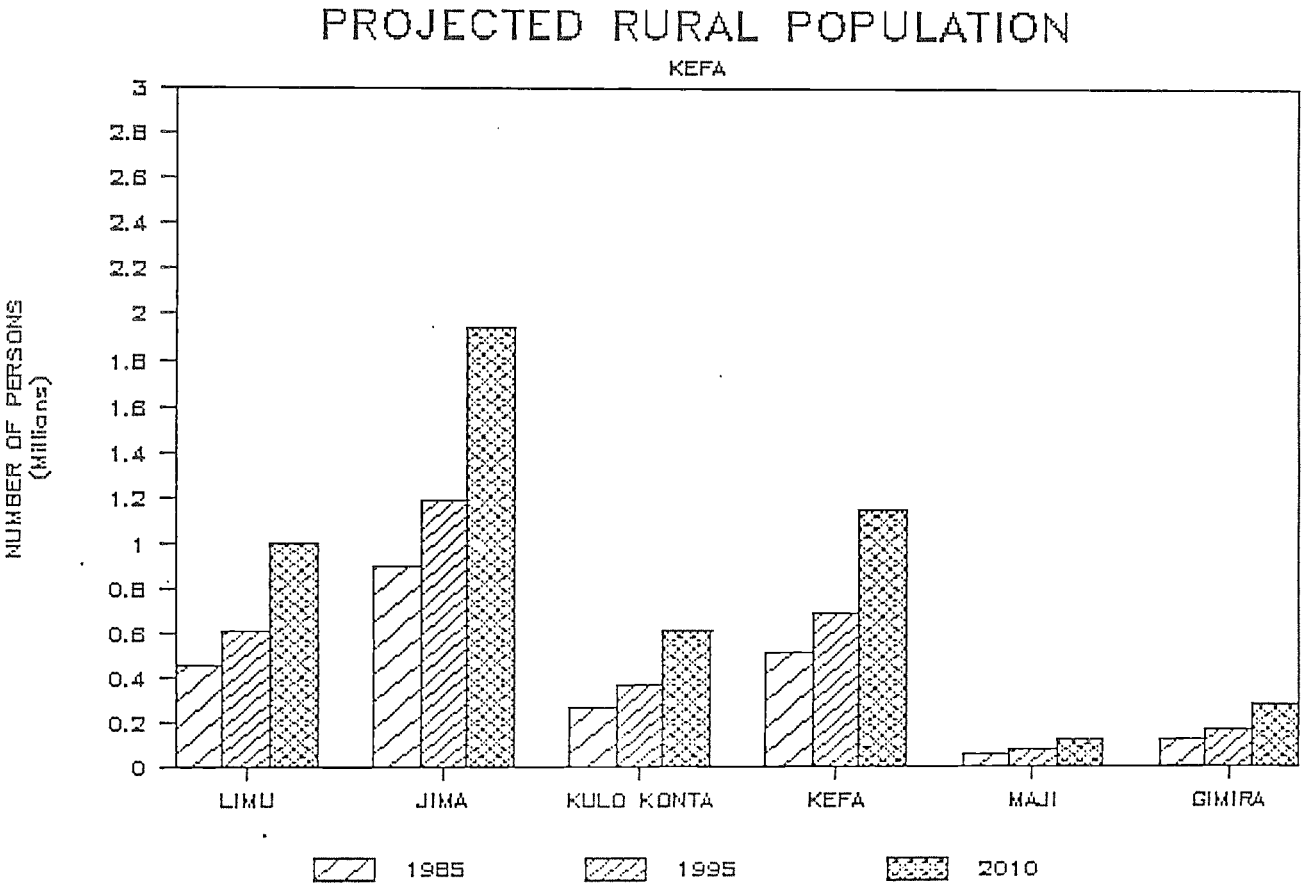
0.4
0.2
0
GARA MULETA
HARER ZURIA
WEBERA
HABRO
1985
1995
2010


PROJECTED RURAL POPULATION
ILUBABOR
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
SOR & GEBA
BUNO
GORE
MOCHA
GAMBELA
1985
1995
2010


PROJECTED RURAL POPULATION
KEFA
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
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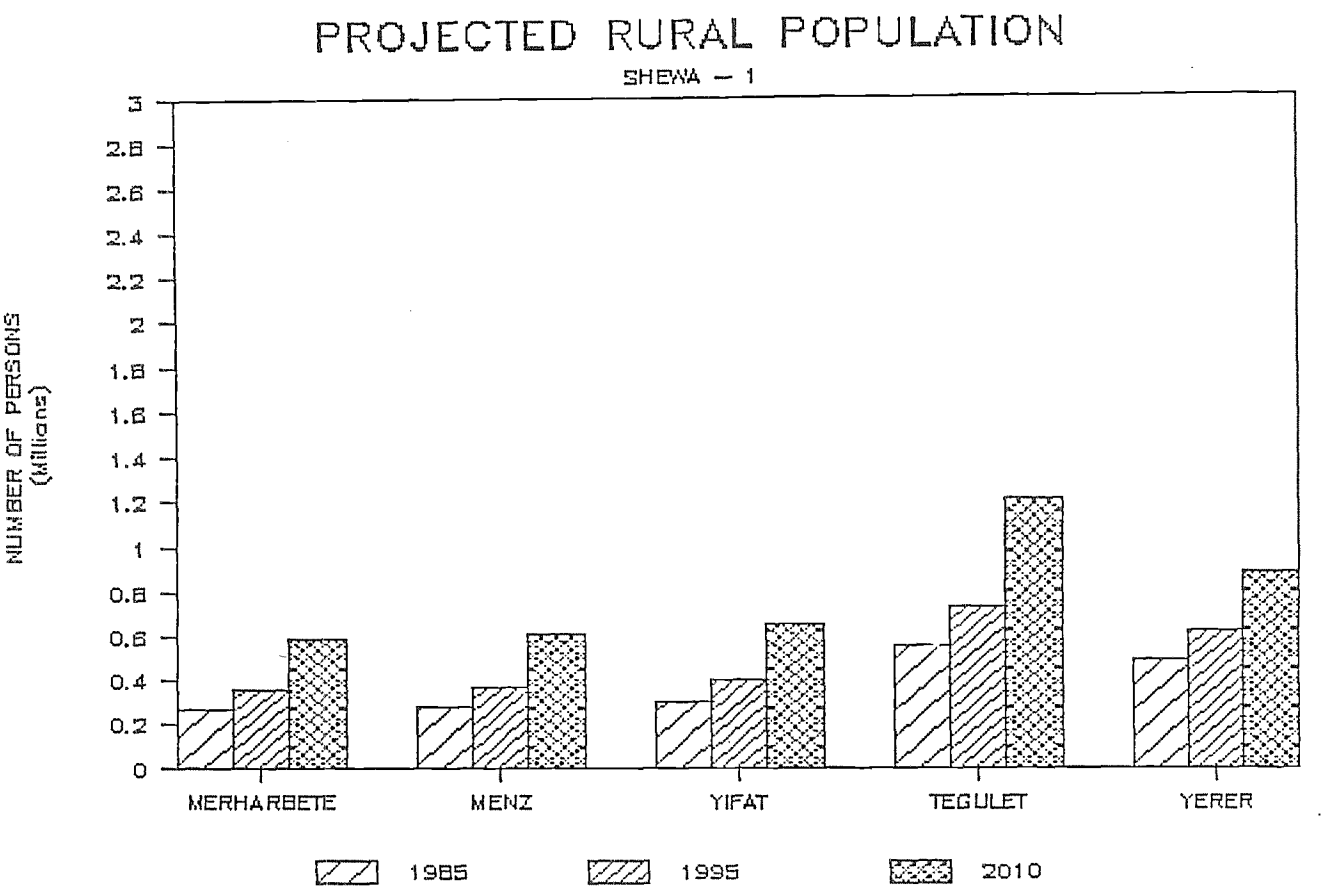
0.2
0
LIMU
JIMA
KULO KONTA
KEFA
MAJI
GIMIRA
1985
1995
2010


PROJECTED RURAL POPULATION
SHEWA — 1
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
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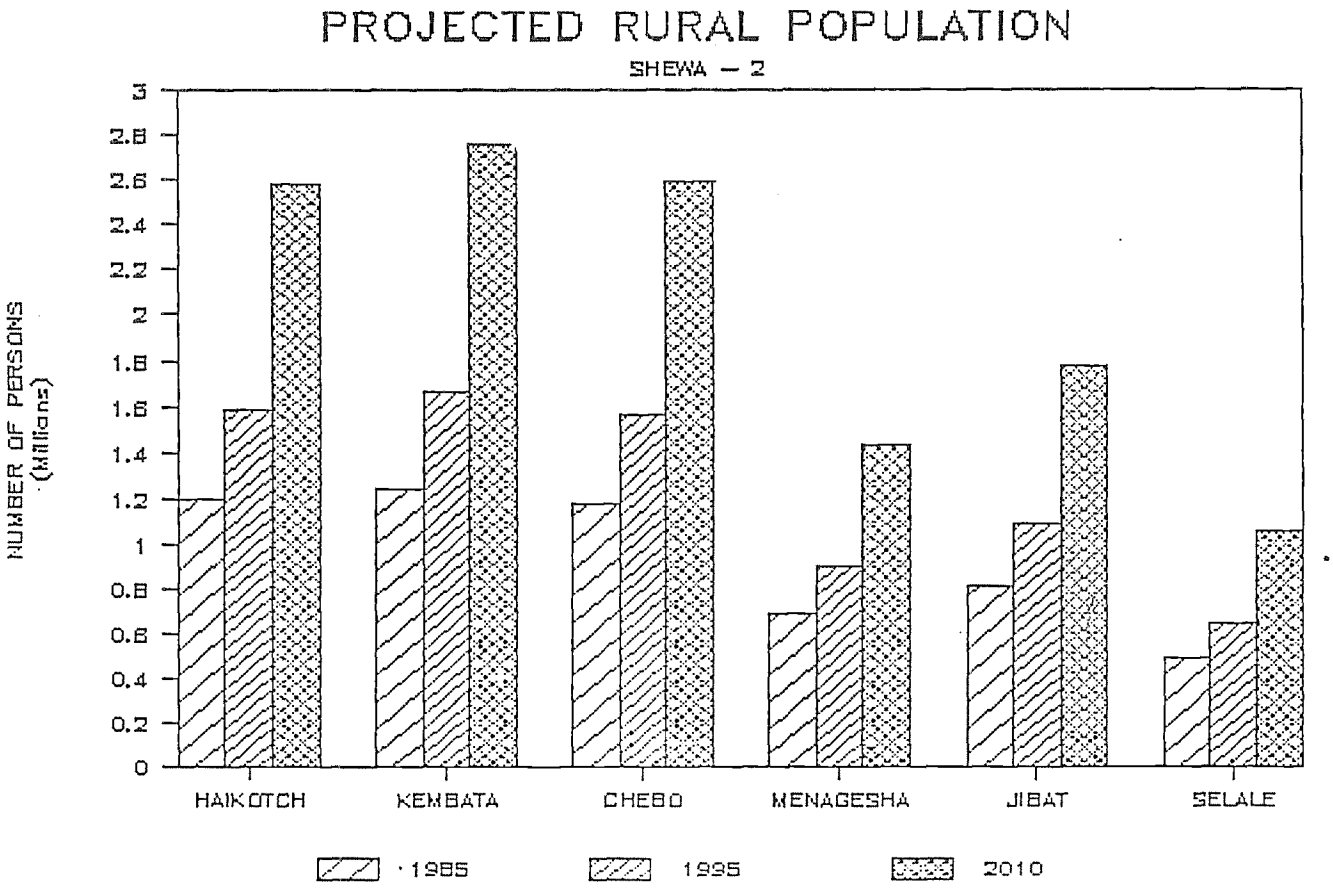
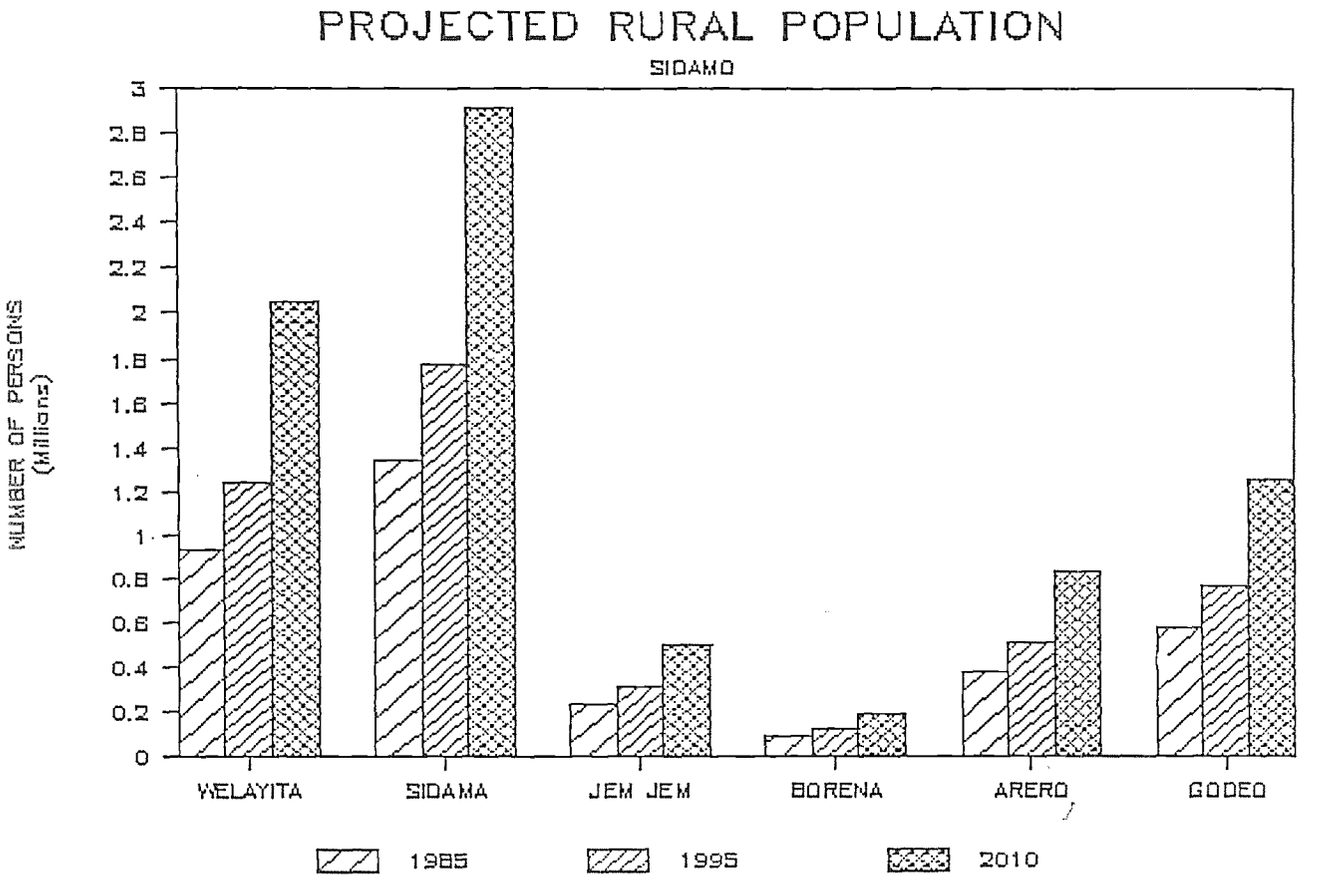
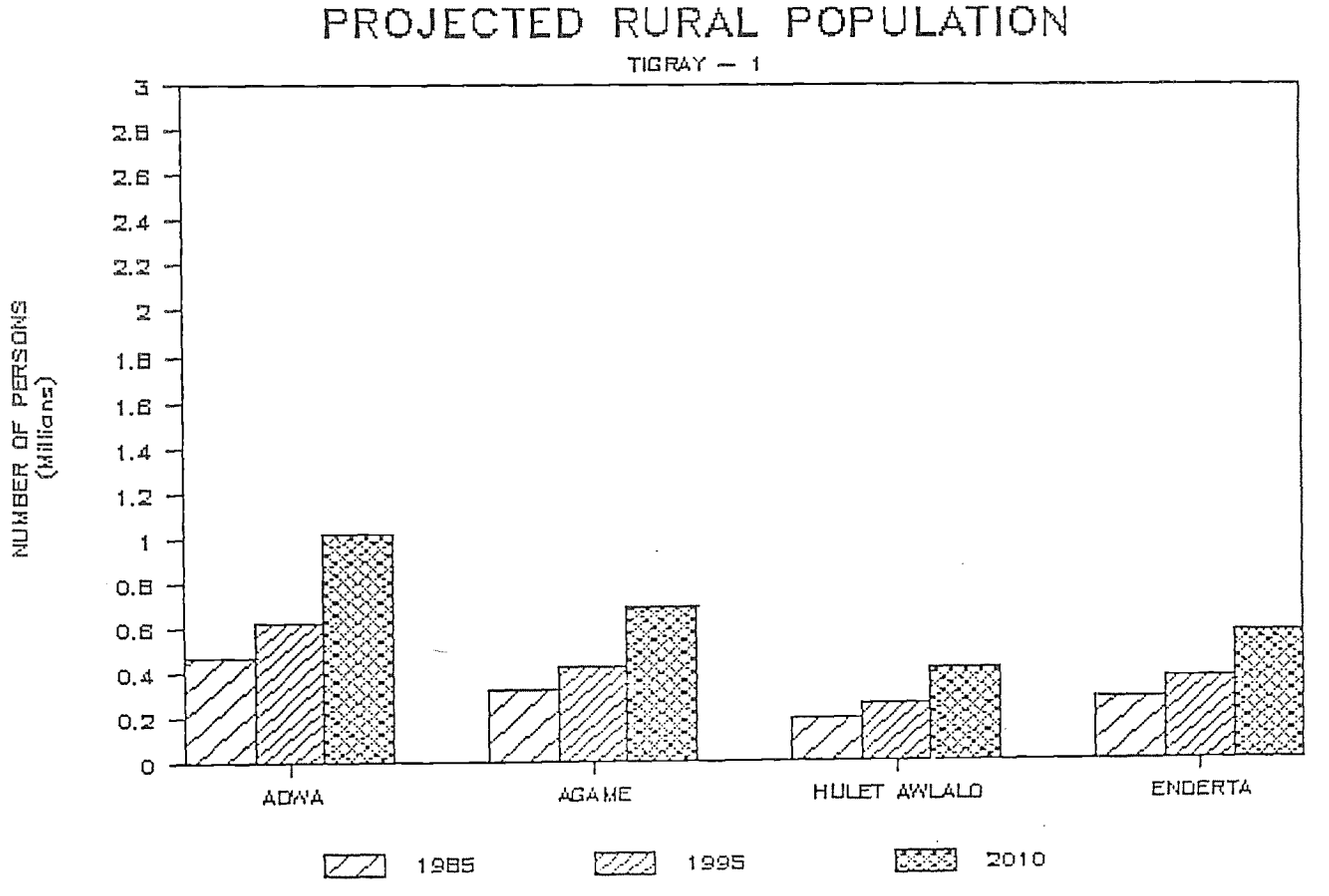
0.6
0.4
0.2
0
MERHABETE
MENZ
YIFAT
TEGULET
YERER
1985
1995
2010


PROJECTED RURAL POPULATION
SHEWA — 2
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
HAIKOTCH
KEMBATA
CHEBO
MENAGESHA
JIBAT
SELALE
1985
1995
2010


PROJECTED RURAL POPULATION
SIDAMO
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
WELAYITA
SIDAMA
JEM JEM
BORENA
ARERO
GODEO
1985
1995
2010


PROJECTED RURAL POPULATION
TIGRAY — 1
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
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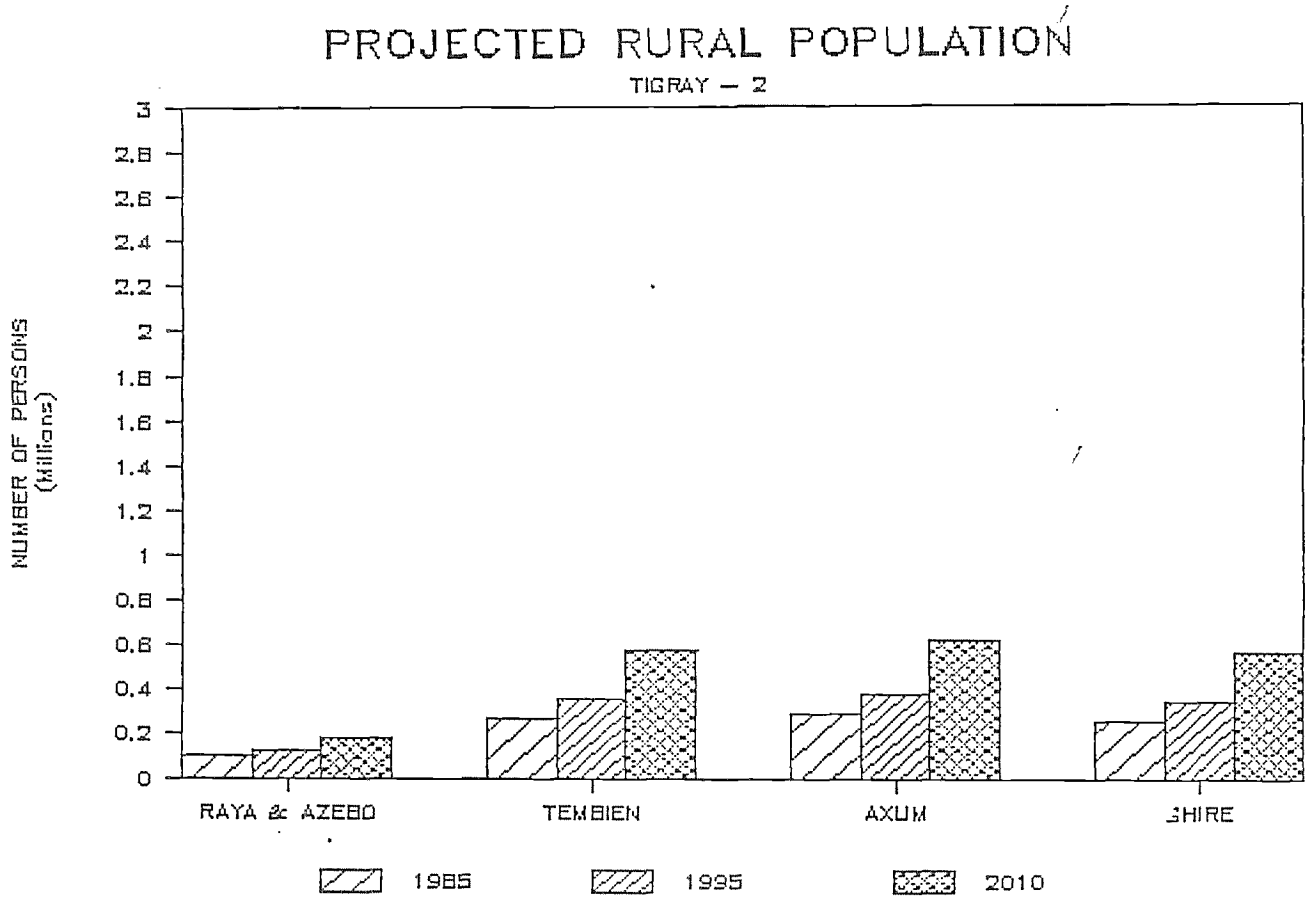
0.6
0.4
0.2
0
ADWA
AGAME
HULET AWLALO
ENDERTA
1985
1995
2010


PROJECTED RURAL POPULATION
TIGRAY – 2
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
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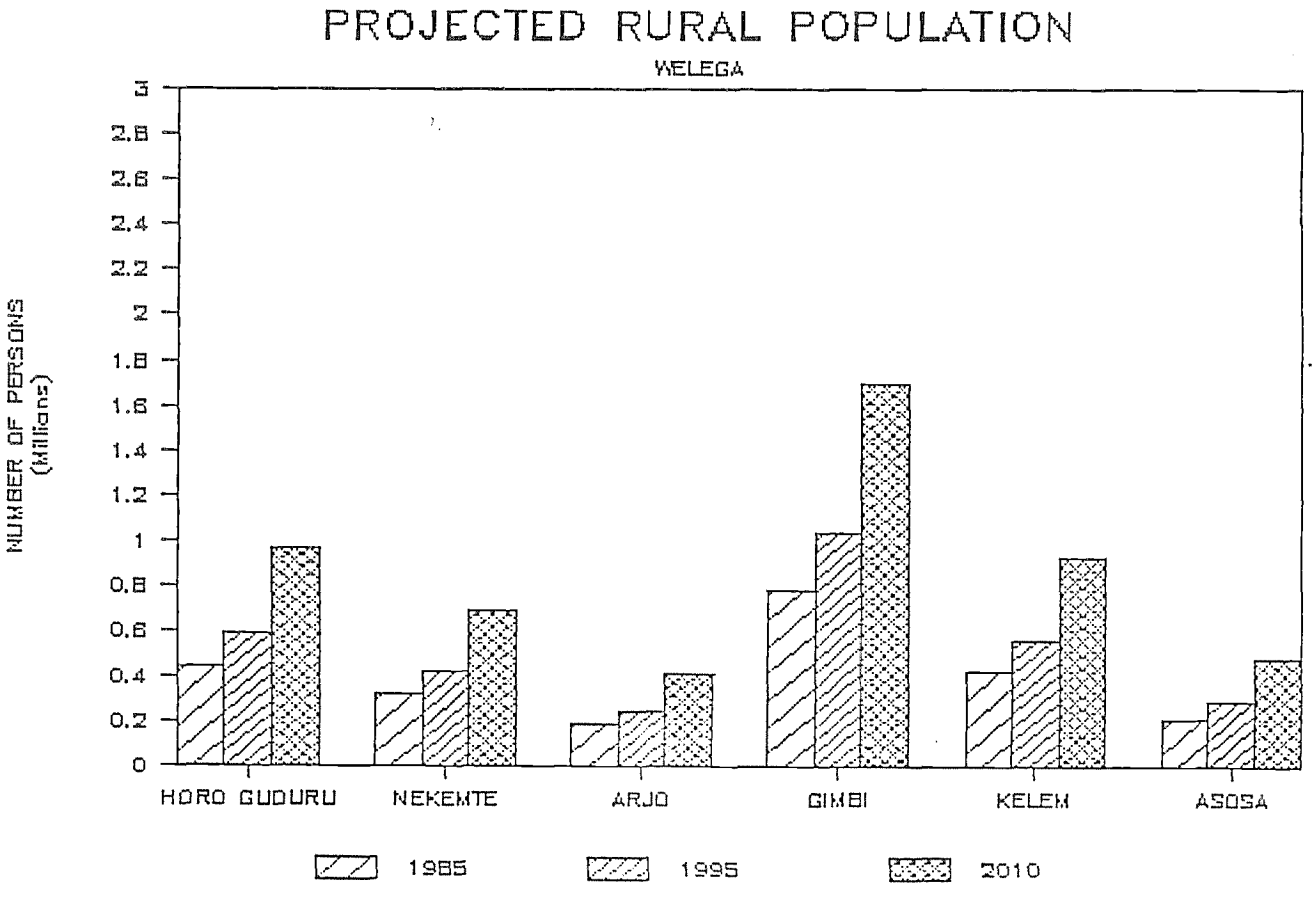
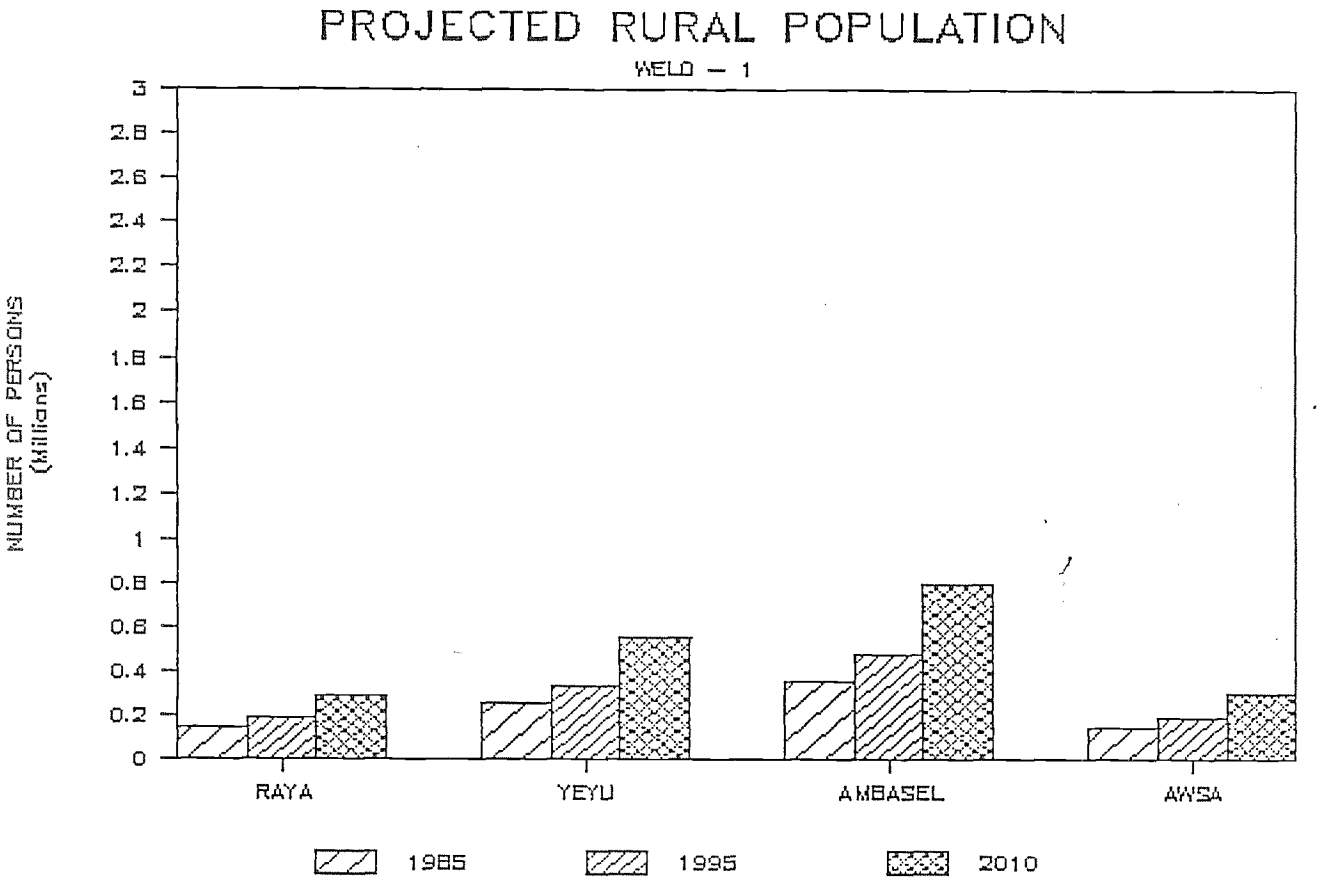
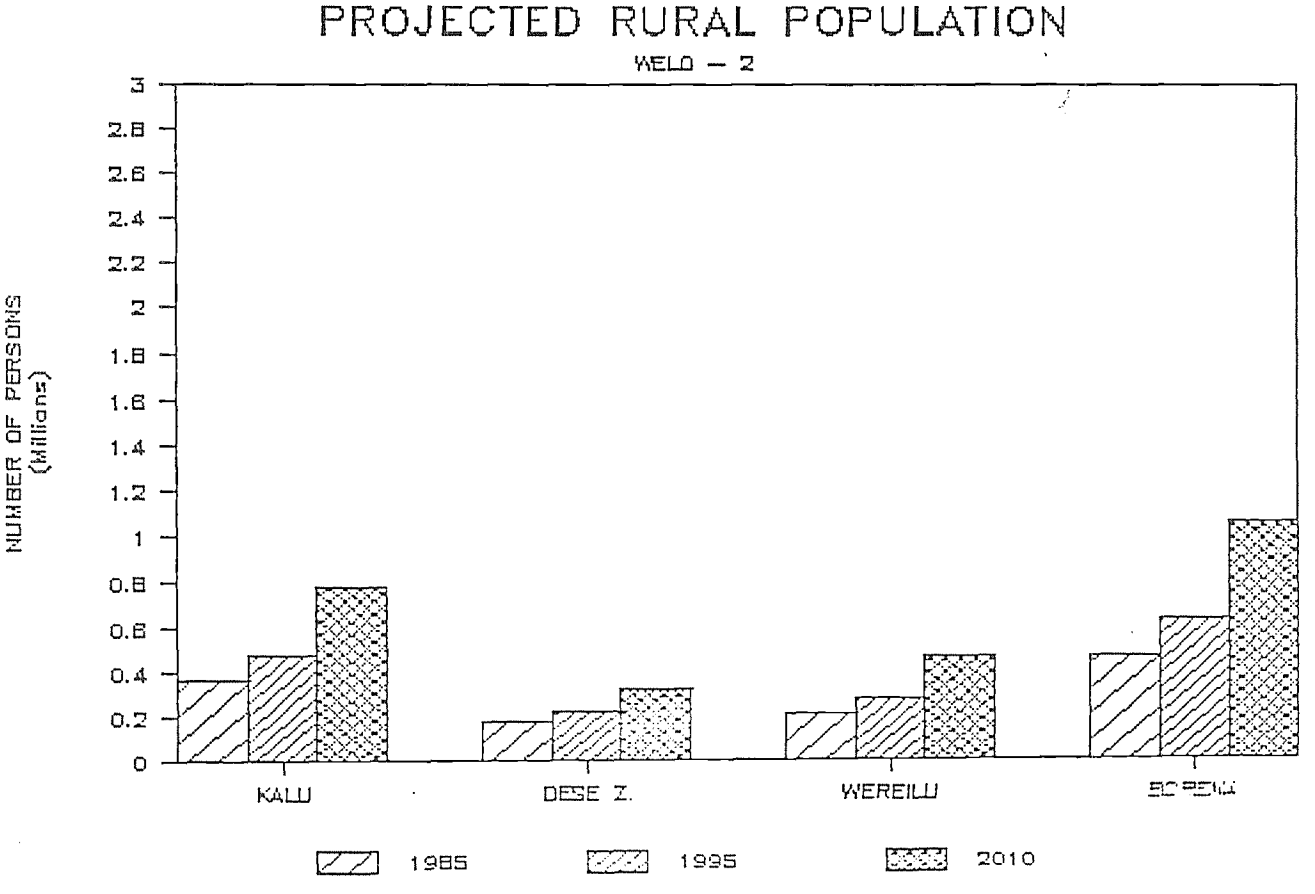
0.6
0.4
0.2
0
RAYA & AZEBO
TEMBIEN
AXUM
SHIRE
1985
1995
2010


PROJECTED RURAL POPULATION
WELEGA
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
HORO GUDURU
NEKEMTE
ARJO
GIMBI
KELEM
ASOSA
1985
1995
2010


PROJECTED RURAL POPULATION
WELO – 1
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
RAYA
YEYU
AMBASEL
AWSA
1985
1995
2010


PROJECTED RURAL POPULATION
WELO – 2
NUMBER OF PERSONS (Millions)
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2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
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0.8
0.6
0.4
0.2
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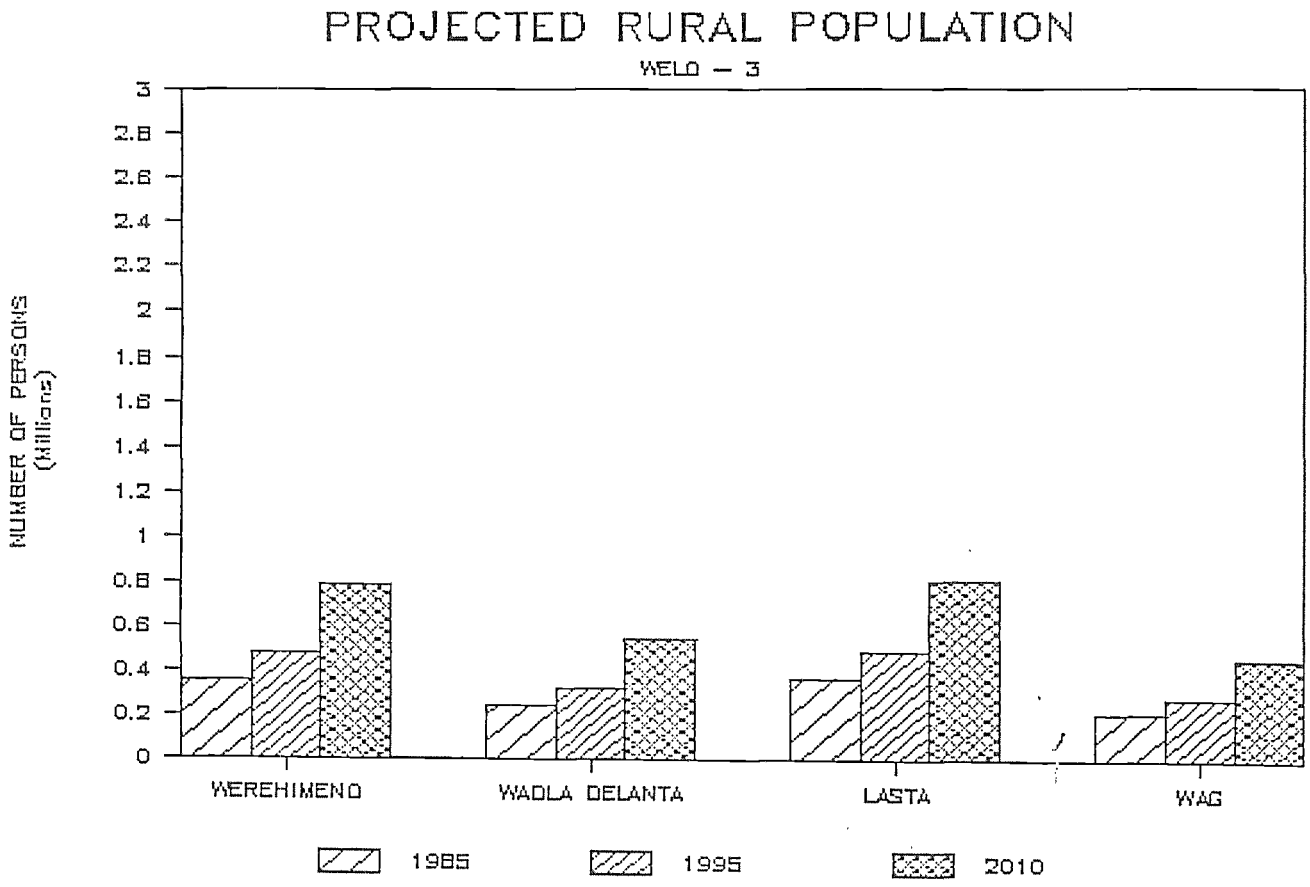
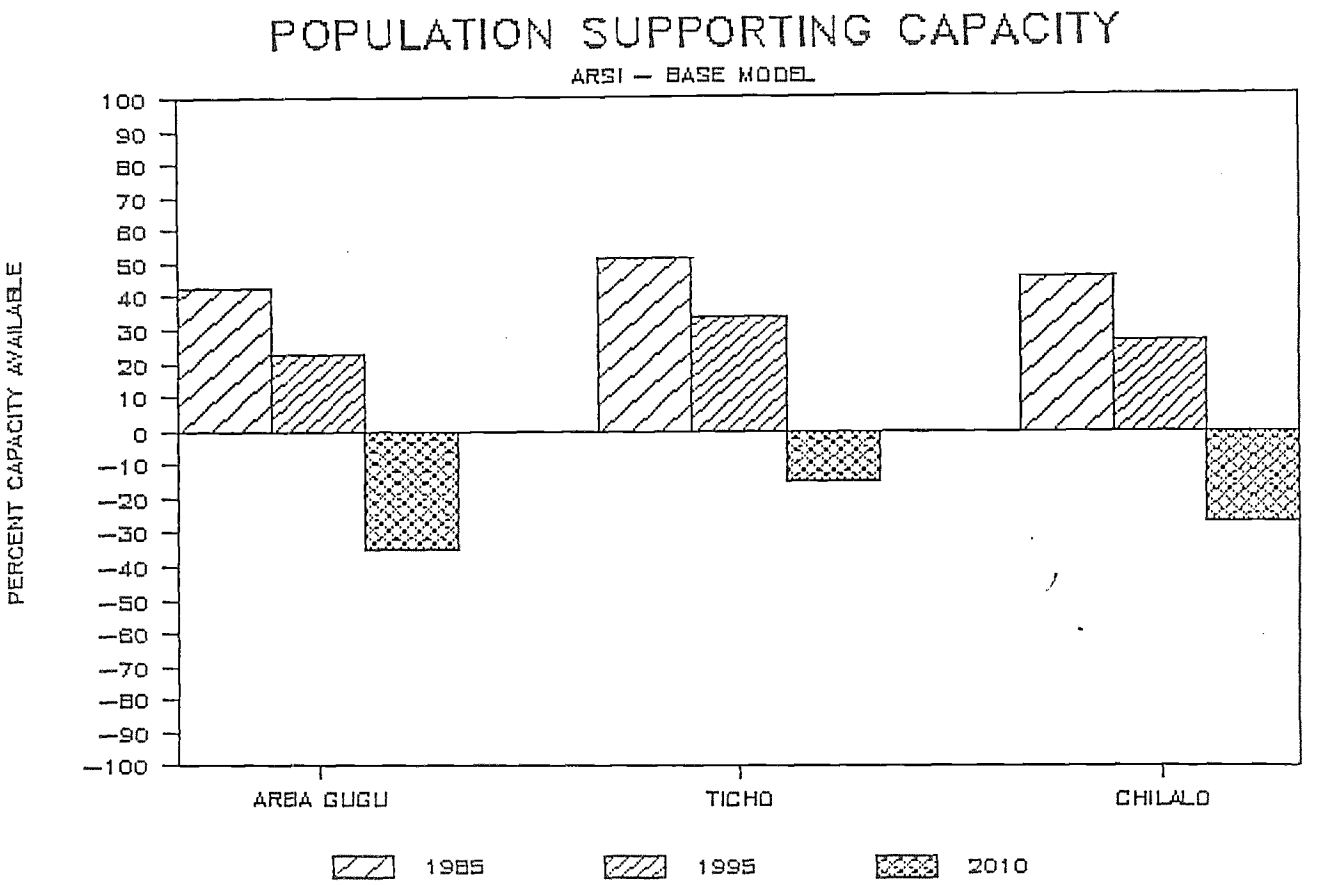
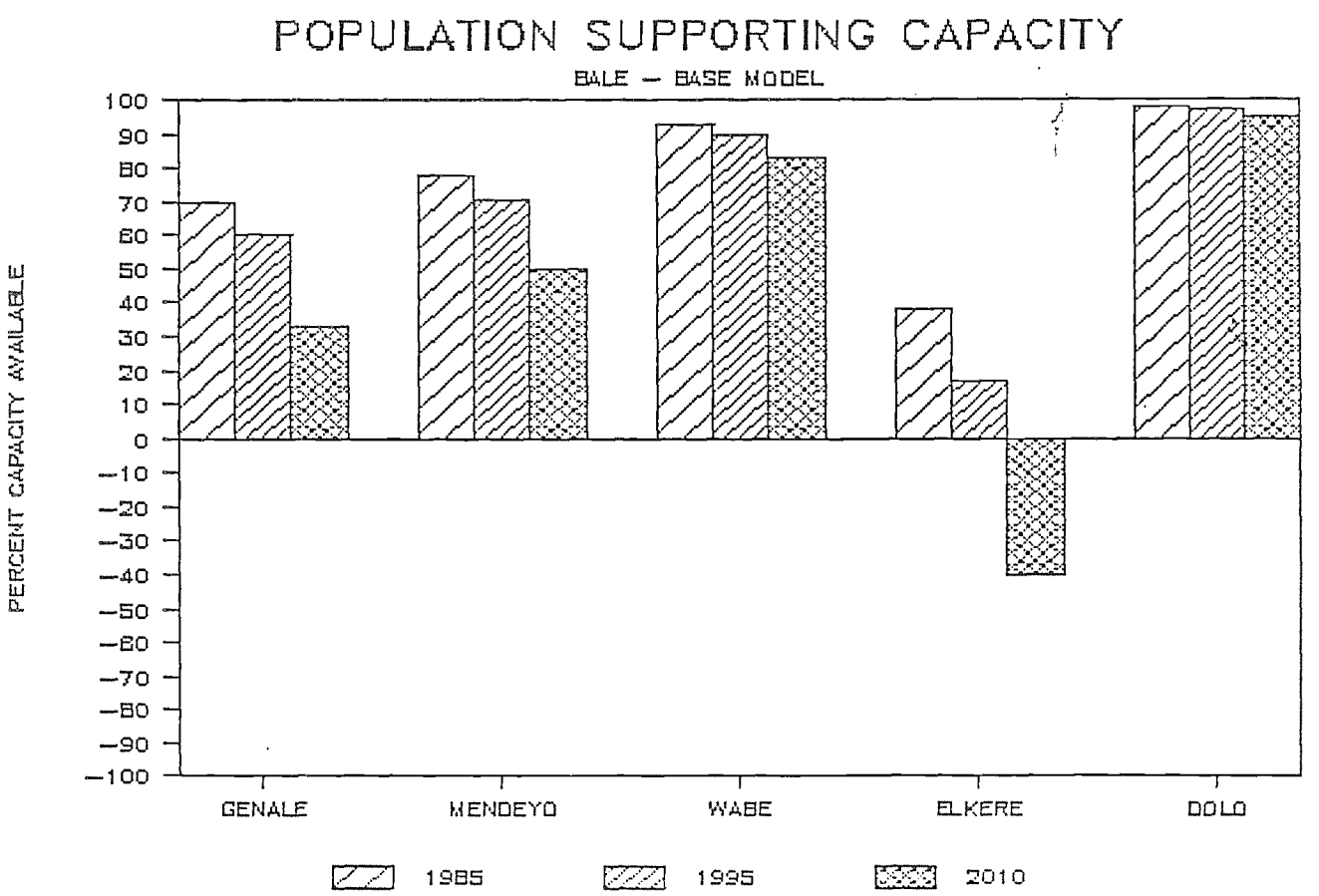
KALU
DESE Z.
WEREILU
1985
1995
2010


PROJECTED RURAL POPULATION
WELO – 3
NUMBER OF PERSONS (Millions)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
WEREHIMENO
WADLA DELANTA
LASTA
WAG
1985
1995
2010

POPULATION SUPPORTING CAPACITY

BASE MODEL


POPULATION SUPPORTING CAPACITY
ARSI — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
80
70
60
50
40
30
20
10
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
−100
ARBA GUGU
TICHO
CHILALO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
BALE — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
80
70
60
50
40
30
20
10
0
−10
−20
−30
−40
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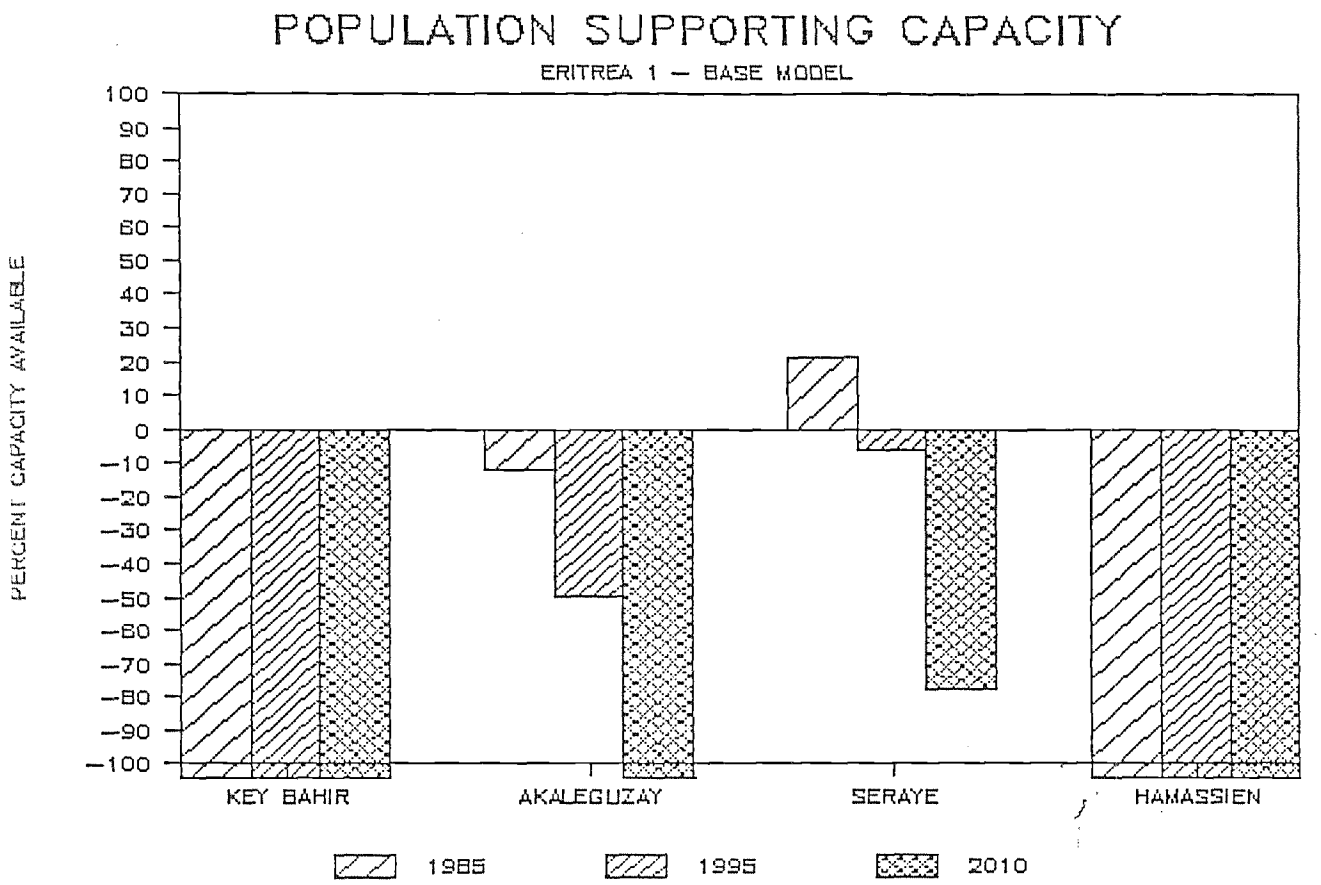
−80
−90
−100
GENALE
MENDEYO
WABE
ELKERE
DOLO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
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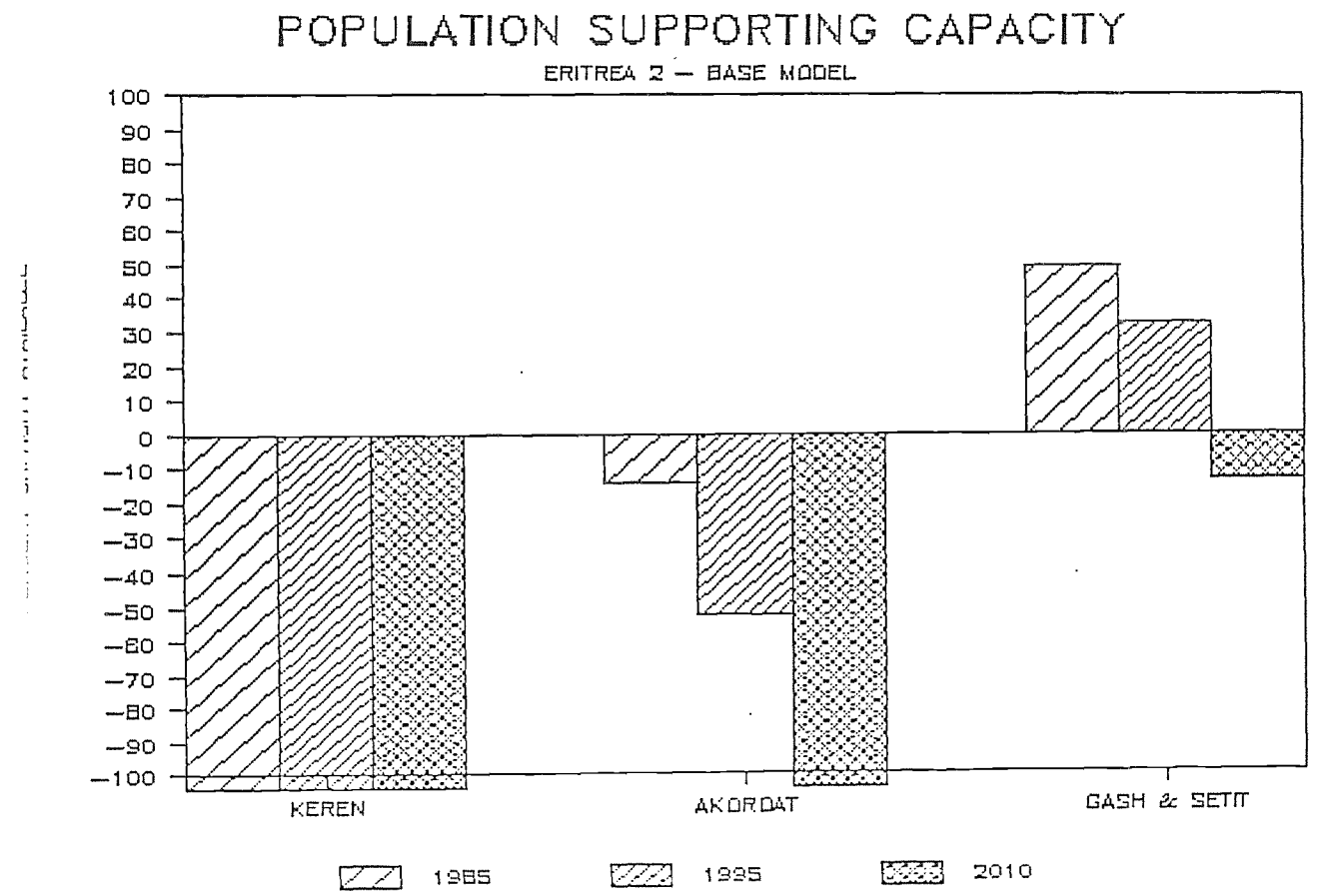
70
60
50
40
30
20
10
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
−100
KEY BAHIR
AKALEGUZAY
SERAYE
HAMASSIEN
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 2 — BASE MODEL
100
90
80
70
60
50
40
30
20
10
0
−10
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−40
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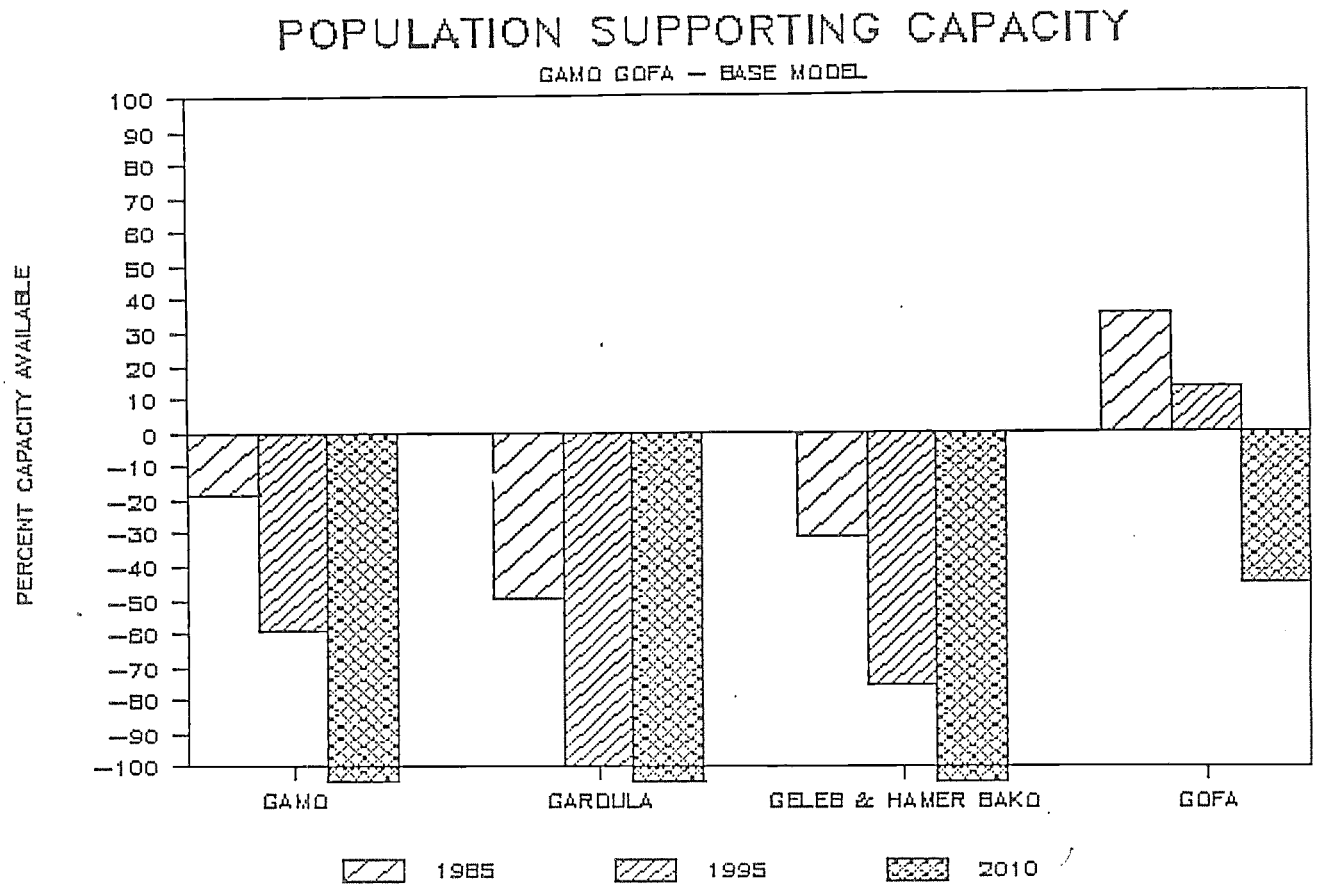
−60
−70
−80
−90
−100
KEREN
AKORDAT
GASH & SETIT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GAMO GOFA — BASE MODEL
PERCENT CAPACITY AVAILABLE
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90
80
70
60
50
40
30
20
10
0
−10
−20
−30
−40
−50
−60
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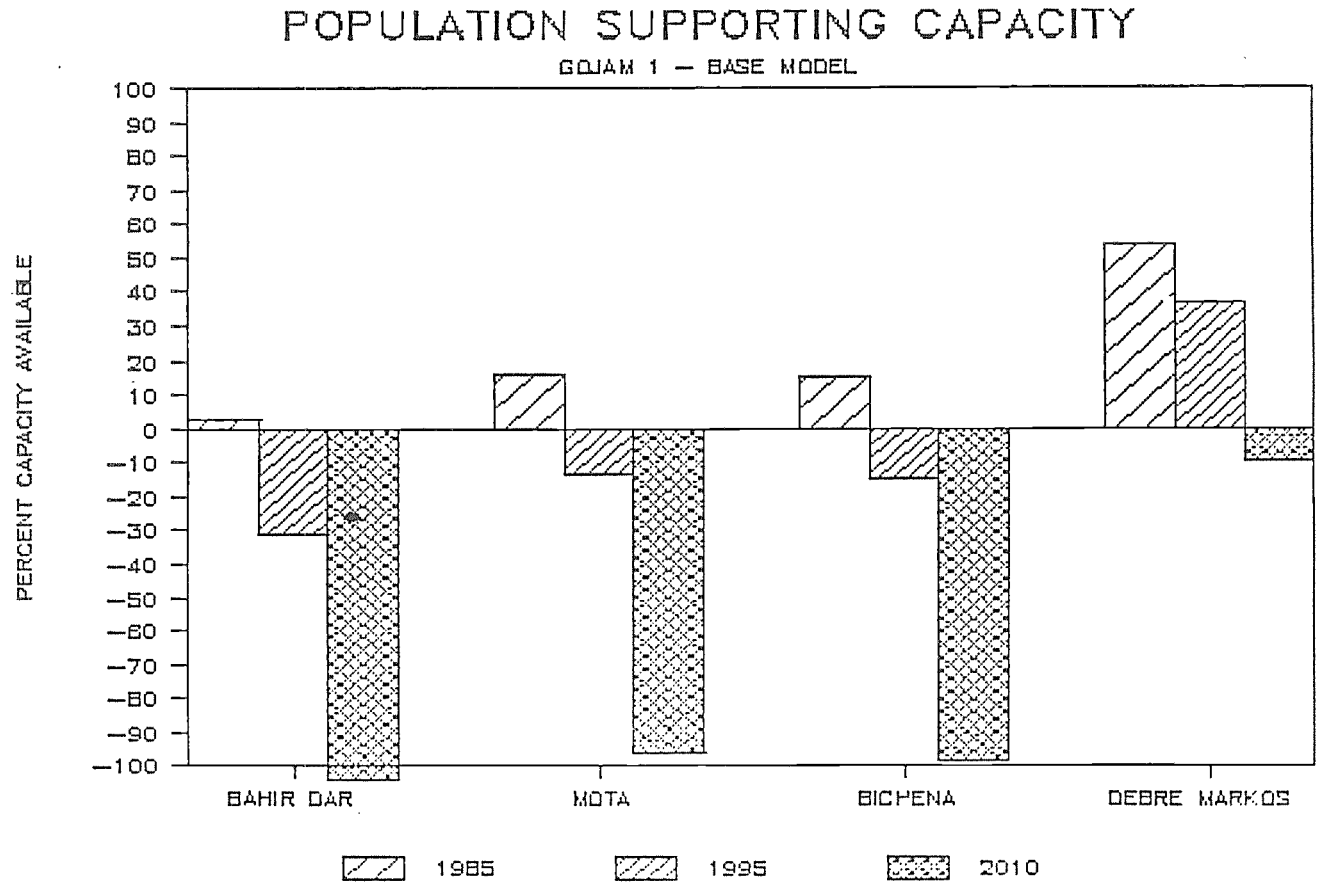
−80
−90
−100
GAMO
GARDULA
GELEB & HAMER BAKO
GOFA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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80
70
60
50
40
30
20
10
0
−10
−20
−30
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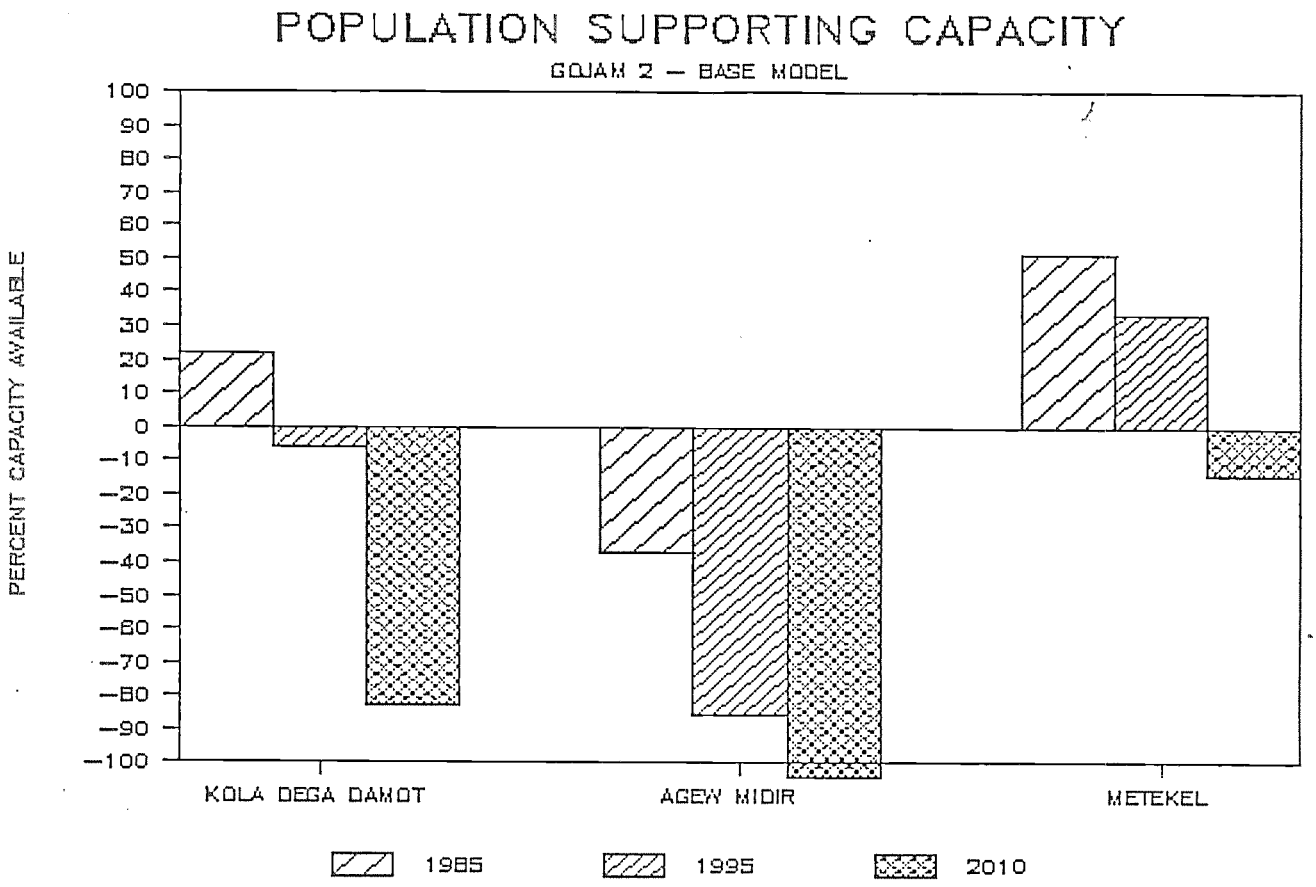
−70
−80
−90
−100
BAHIR DAR
MOTA
BICHENA
DEBRE MARKOS
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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90
80
70
60
50
40
30
20
10
0
−10
−20
−30
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−90
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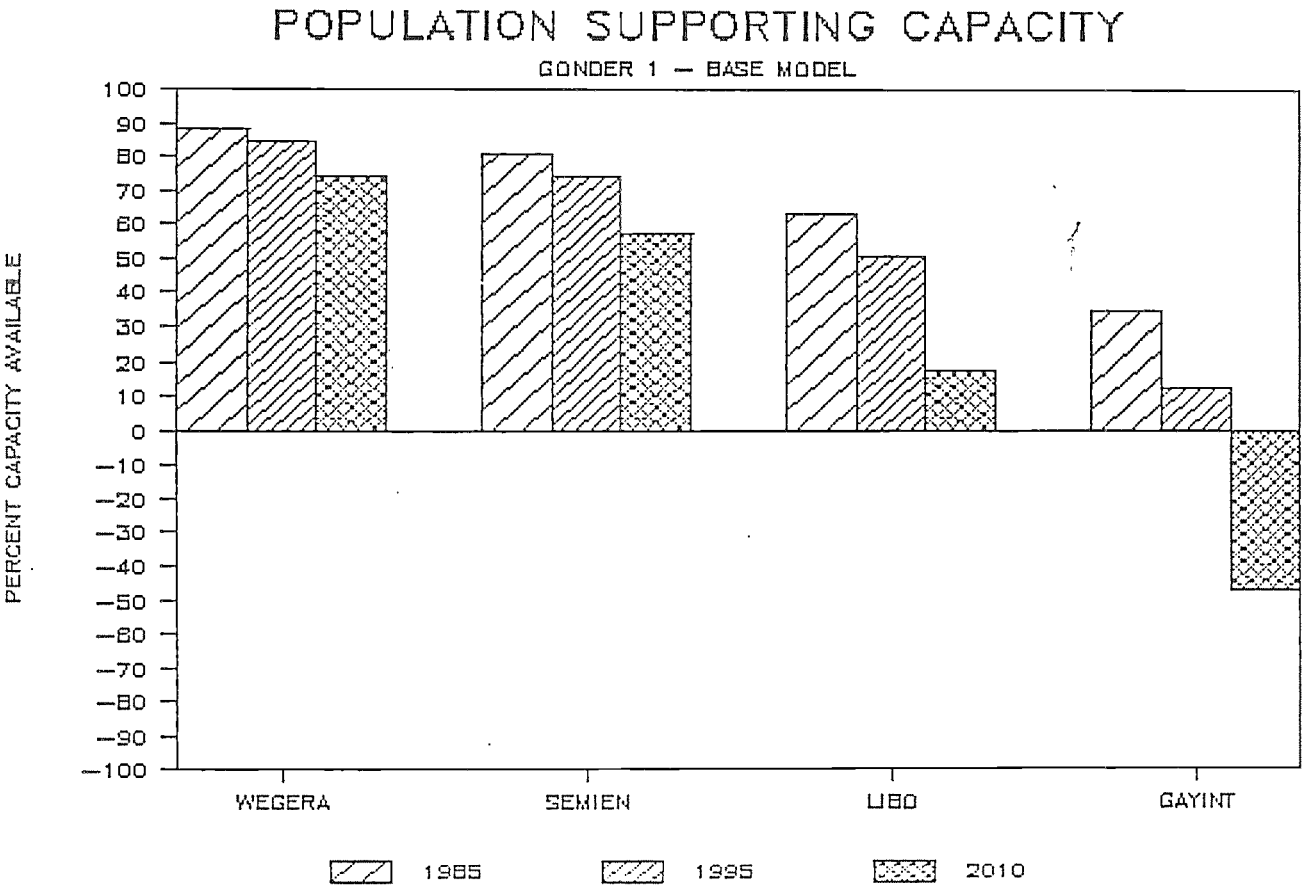
KOLA DEGA DAMOT
AGEW MIDIR
METEKEL
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
80
70
60
50
40
30
20
10
0
−10
−20
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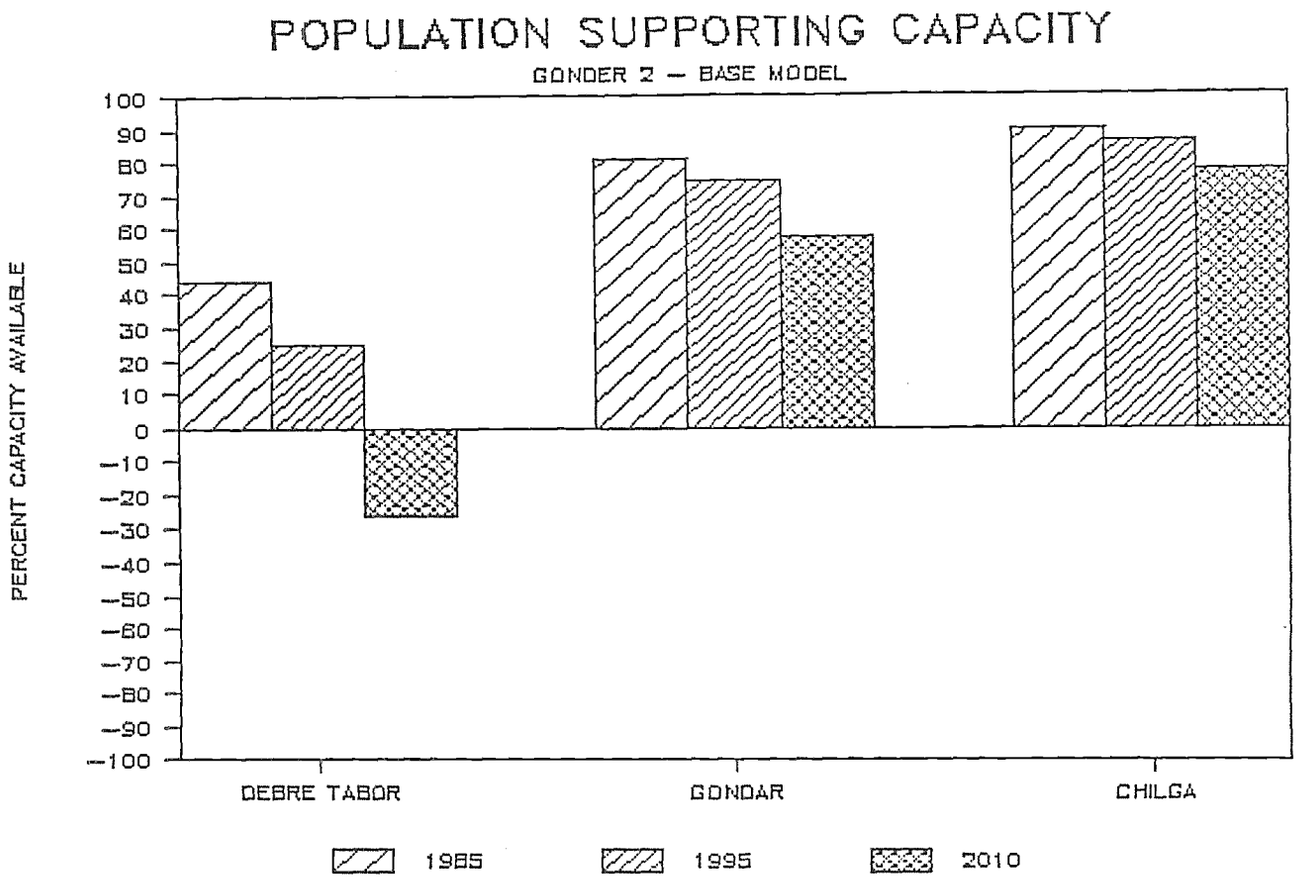
−80
−90
−100
WEGERA
SEMIEN
LIBO
GAYINT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
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70
60
50
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30
20
10
0
−10
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−80
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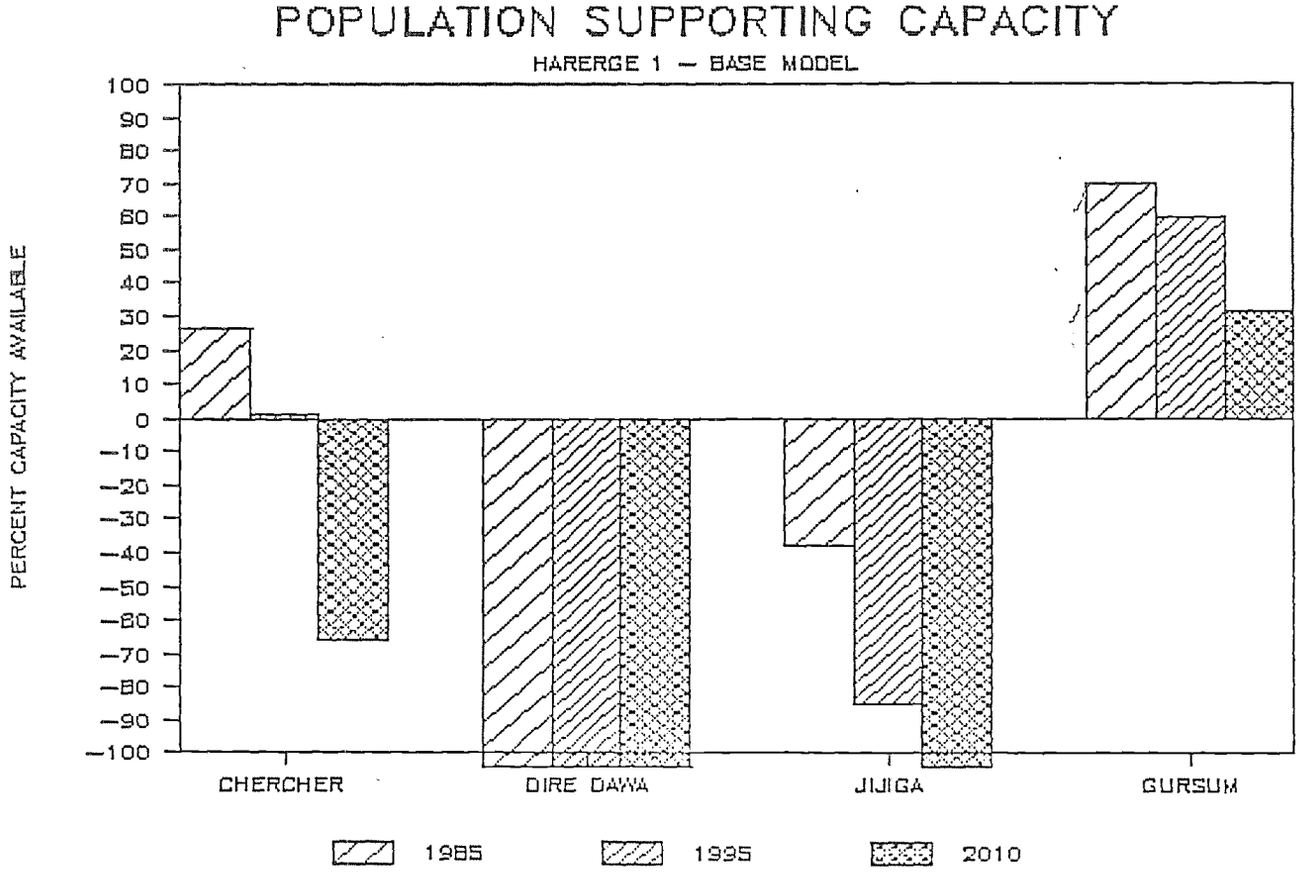
−100
DEBRE TABOR
GONDAR
CHILGA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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90
80
70
60
50
40
30
20
10
0
−10
−20
−30
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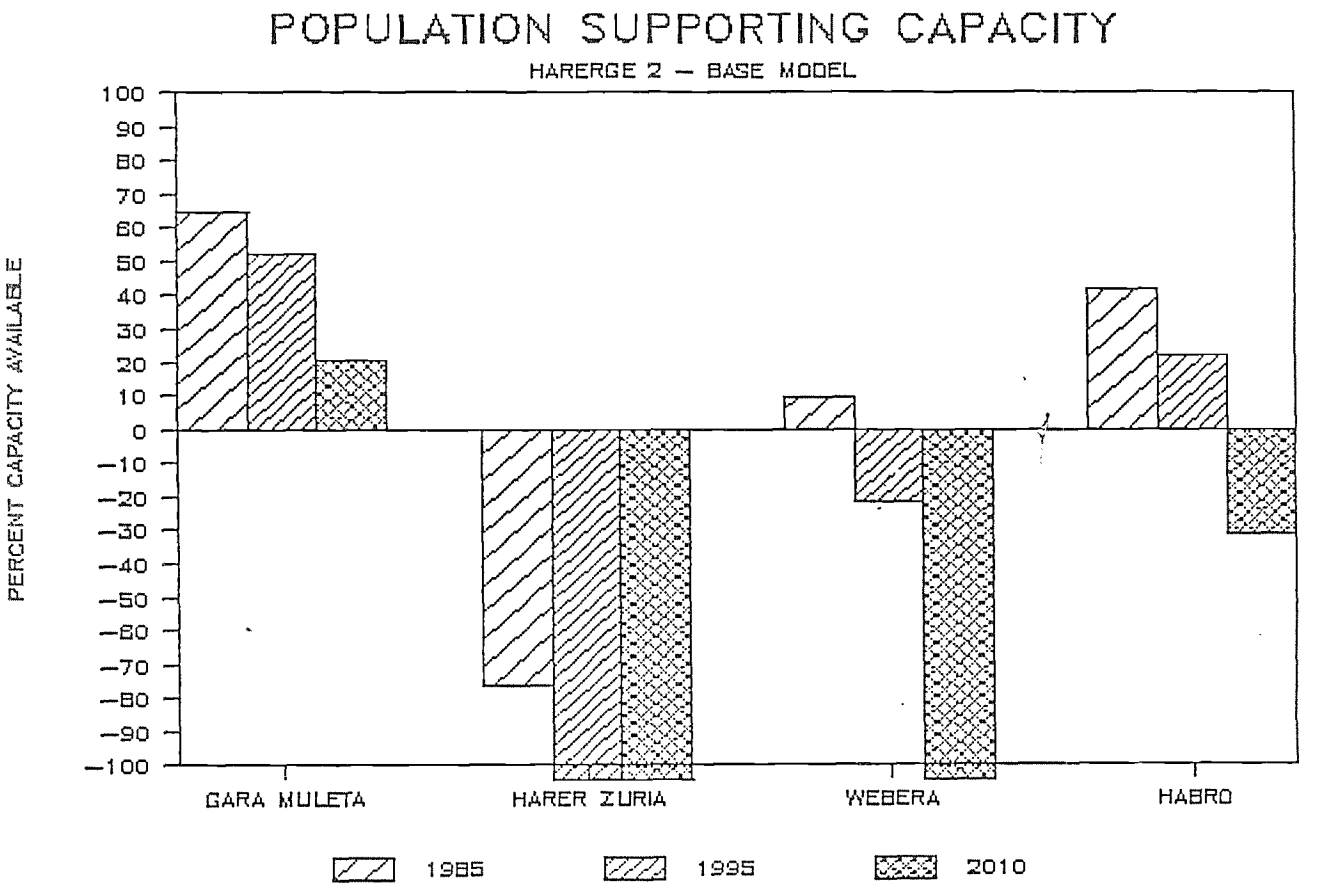
−80
−90
−100
CHERCHER
DIRE DAWA
JIJIGA
GURSUM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
80
70
60
50
40
30
20
10
0
−10
−20
−30
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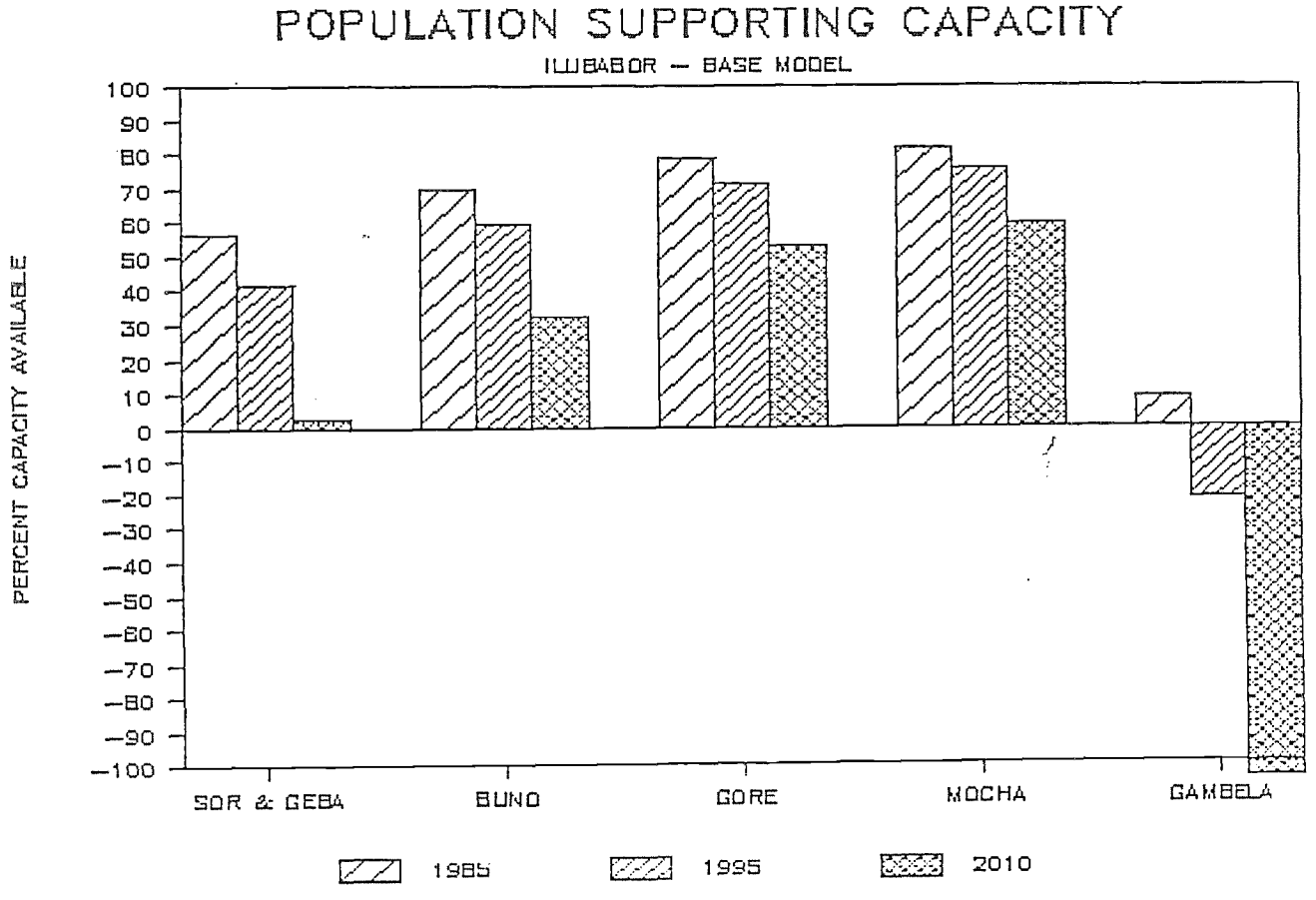
−100
GARA MULETA
HARER ZURIA
WEBERA
HABRO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ILUBABOR — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
80
70
60
50
40
30
20
10
0
−10
−20
−30
−40
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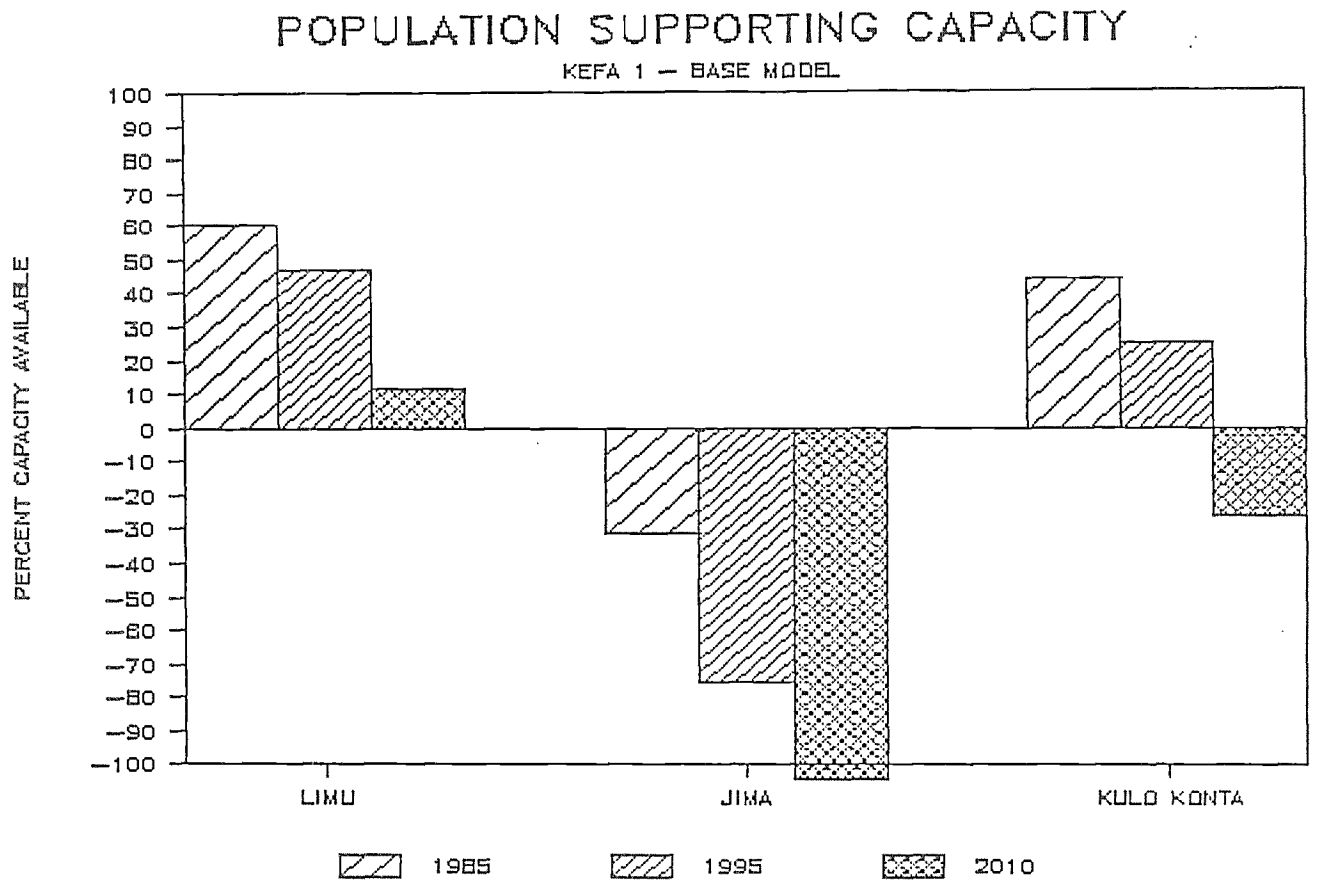
−100
SOR & GEBA
BUNO
GORE
MOCHA
GAMBELA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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70
60
50
40
30
20
10
0
−10
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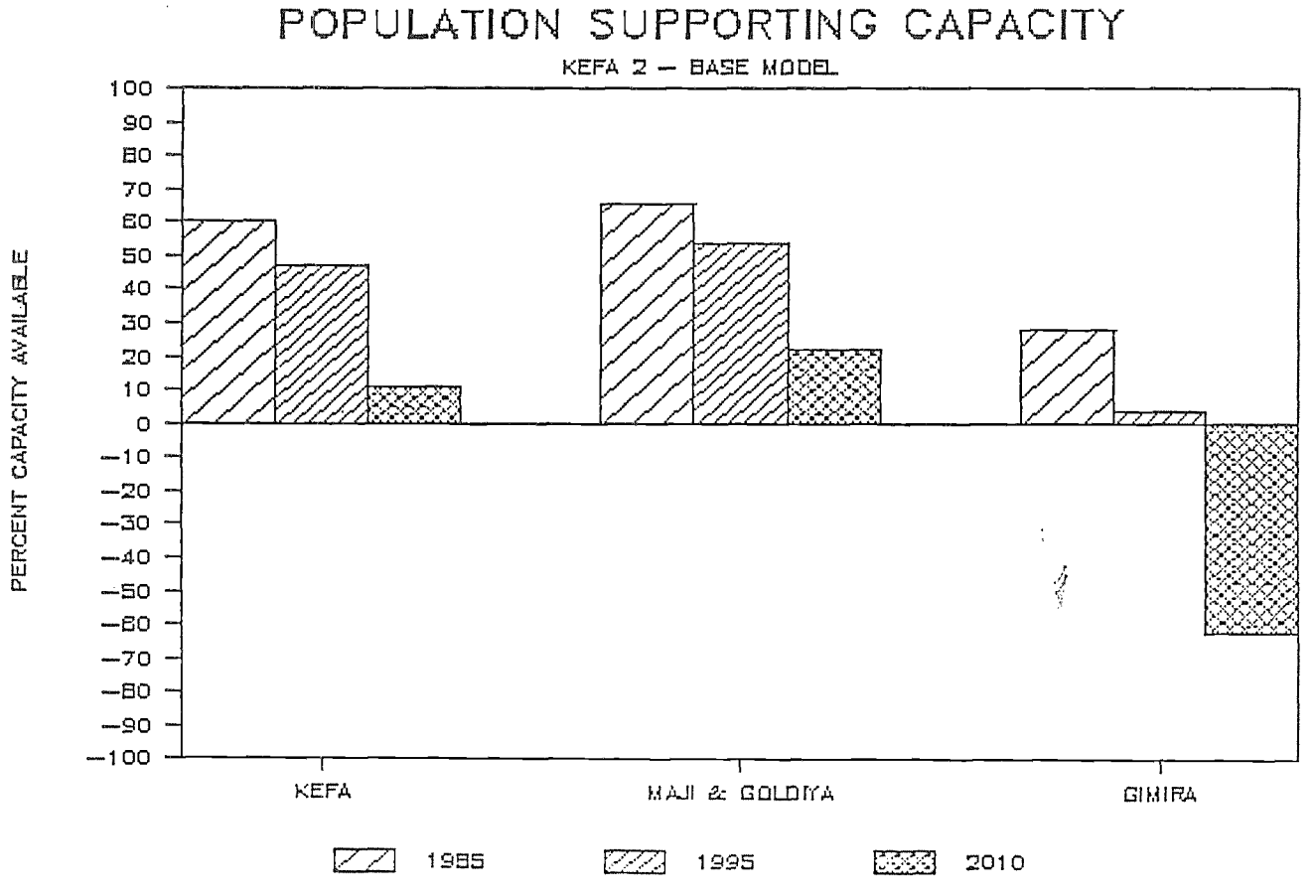
−80
−90
−100
LIMU
JIMA
KULO KONTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
80
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60
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40
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20
10
0
−10
−20
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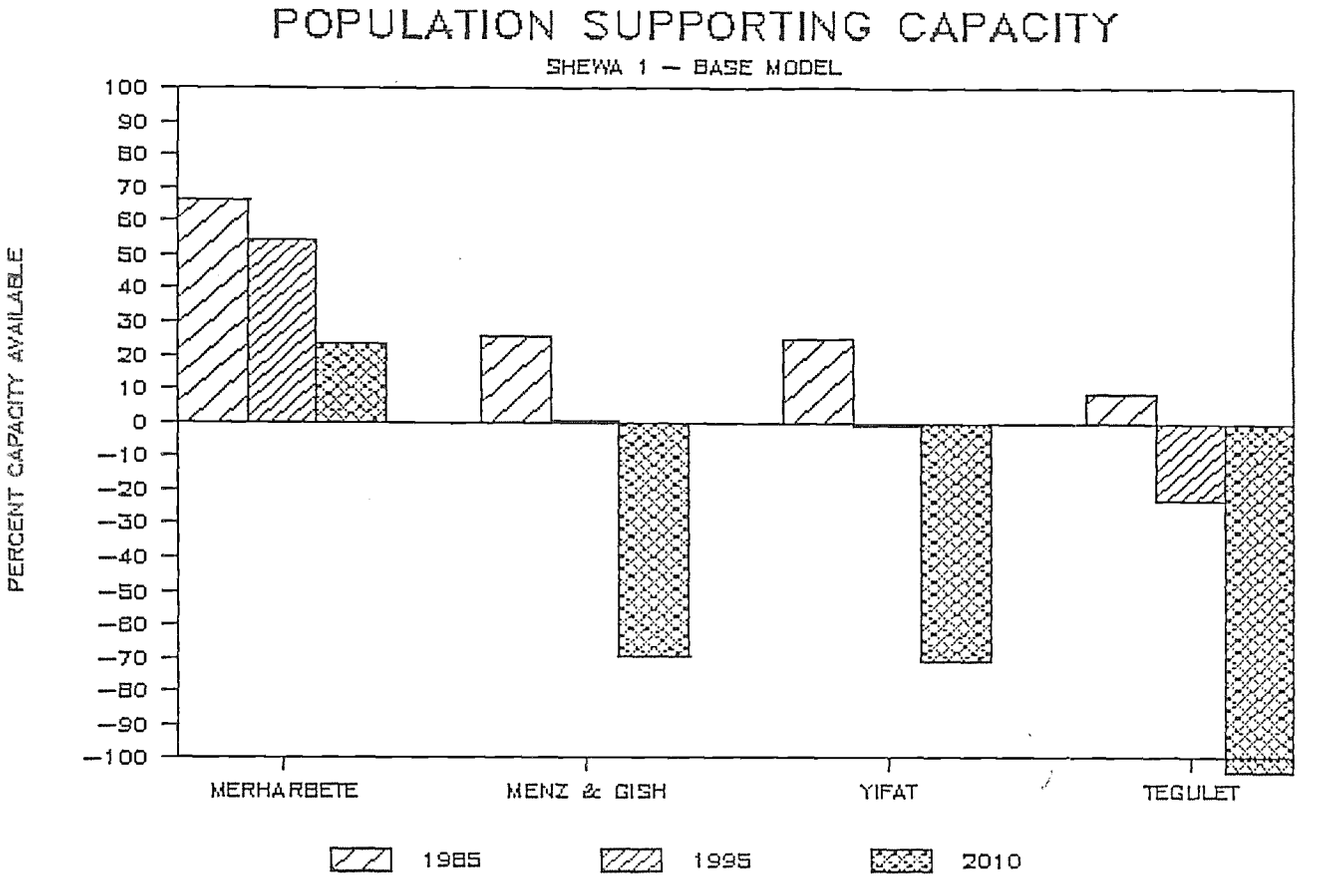
−90
−100
KEFA
MAJI & GOLDIYA
GIMIRA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
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70
60
50
40
30
20
10
0
−10
−20
−30
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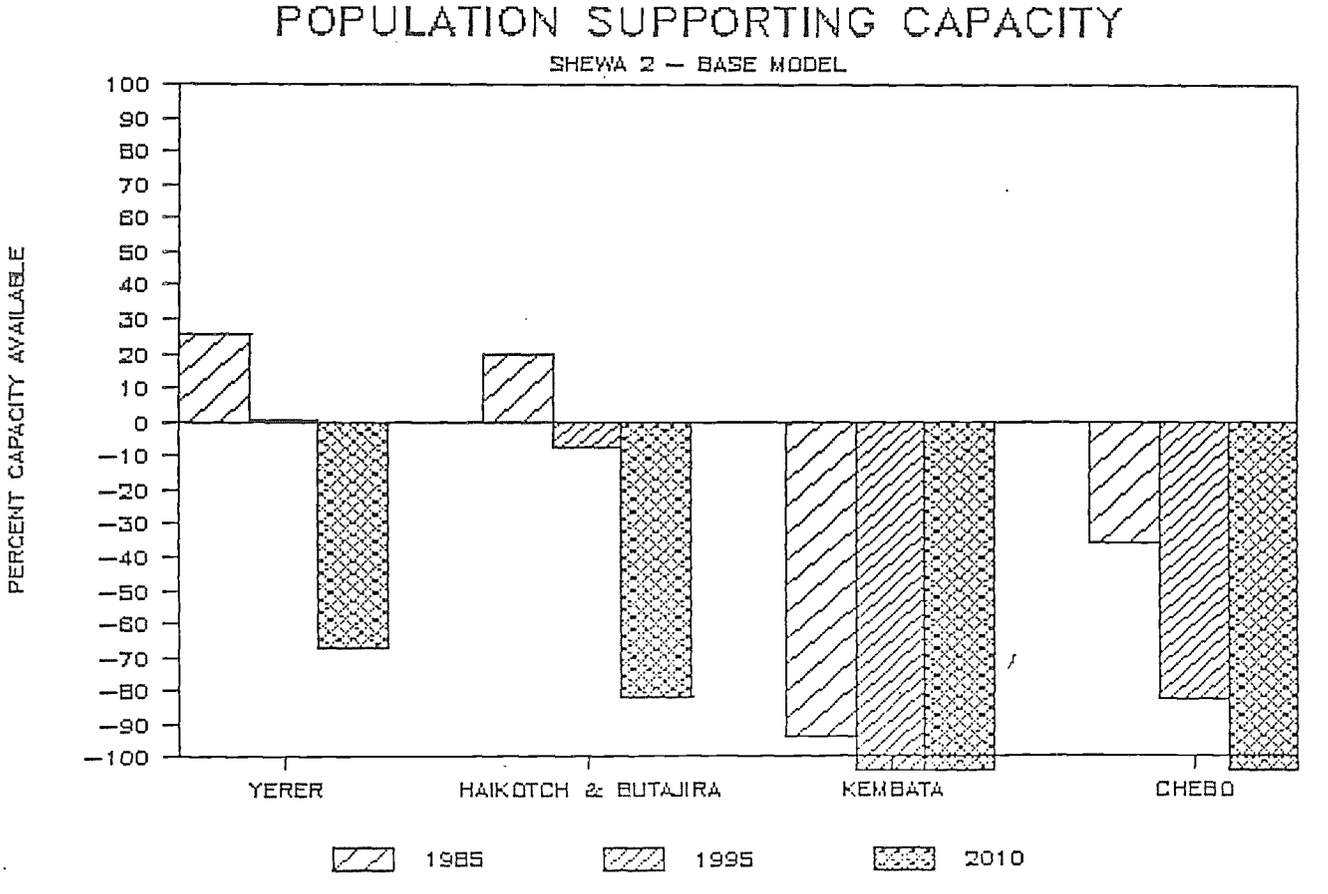
−80
−90
−100
MERHARBETE
MENZ & GISH
YIFAT
TEGULET
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
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60
50
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30
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10
0
−10
−20
−30
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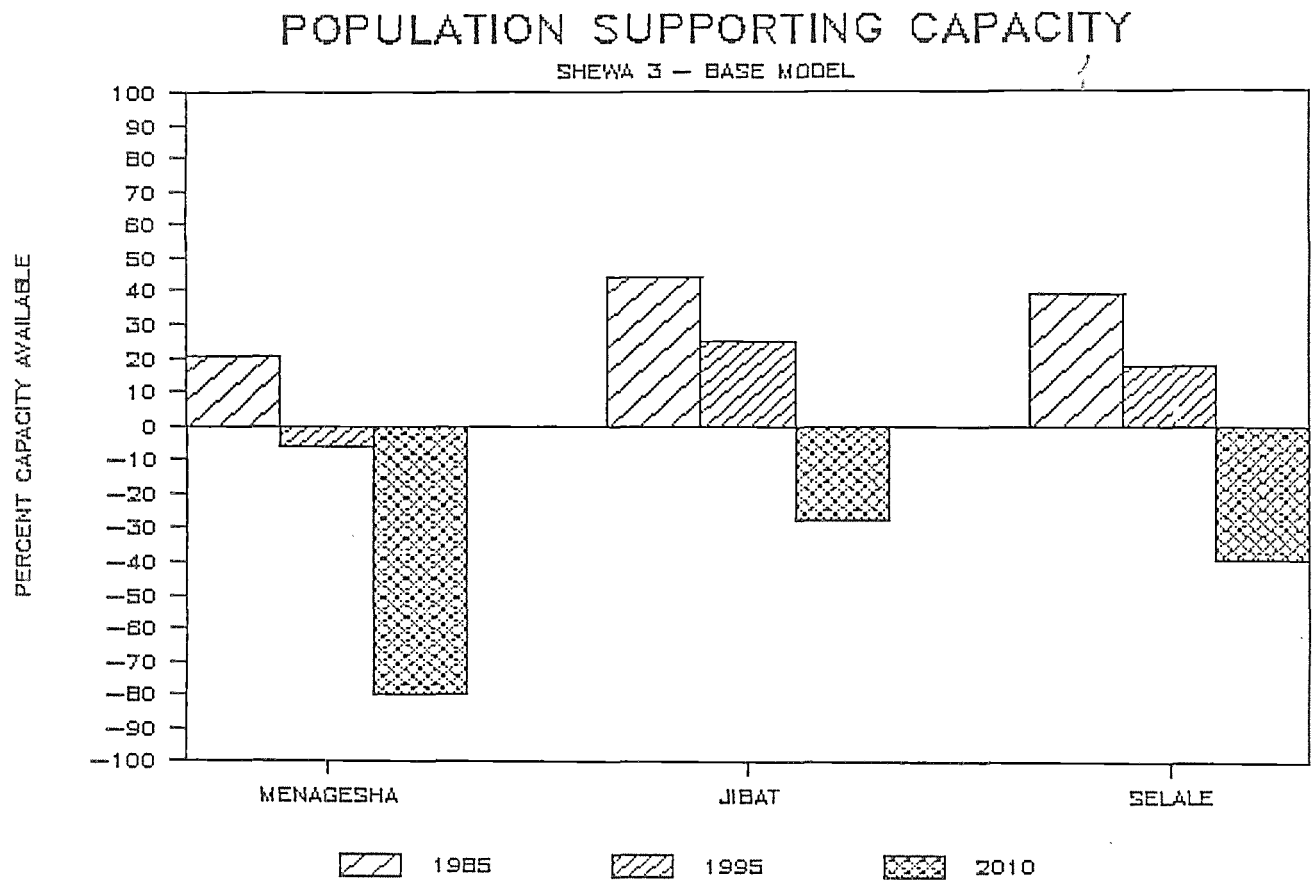
−100
YERER
HAIKOTCH & BUTAJIRA
KEMBATA
CHEBO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 3 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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60
50
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30
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10
0
−10
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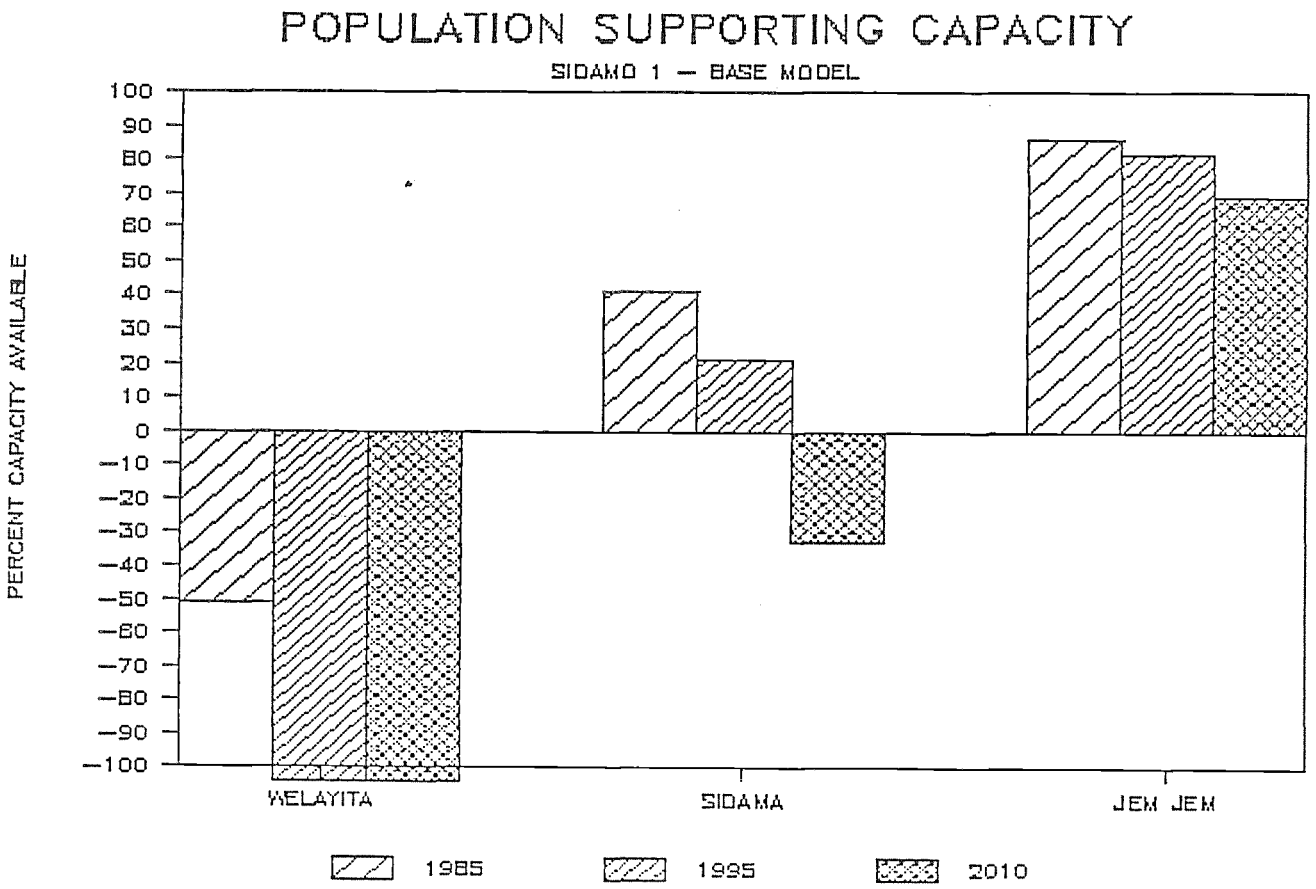
−60
−70
−80
−90
−100
MENAGESHA
JIBAT
SELALE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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90
80
70
60
50
40
30
20
10
0
−10
−20
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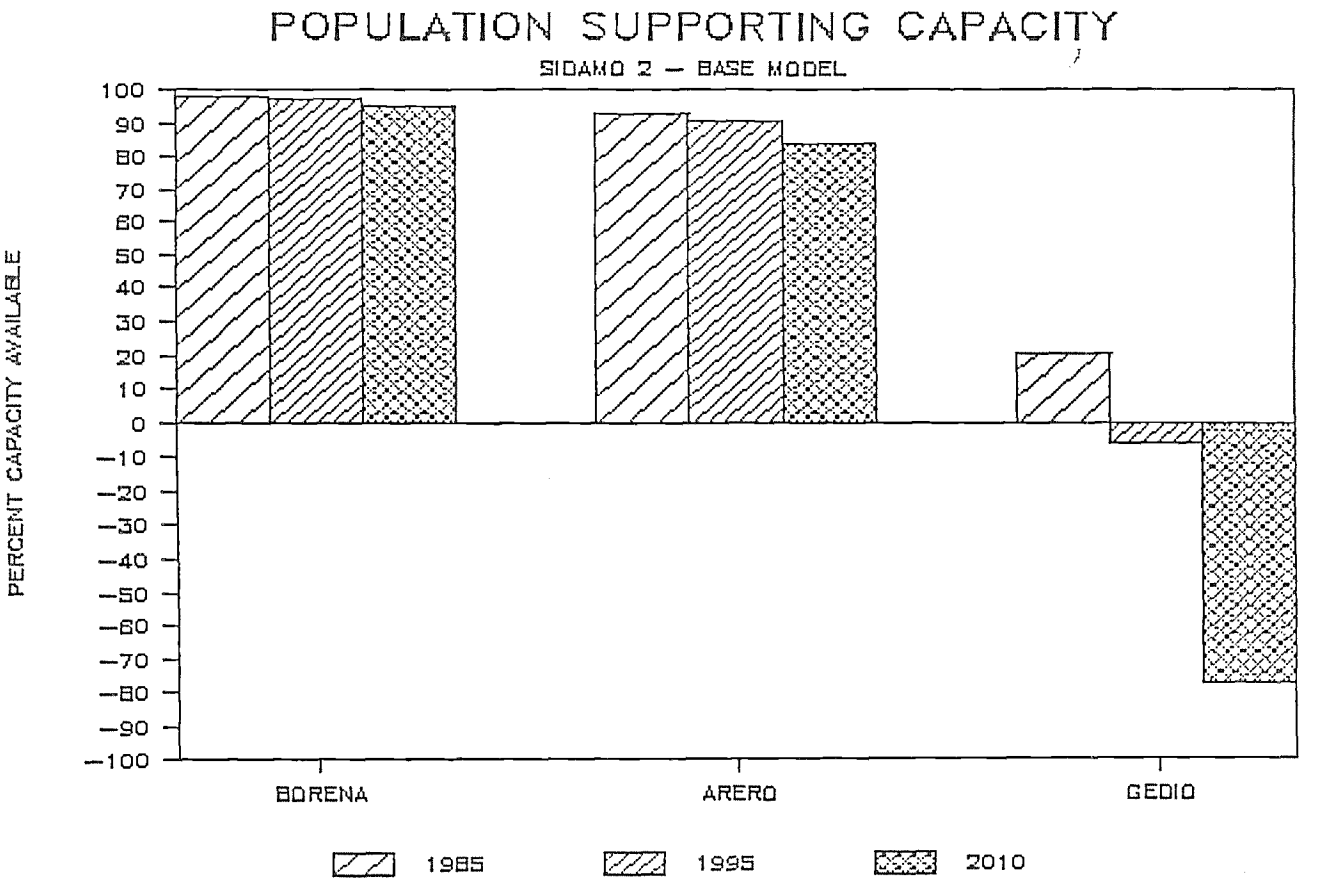
−80
−90
−100
WELAYITA
SIDAMA
JEM JEM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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0
−10
−20
−30
−40
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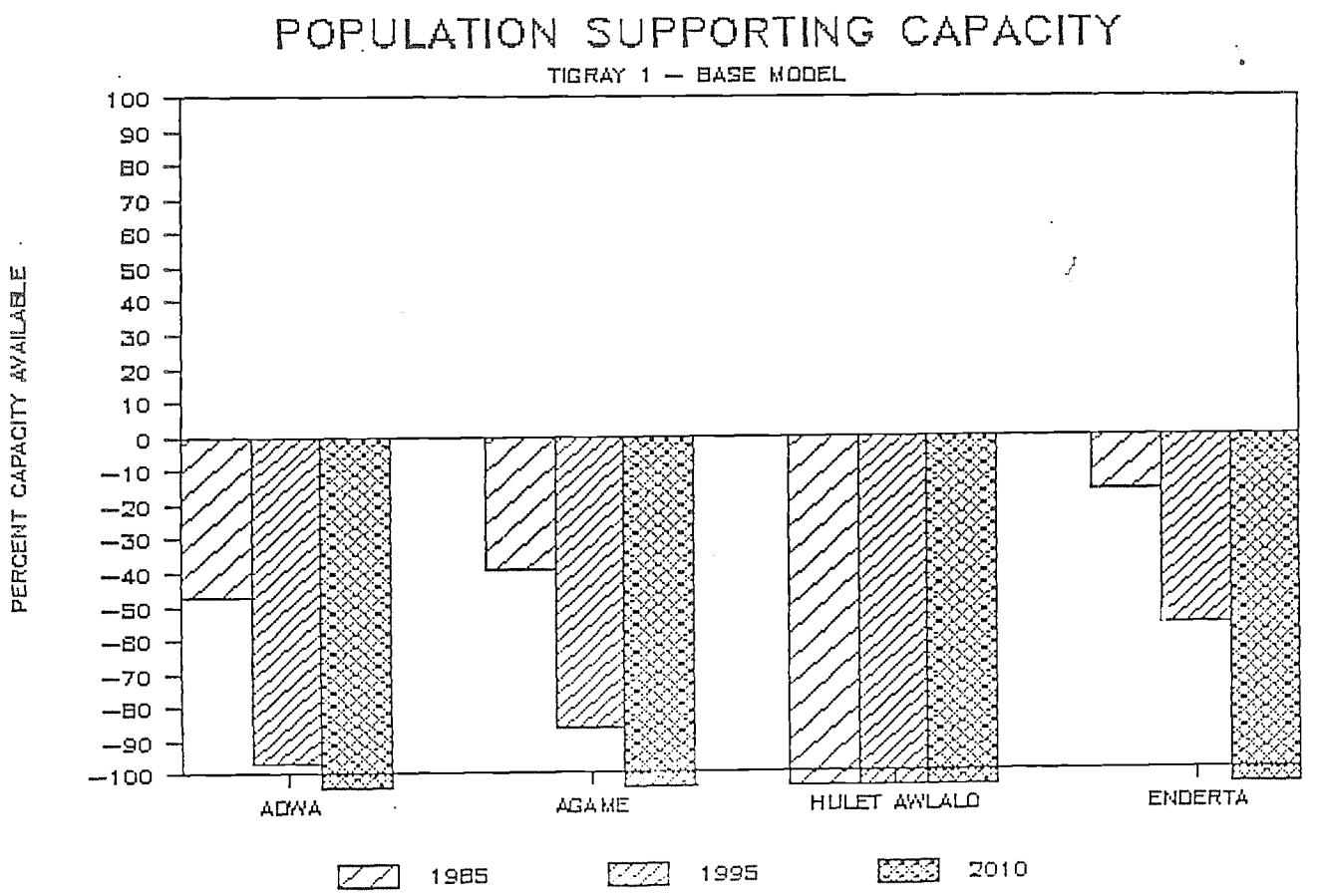
−60
−70
−80
−90
−100
BORENA
ARERO
GEDIO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
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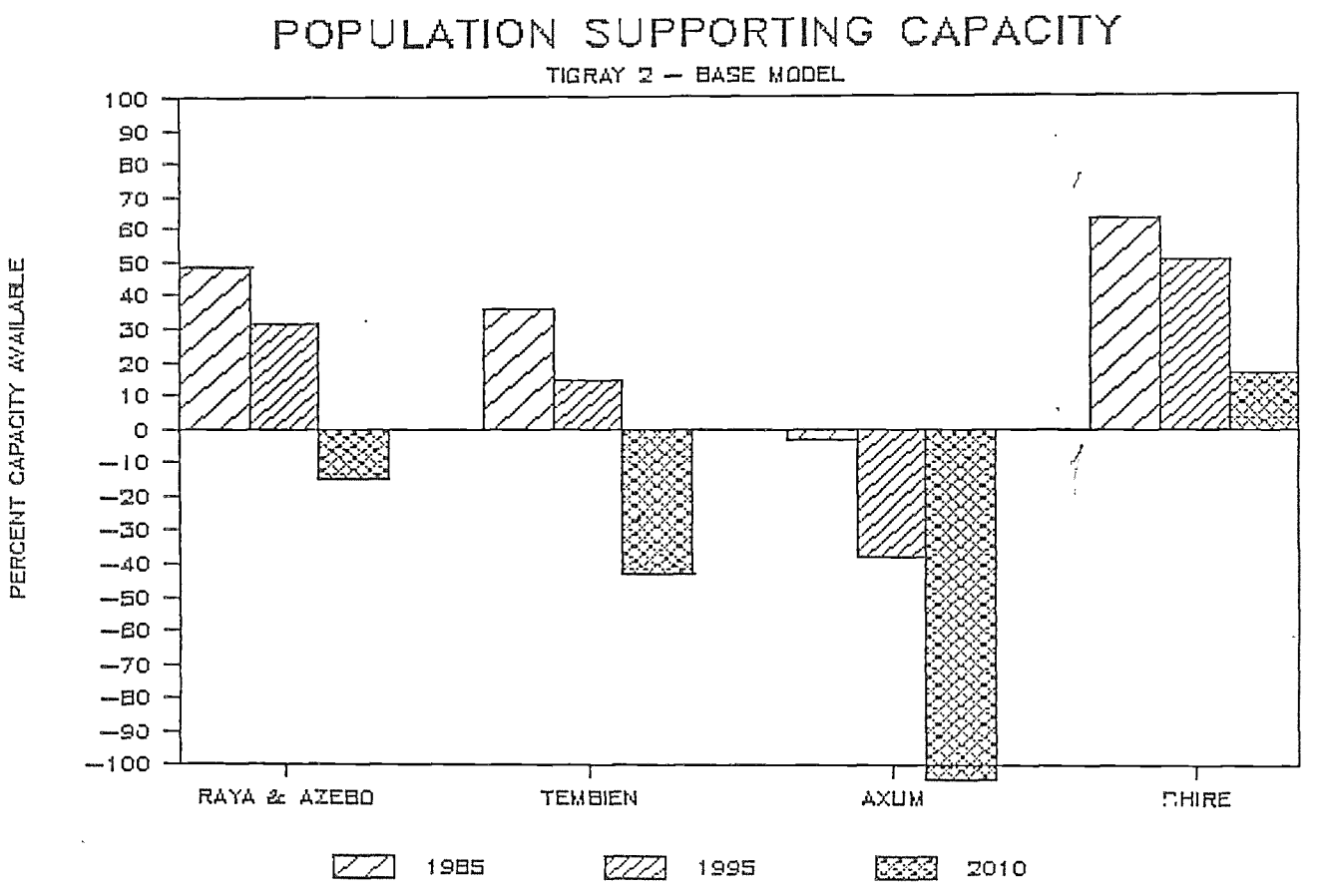
−100
ADWA
AGAME
HULET AWLALO
ENDERTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
90
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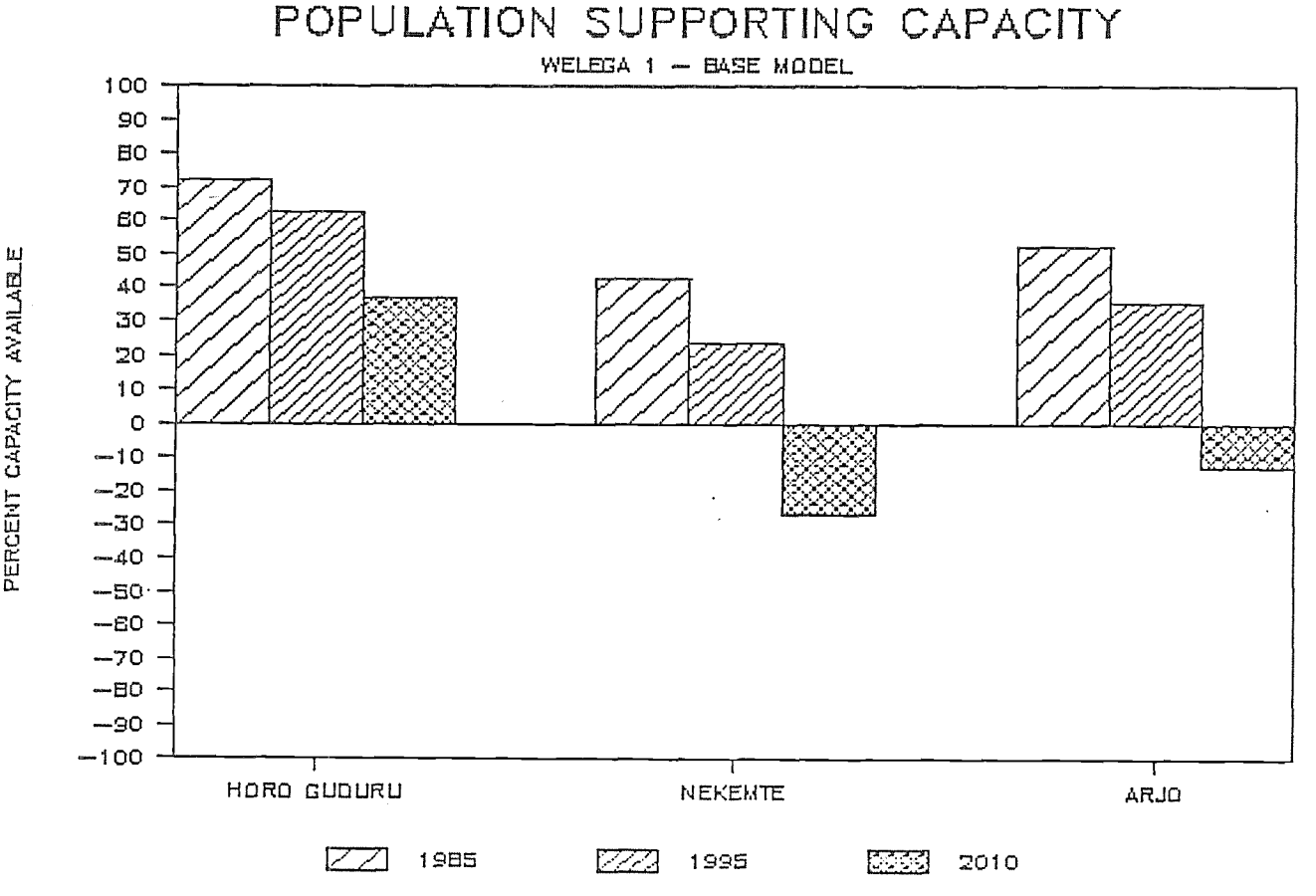
-100
RAYA & AZEBO
TEMBIEN
AXUM
CHIRE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
100
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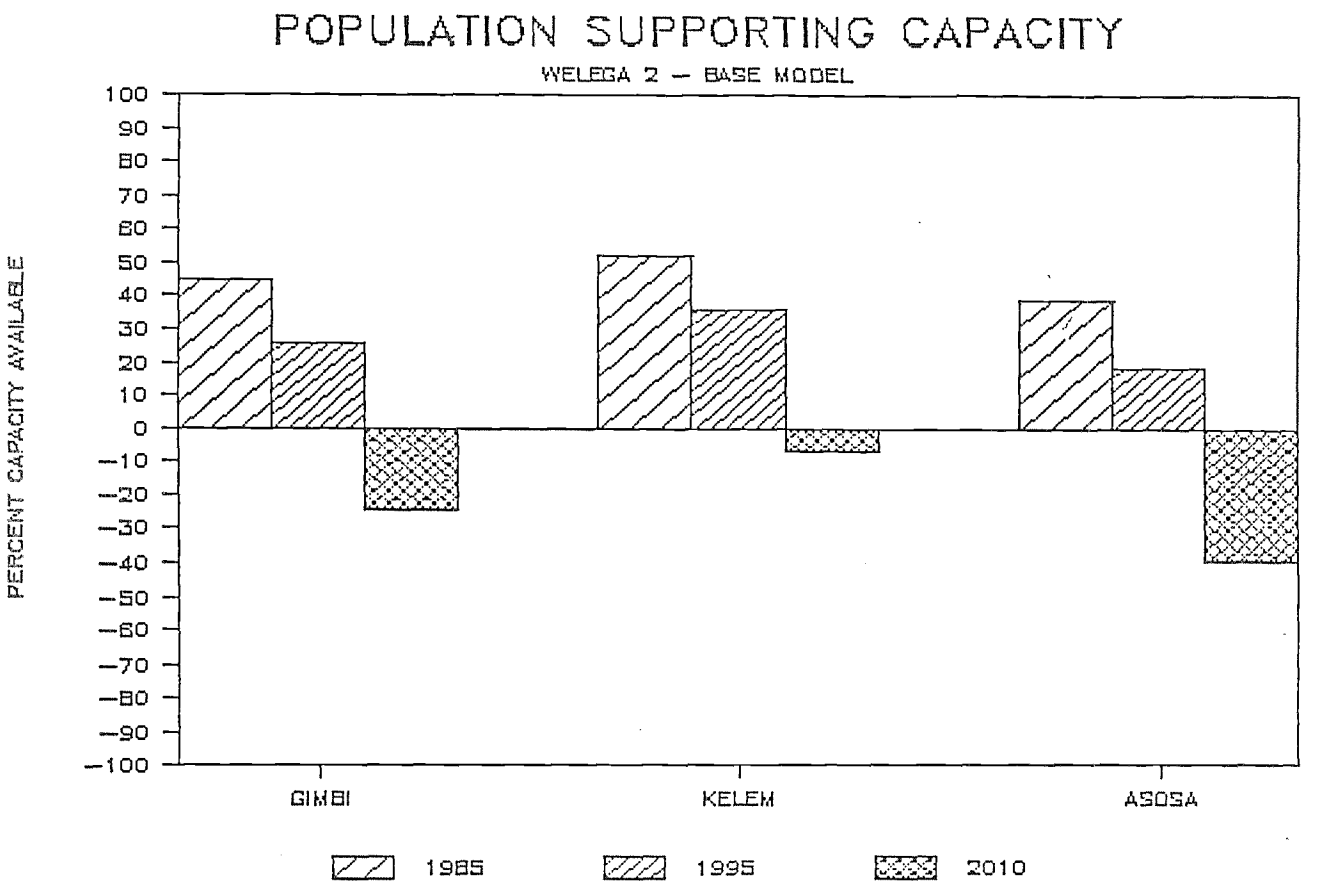
HORO GUDURU
NEKEMTE
ARJO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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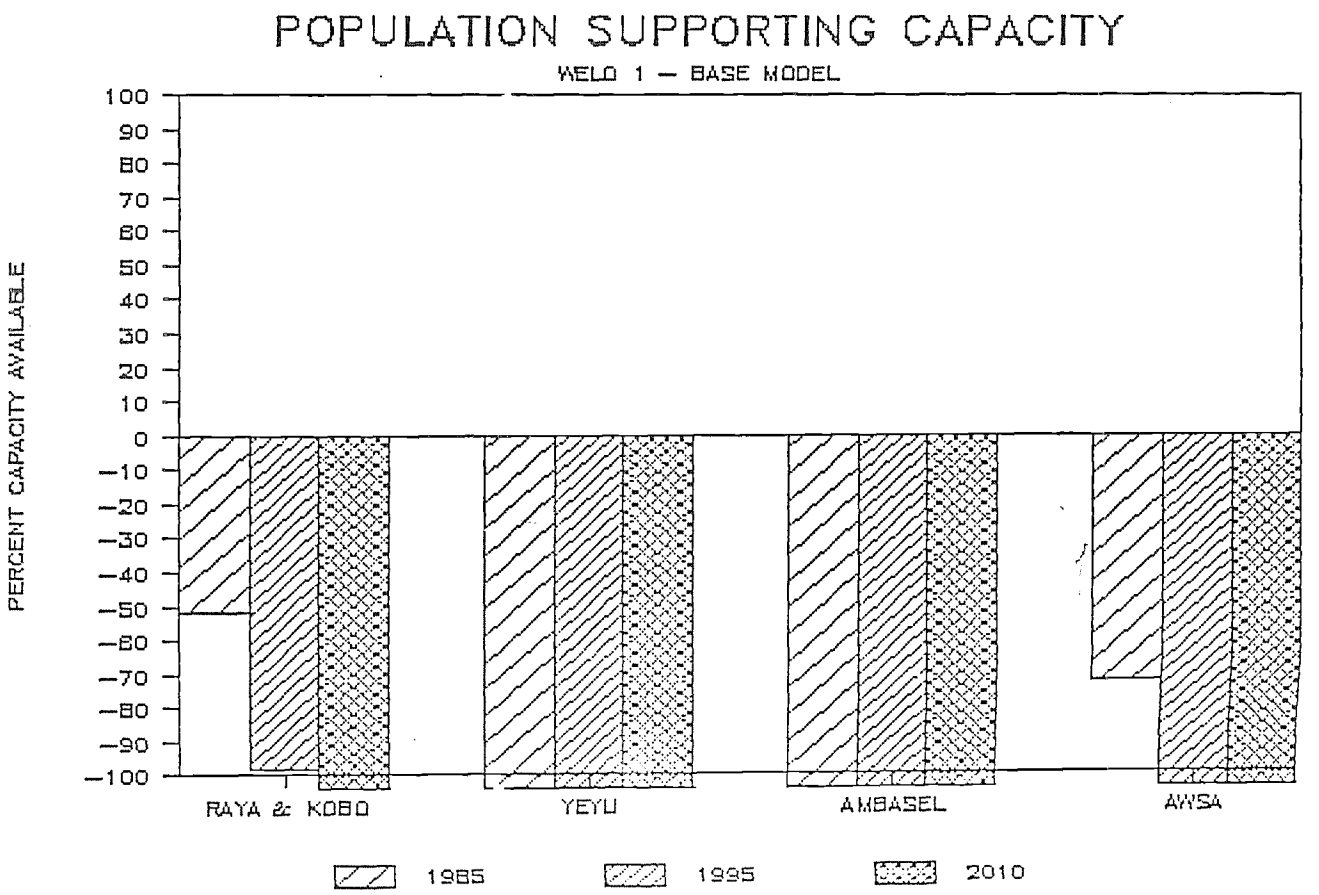
GIMBI
KELEM
ASOSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 1 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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RAYA & KOBO
YEYU
AMBASEL
AWSA
1985
1995
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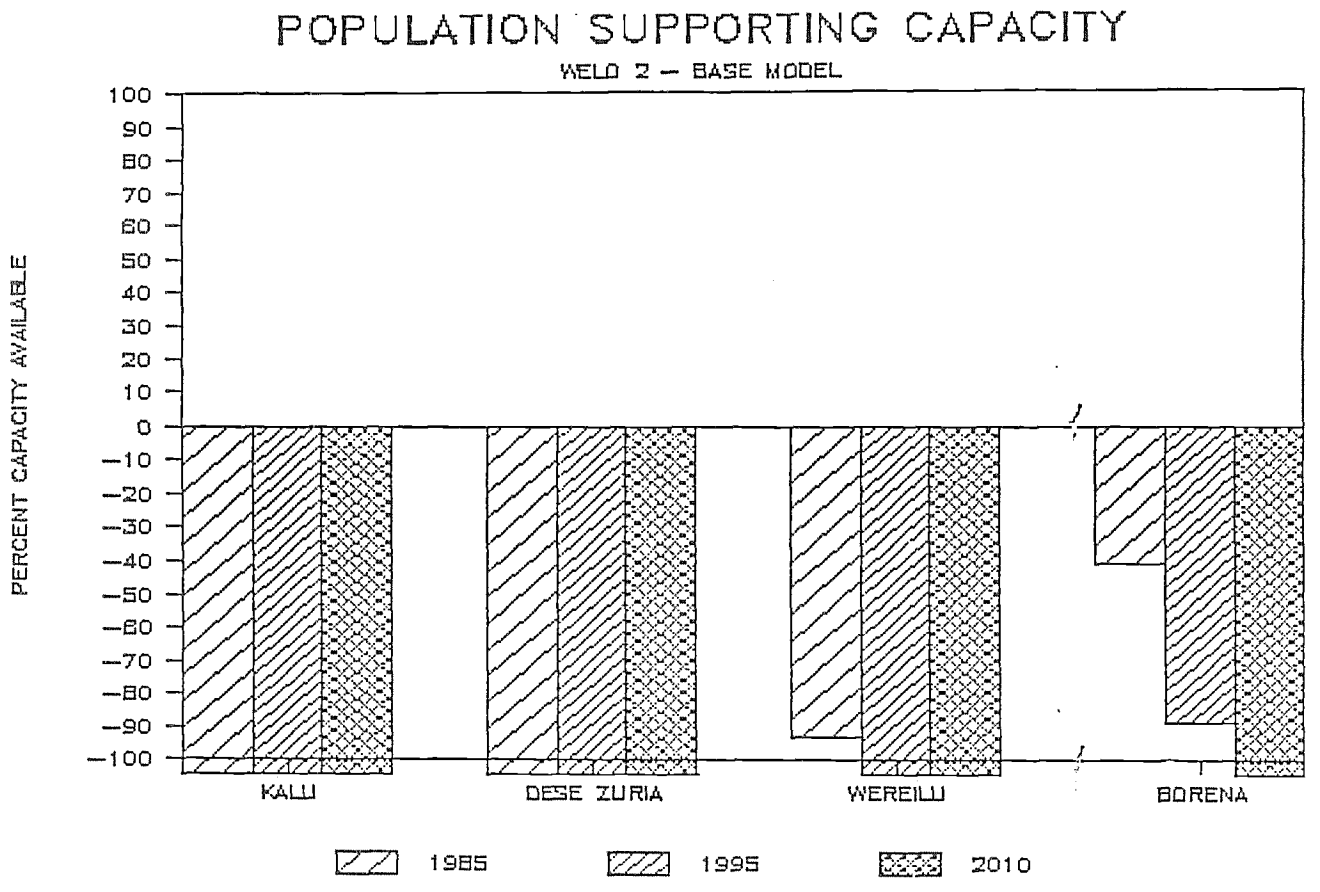
POPULATION SUPPORTING CAPACITY
WELO 2 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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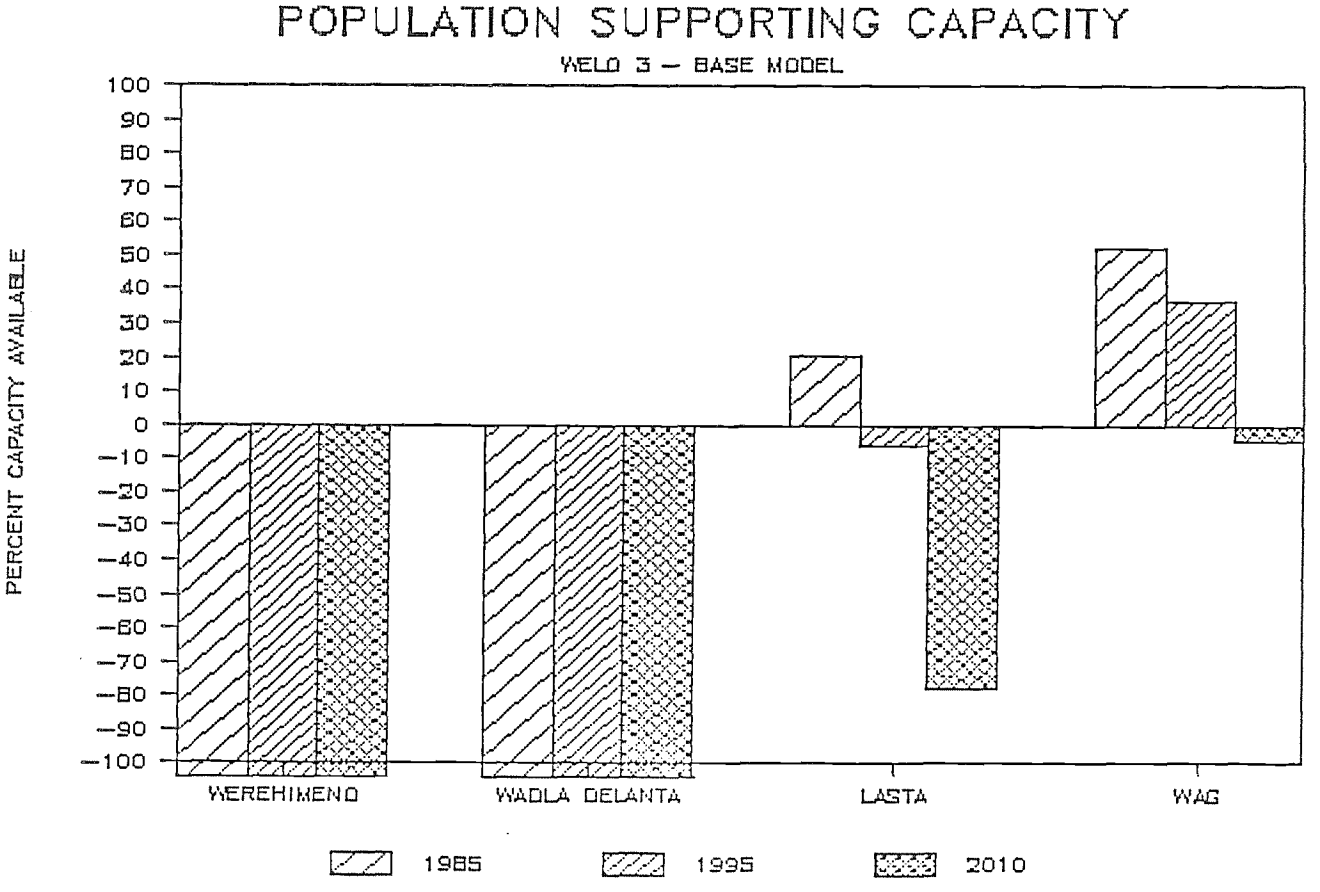
KALU
DESE ZURIA
WEREILU
BORENA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 3 — BASE MODEL
PERCENT CAPACITY AVAILABLE
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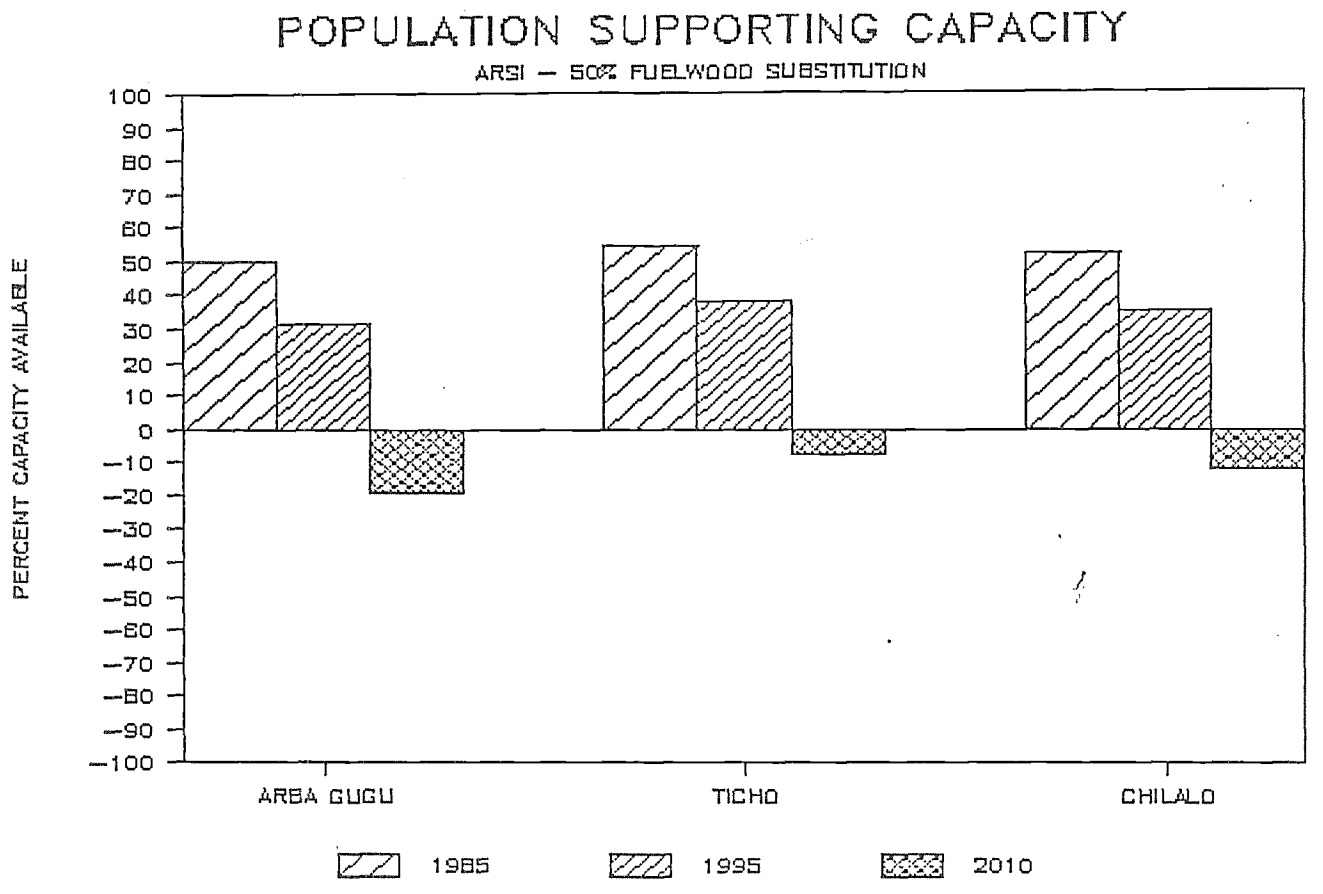
-90
-100
WEREHIMENO
WADLA DELANTA
LASTA
WAG
1985
1995
2010

POPULATION SUPPORTING CAPACITY

50% FUELWOOD SUBSTITUTION


POPULATION SUPPORTING CAPACITY
ARSI — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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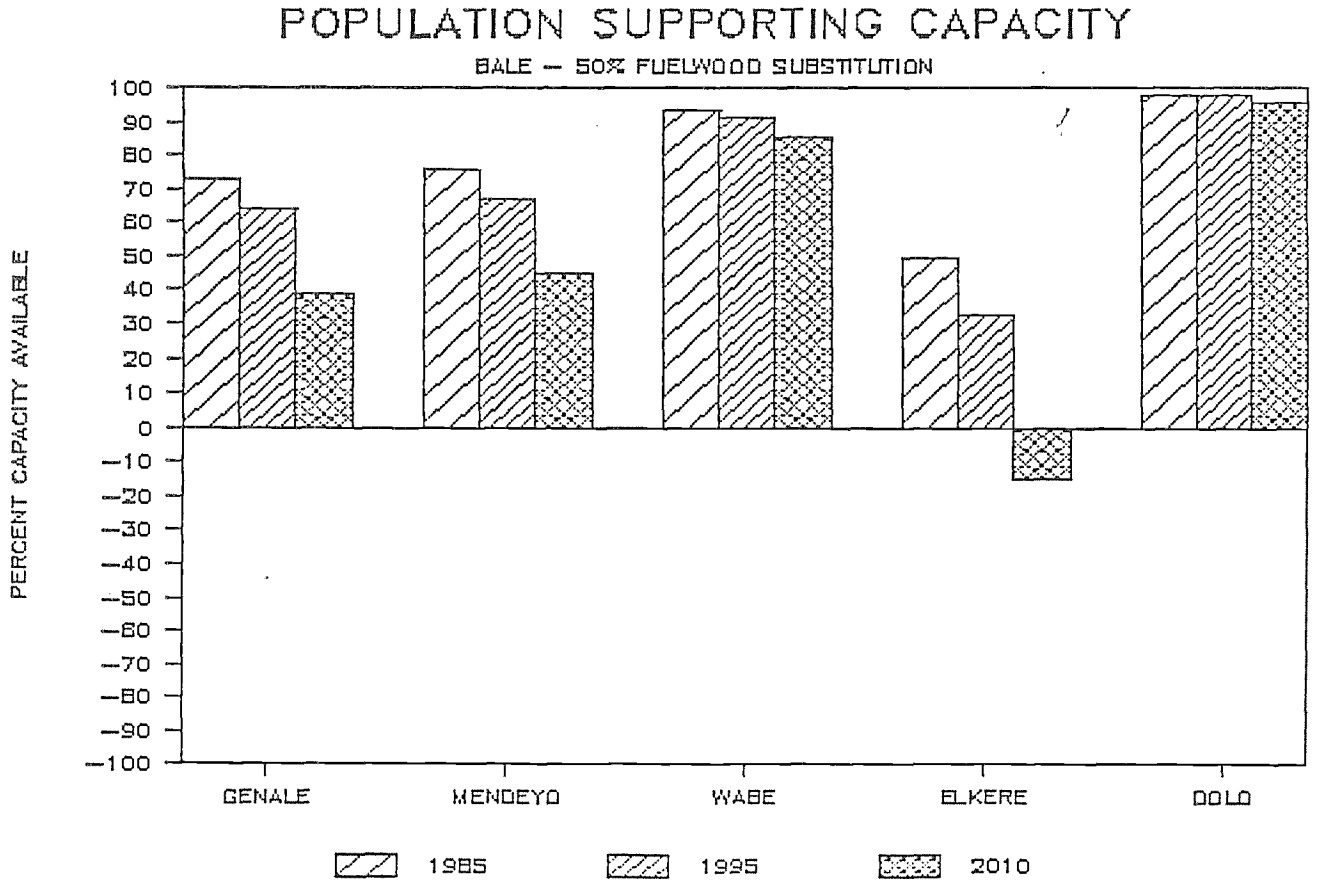
ARBA GUGU
TICHO
CHILALO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
BALE — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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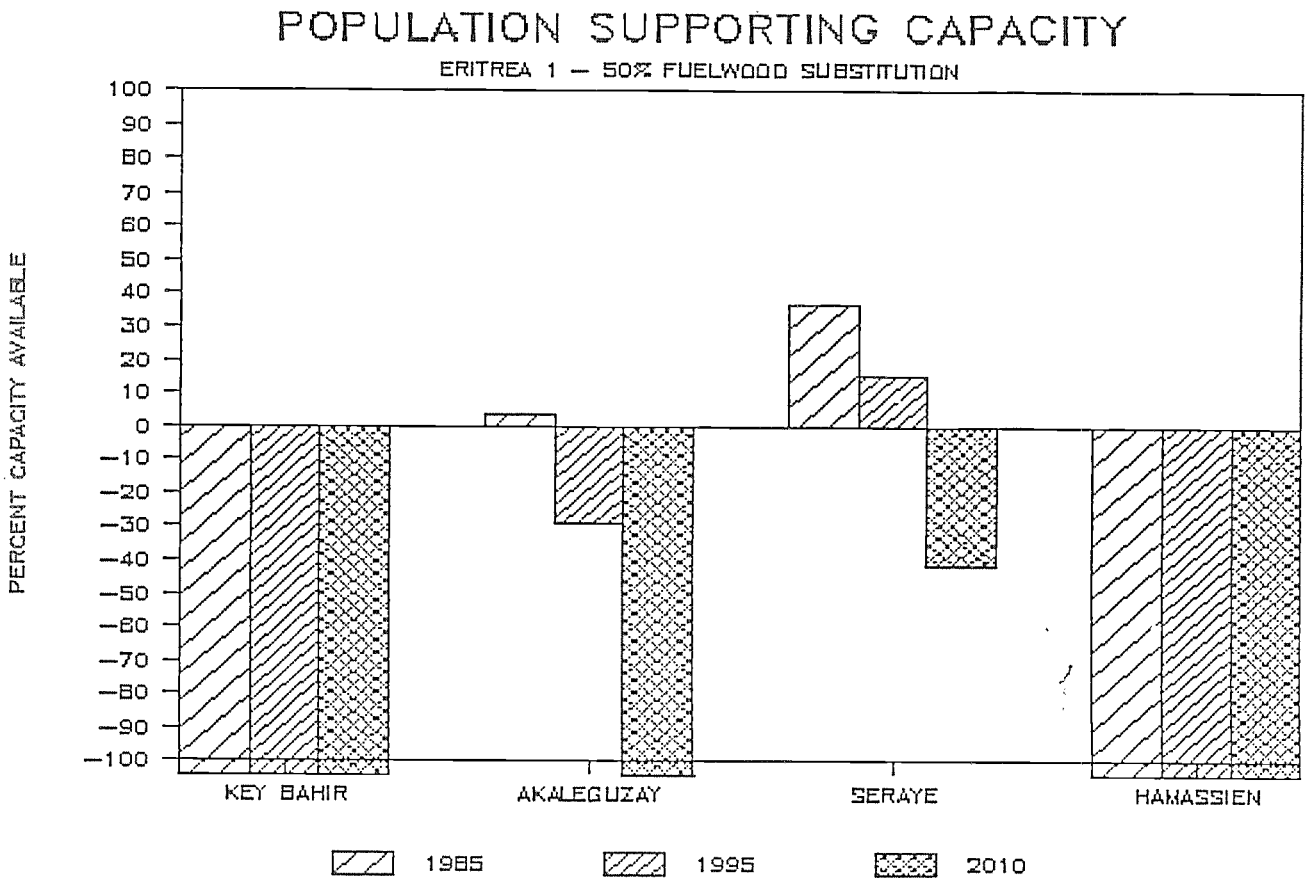
GENALE
MENDEYO
WABE
ELKERE
DOLO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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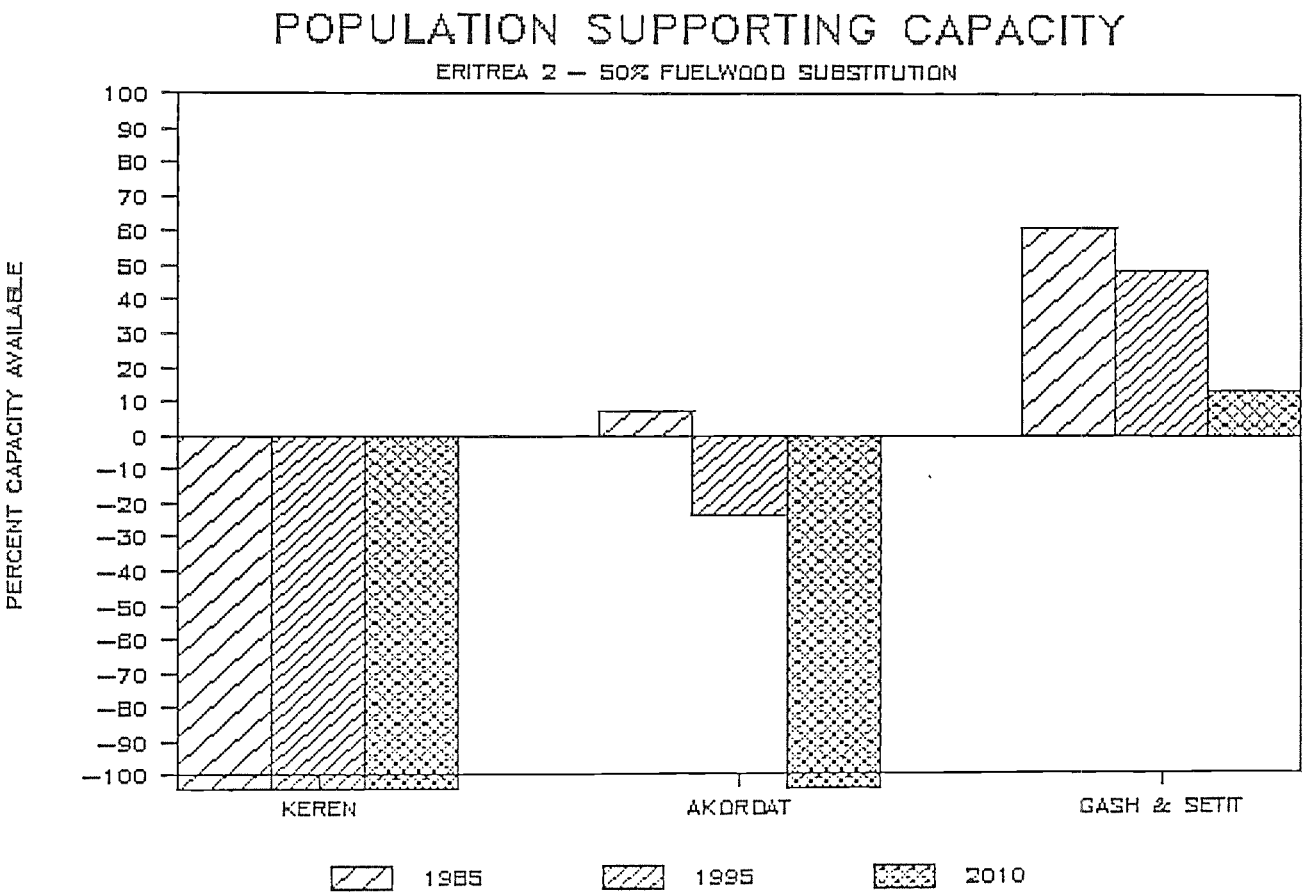
KEY BAHIR
AKALEGUZAY
SERAYE
HAMASSIEN
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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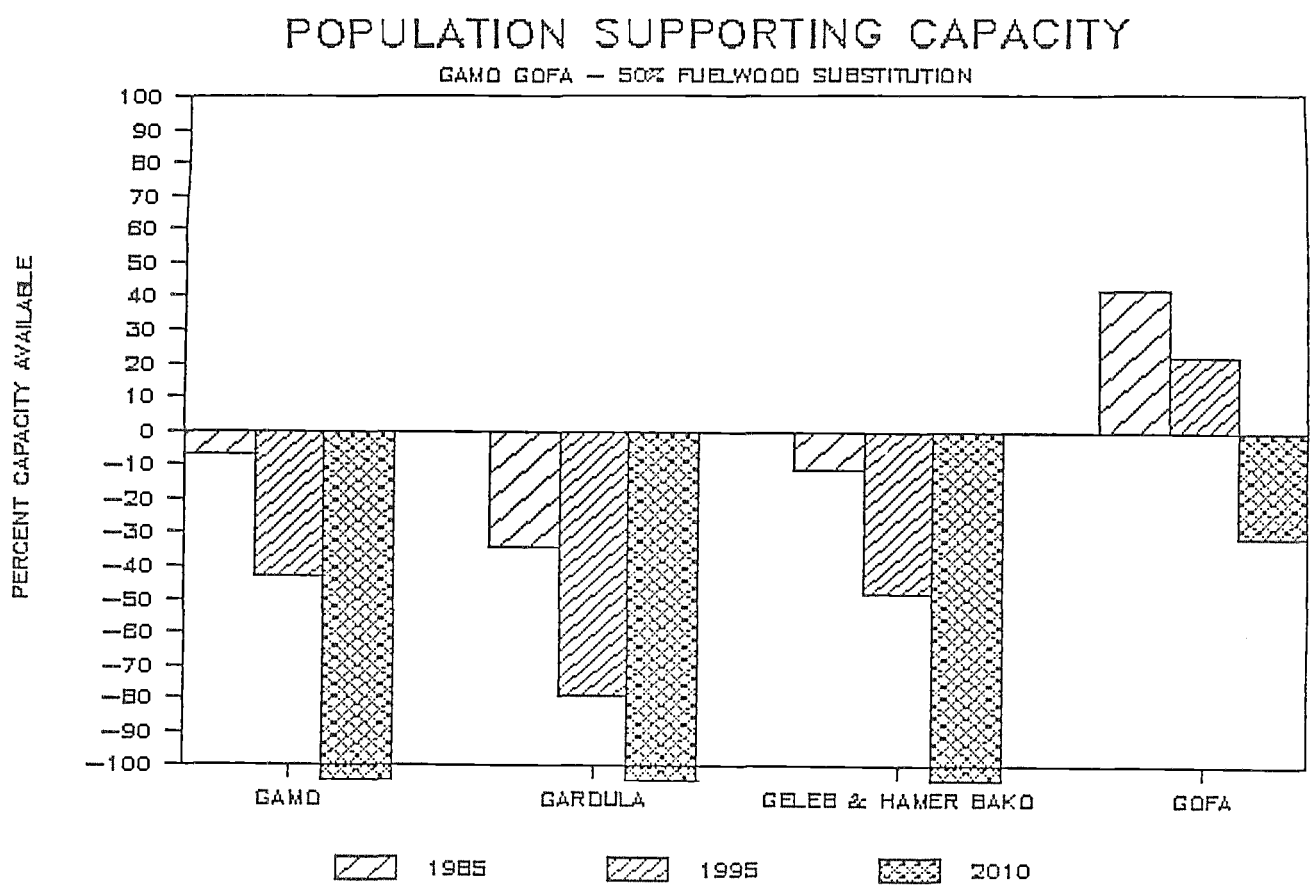
KEREN
AKORDAT
GASH & SETIT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GAMO GOFA — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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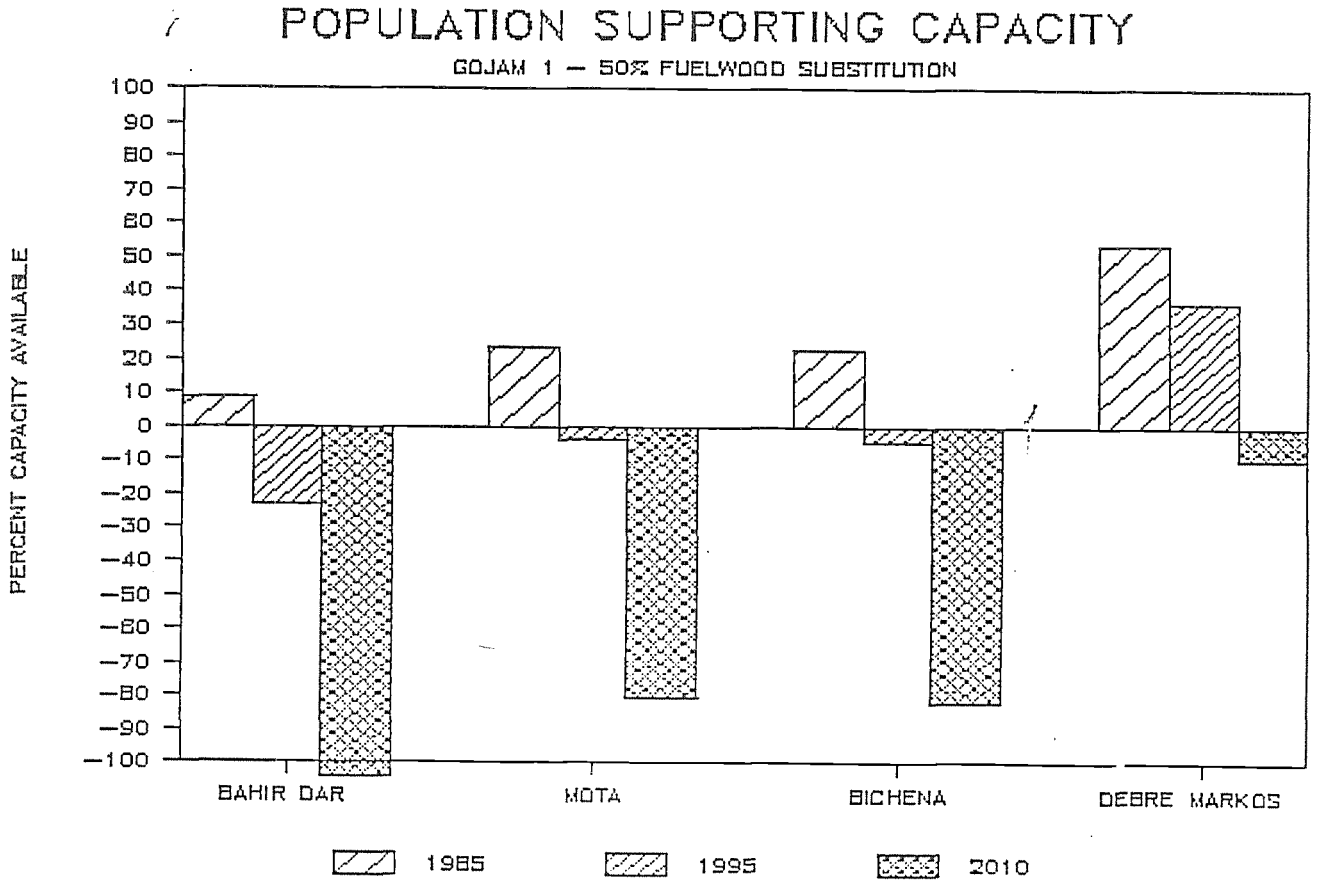
GAMO
GARDULA
GELEB & HAMER BAKO
GOFA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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BAHIR DAR
MOTA
BICHENA
DEBRE MARKOS
1985
1995
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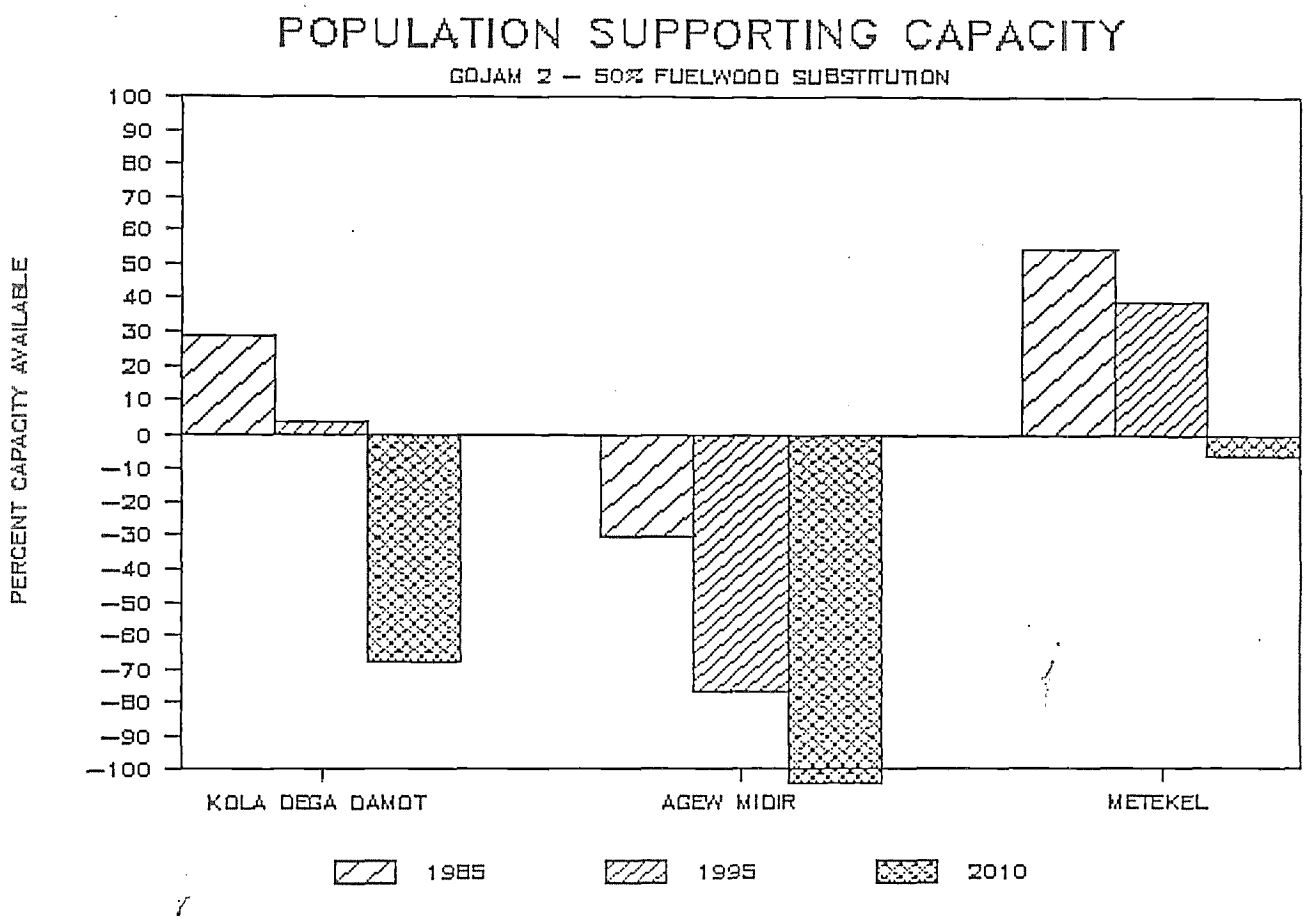
POPULATION SUPPORTING CAPACITY
GOJAM 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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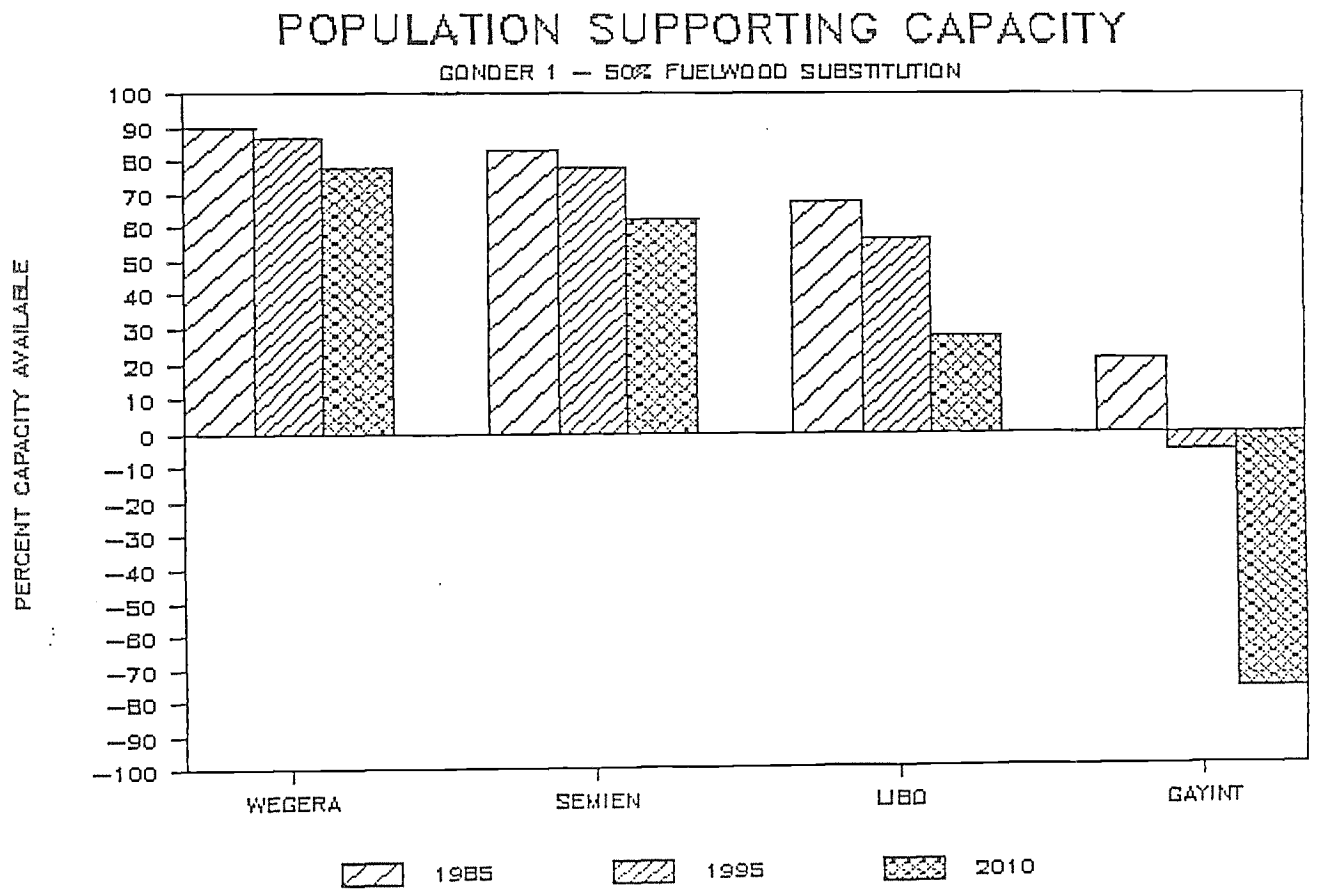
KOLA DEGA DAMOT
AGEW MIDIR
METEKEL
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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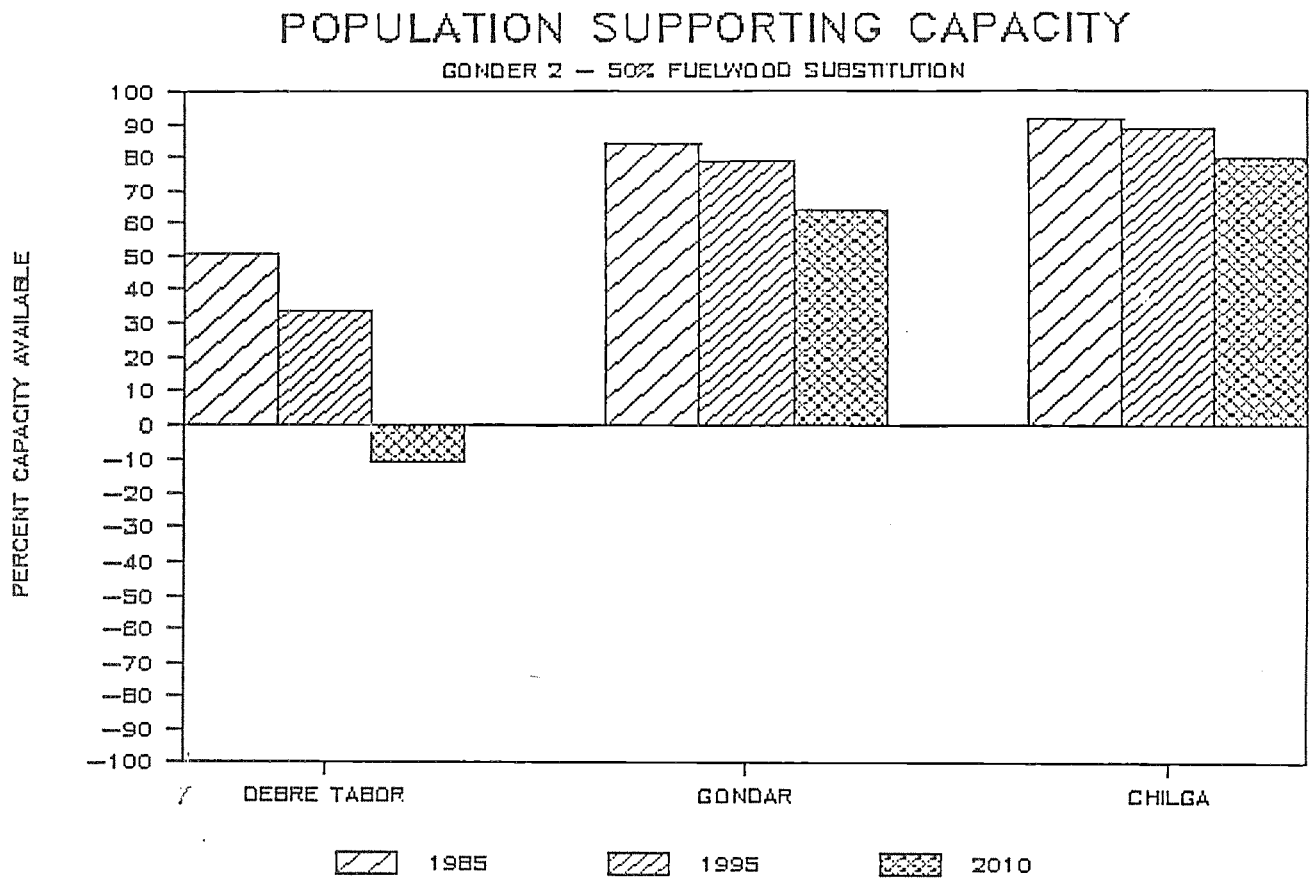
WEGERA
SEMIEN
LIBO
GAYINT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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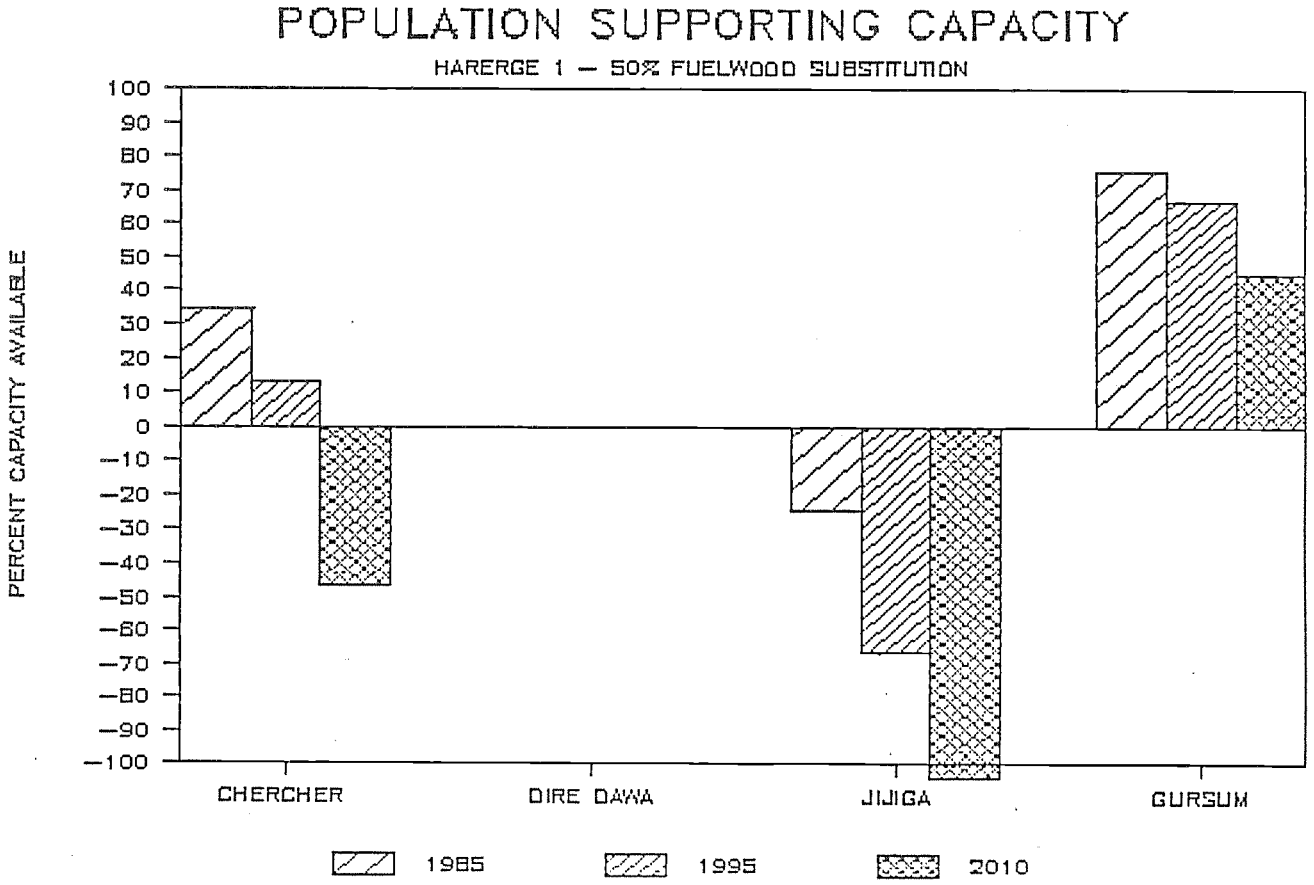
DEBRE TABOR
GONDAR
CHILGA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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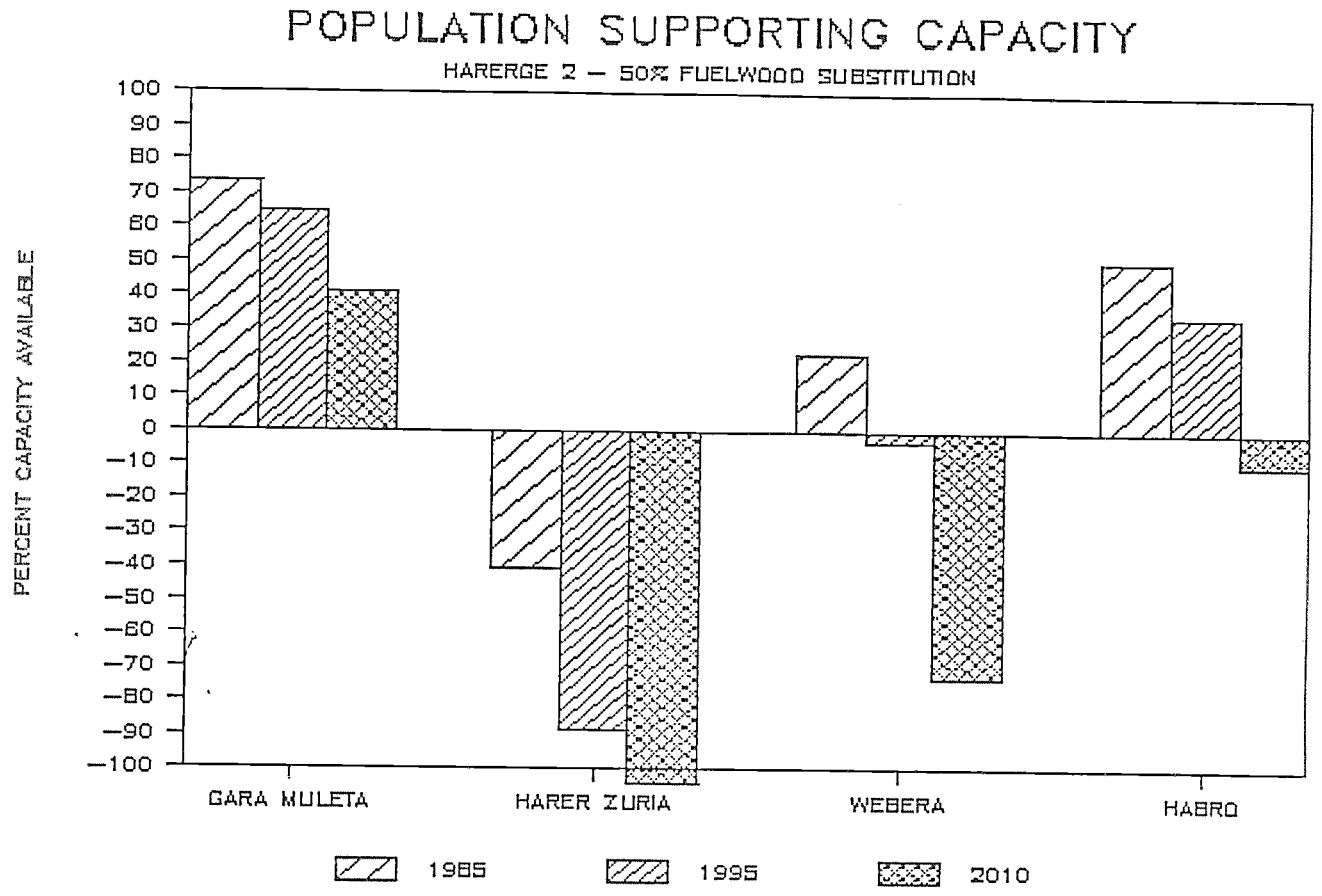
CHERCHER
DIRE DAWA
JIJIGA
GURSUM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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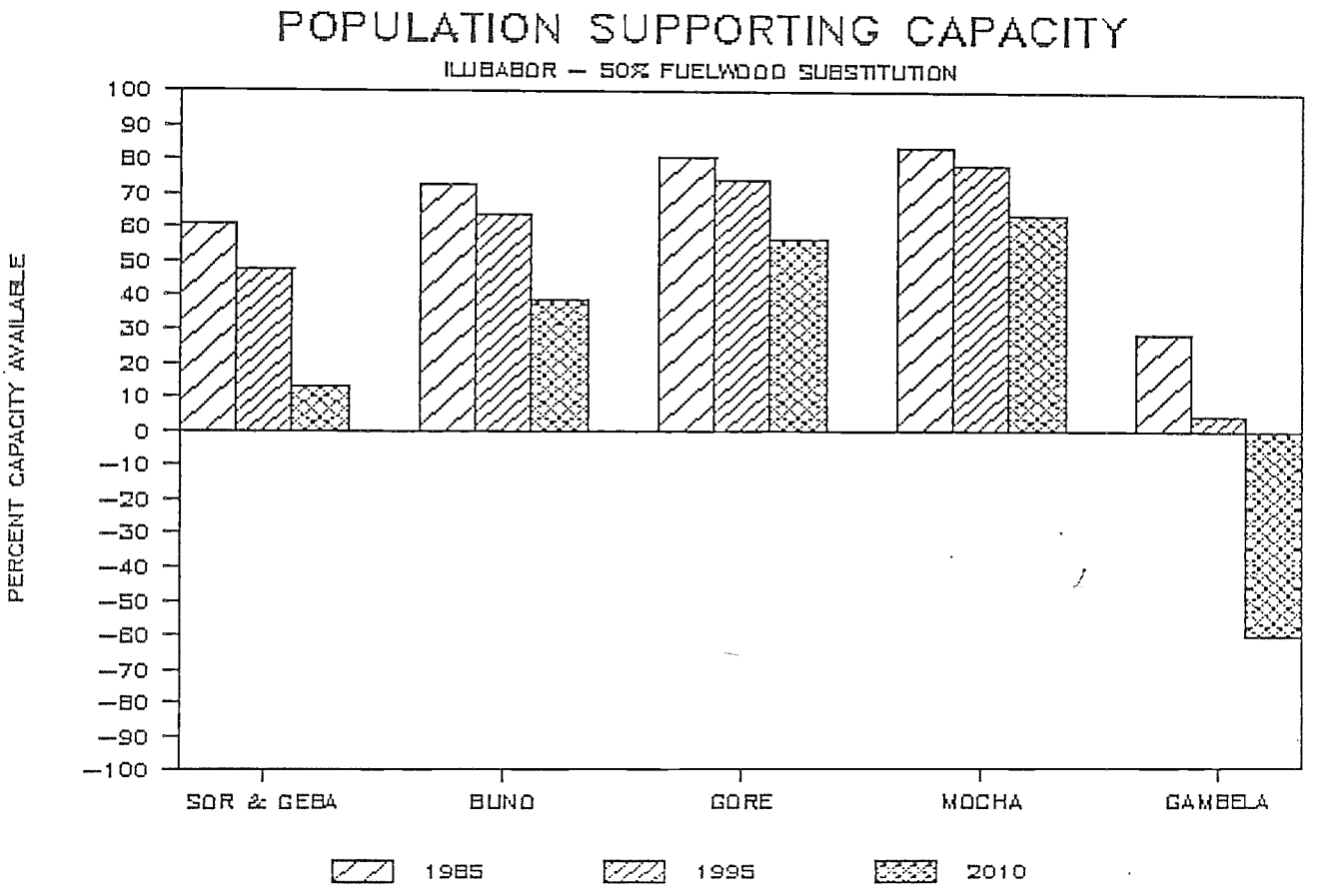
GARA MULETA
HARER ZURIA
WEBERA
HABRO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ILUBABOR — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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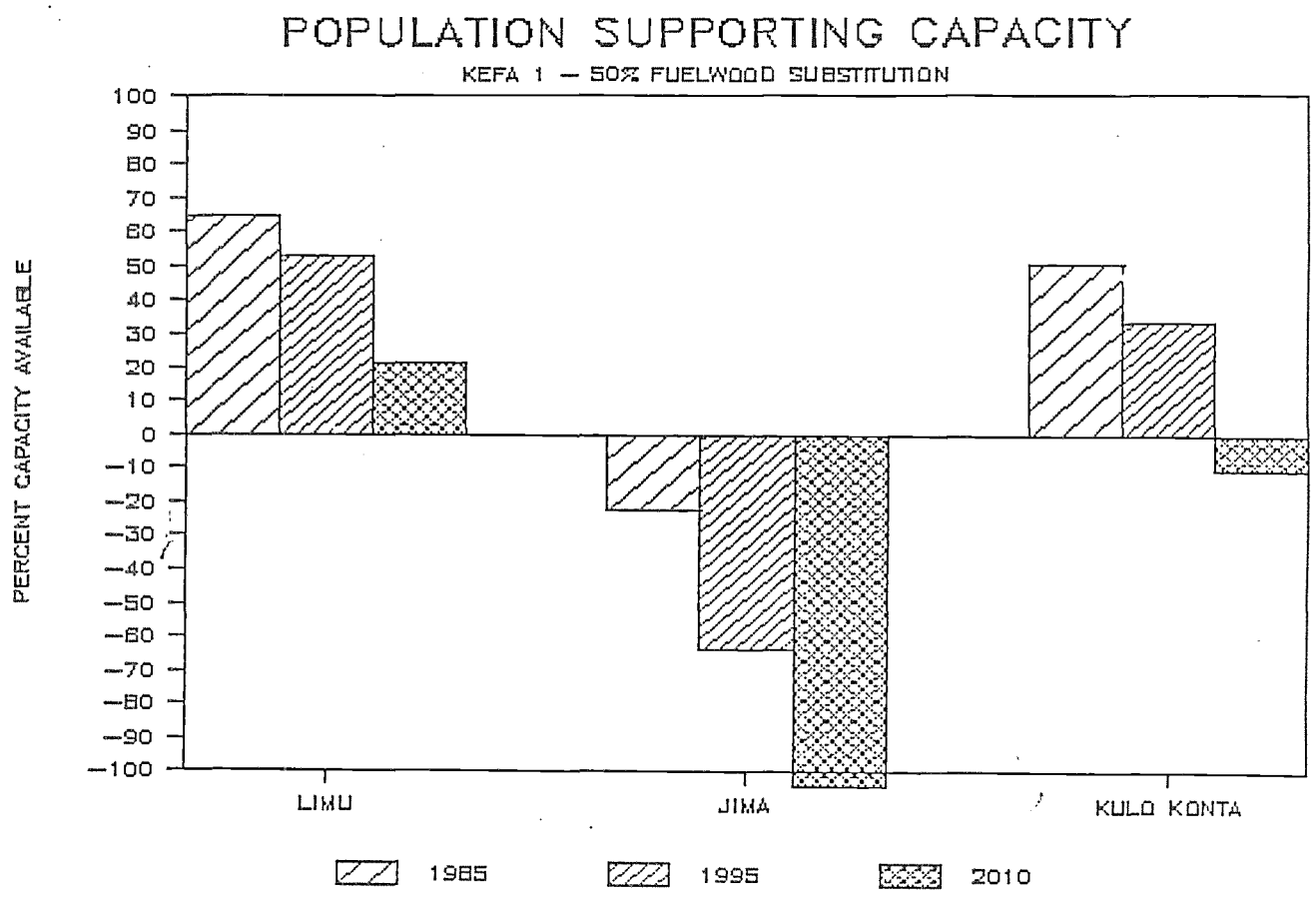
SOR & GEBA
BUNO
GORE
MOCHA
GAMBELA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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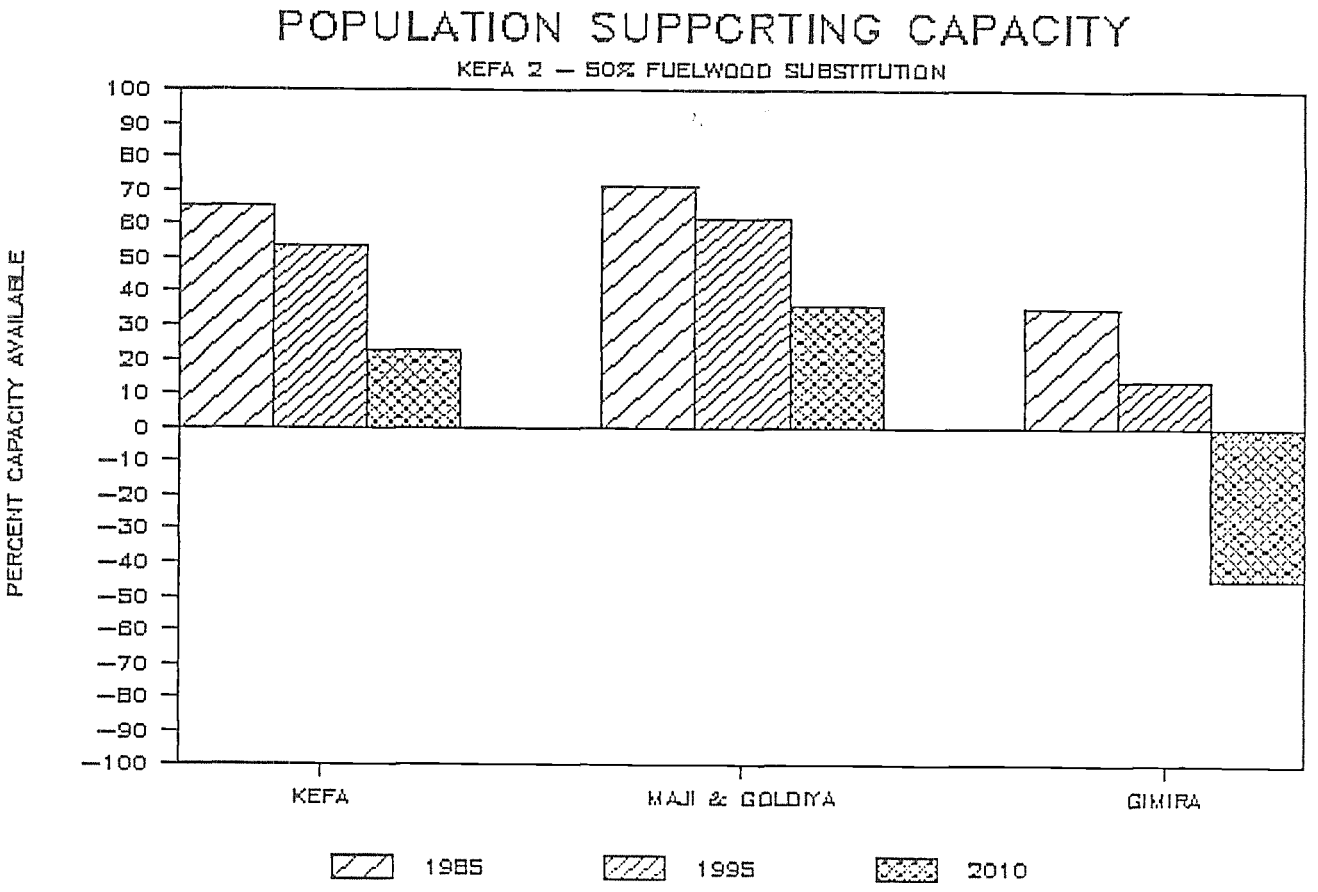
LIMU
JIMA
KULO KONTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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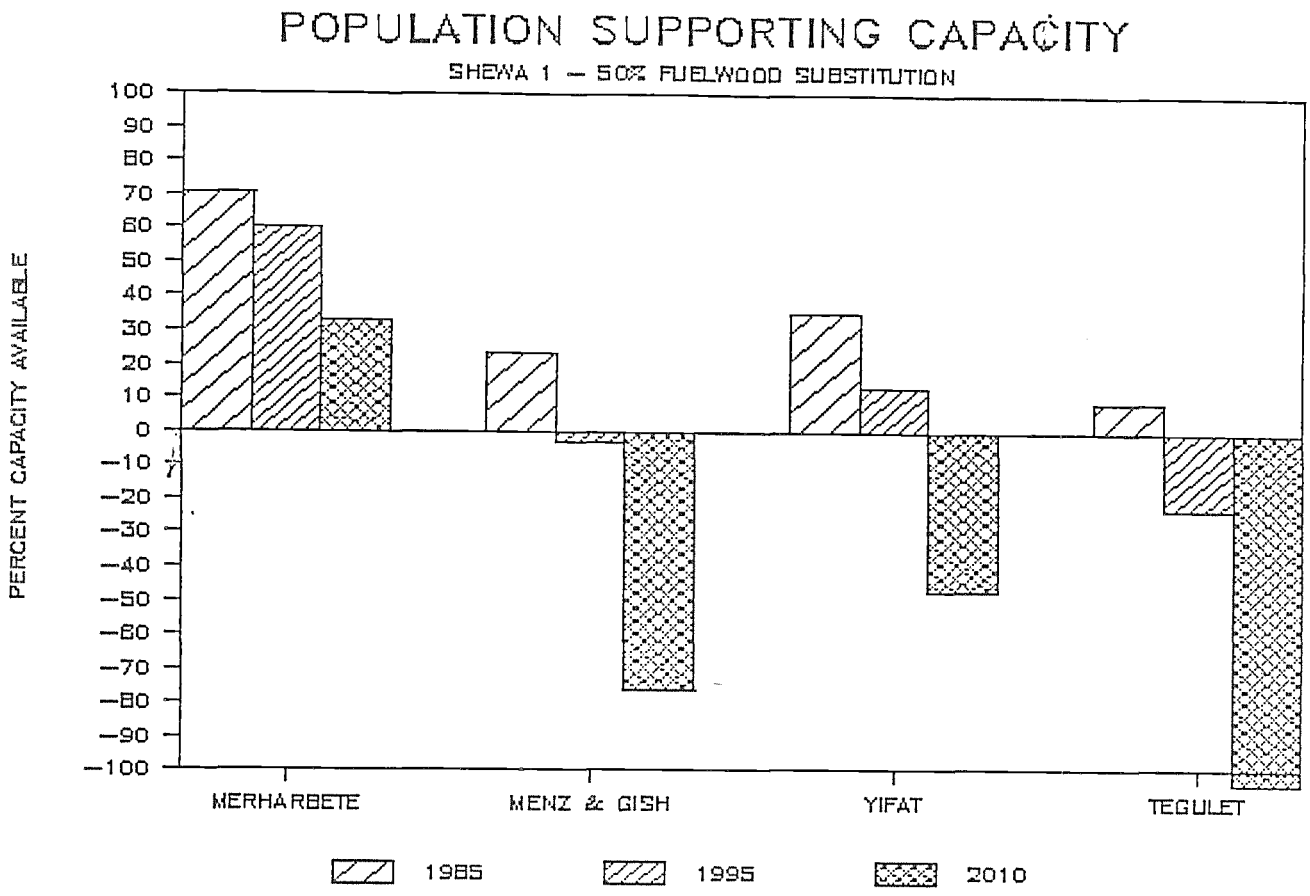
KEFA
MAJI & GOLDIYA
GIMIRA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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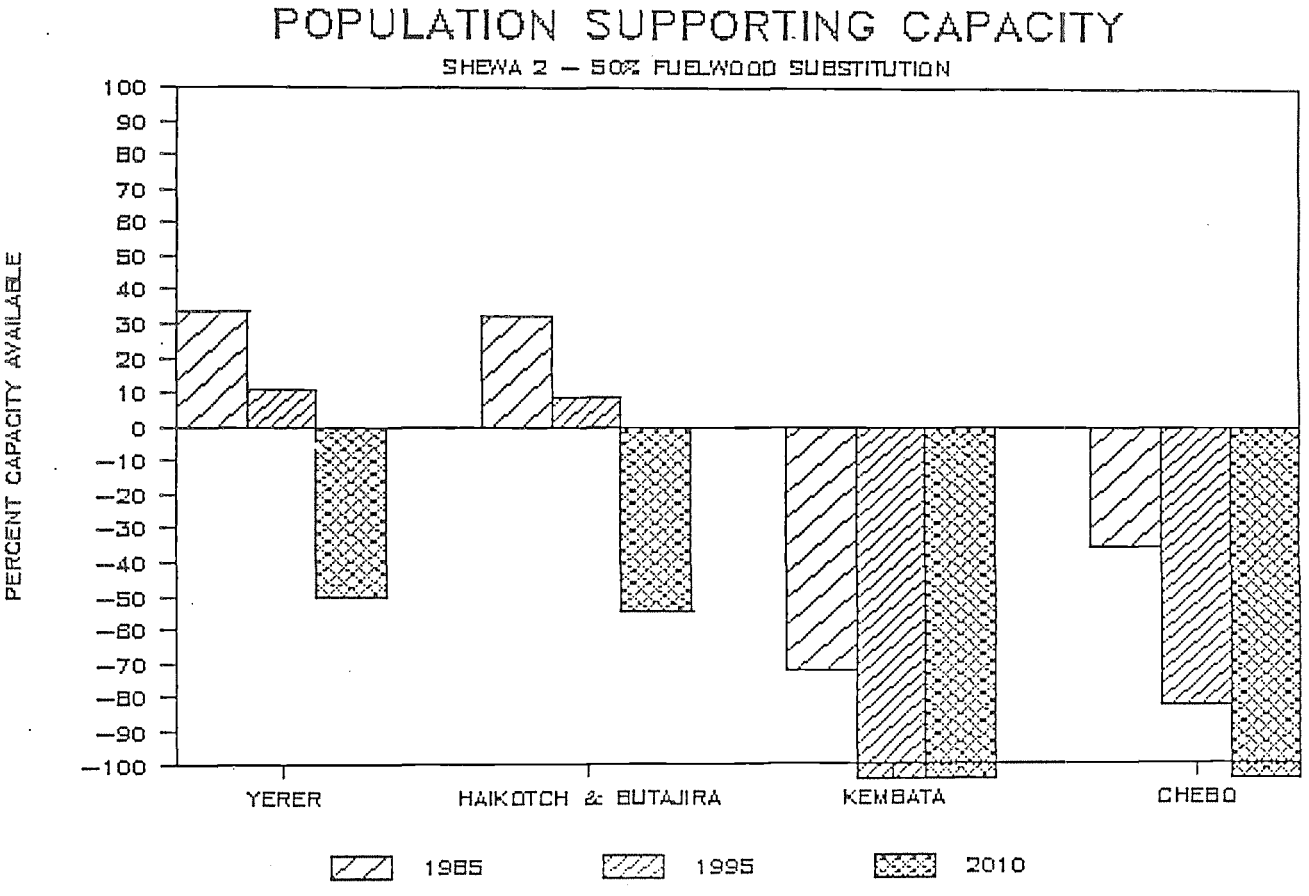
MERHARBETE
MENZ & GISH
YIFAT
TEGULET
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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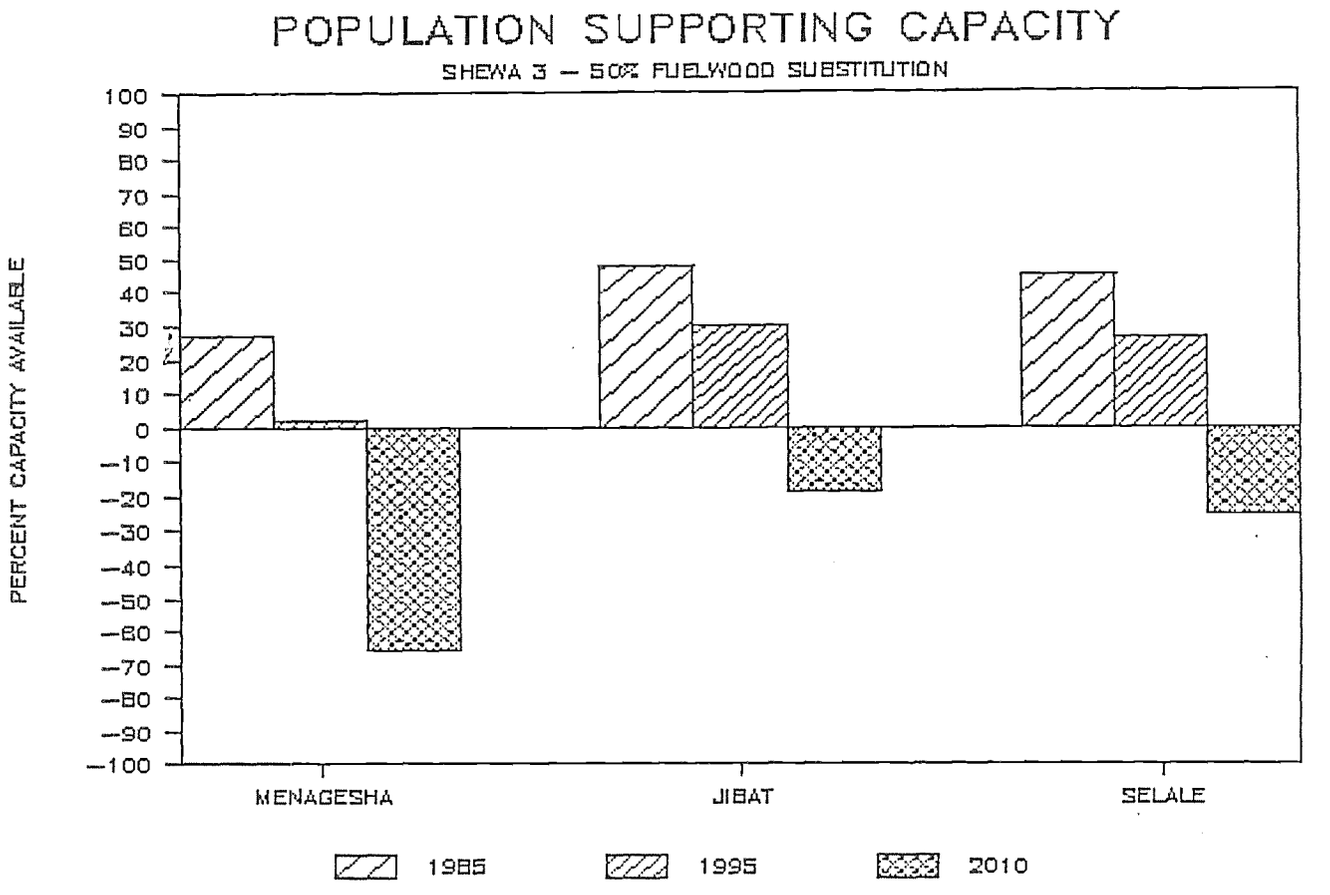
YERER
HAIKOTCH & BUTAJIRA
KEMBATA
CHEBO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 3 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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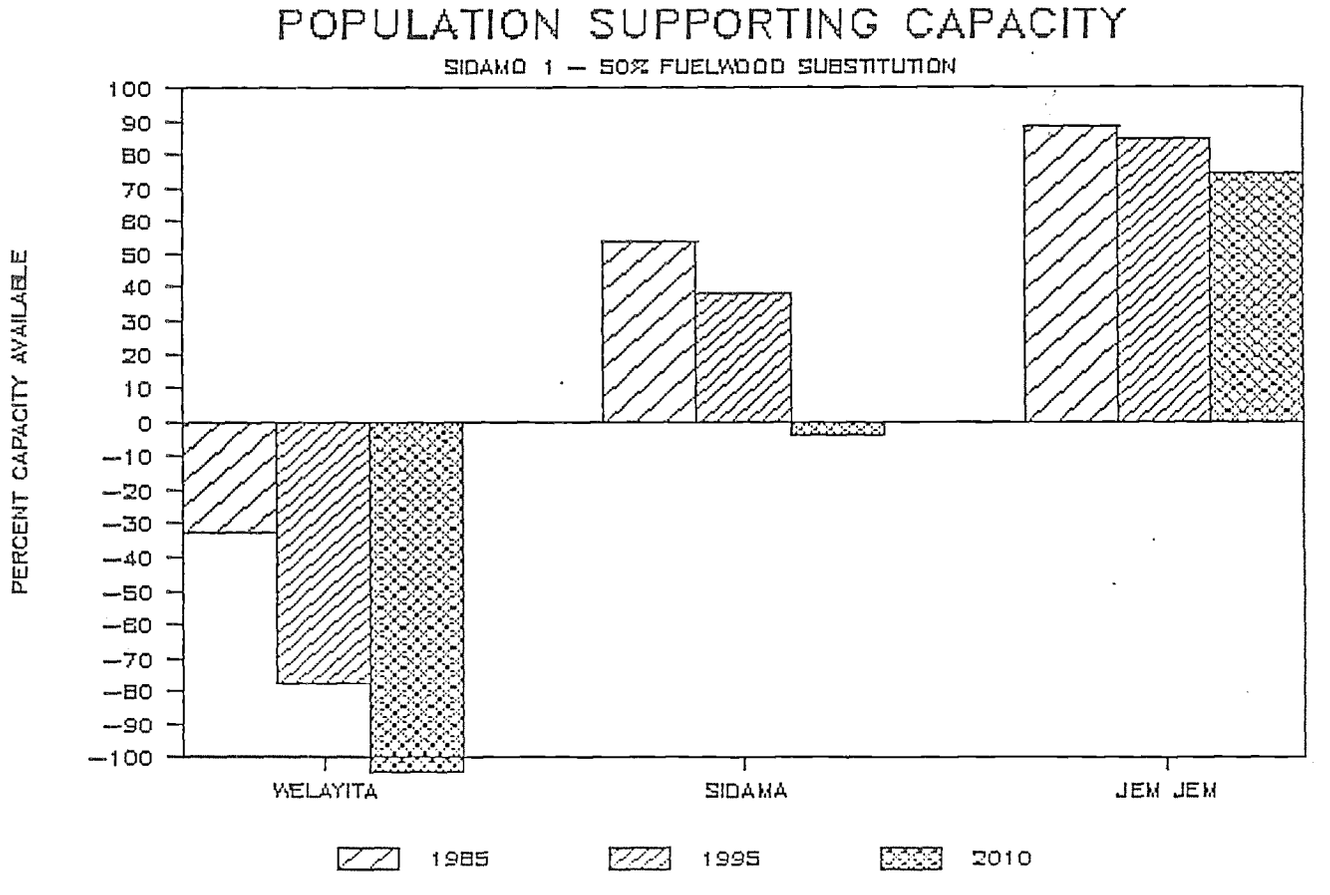
MENAGESHA
JIBAT
SELALE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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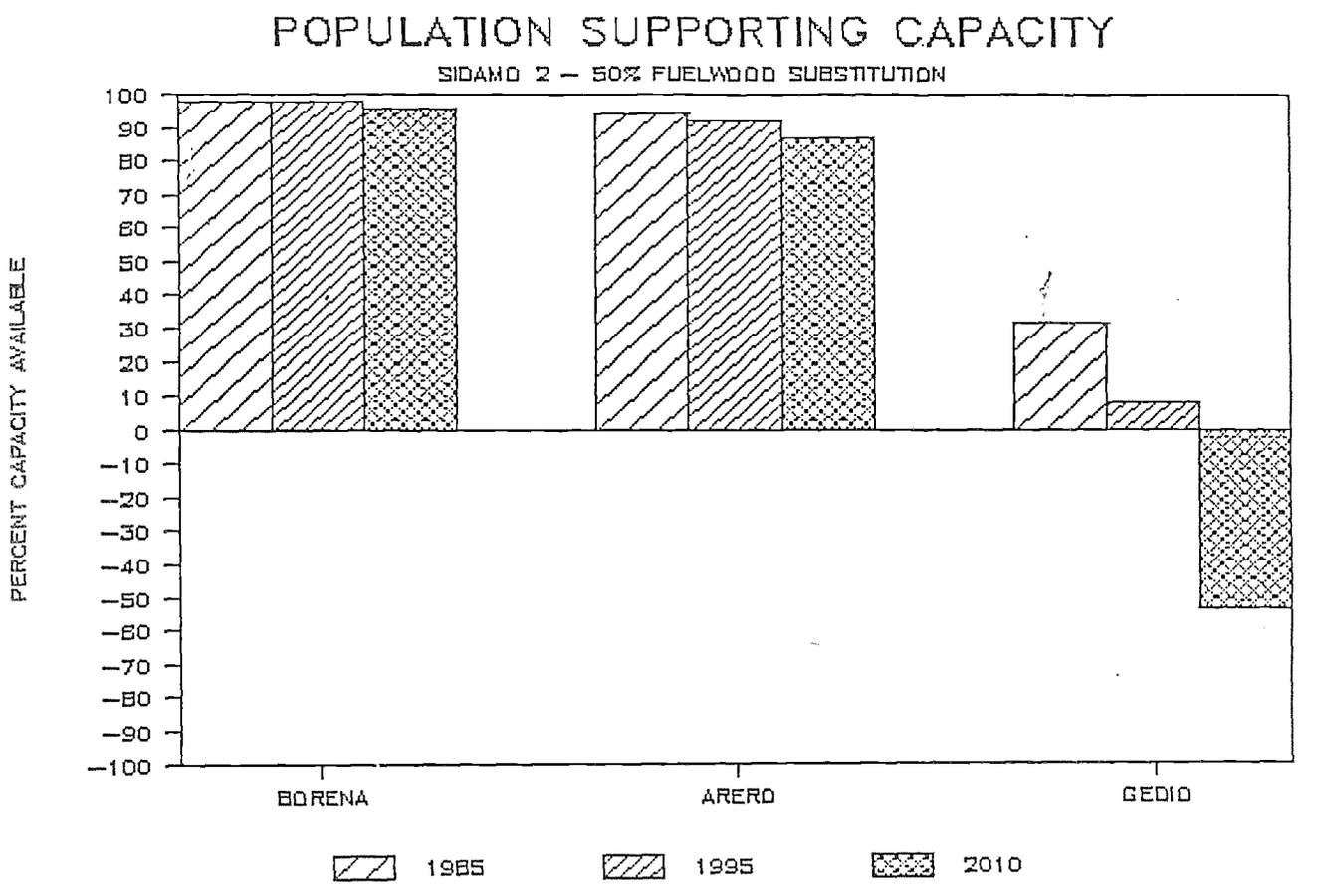
WELAYITA
SIDAMA
JEM JEM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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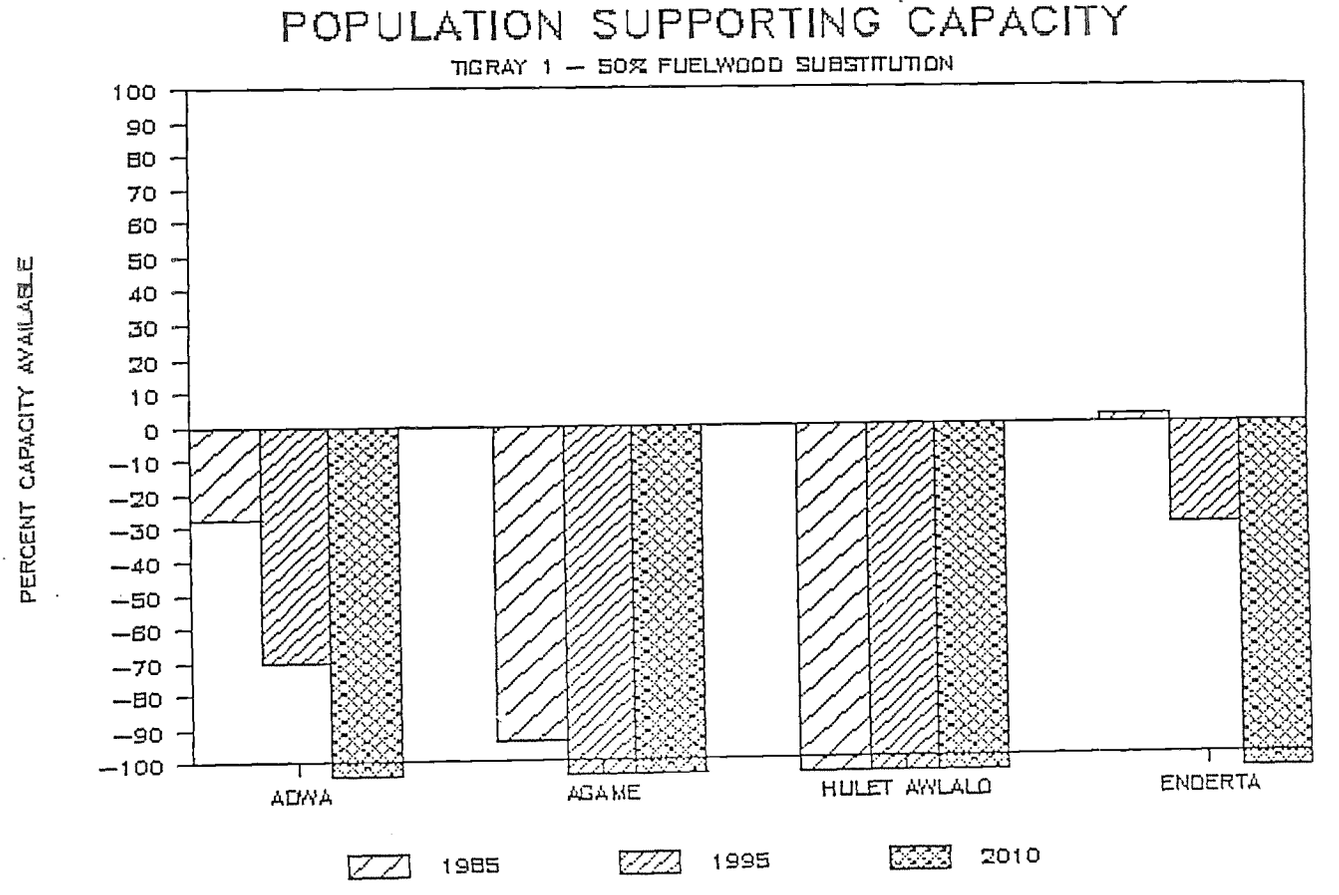
BORENA
ARERO
GEDIO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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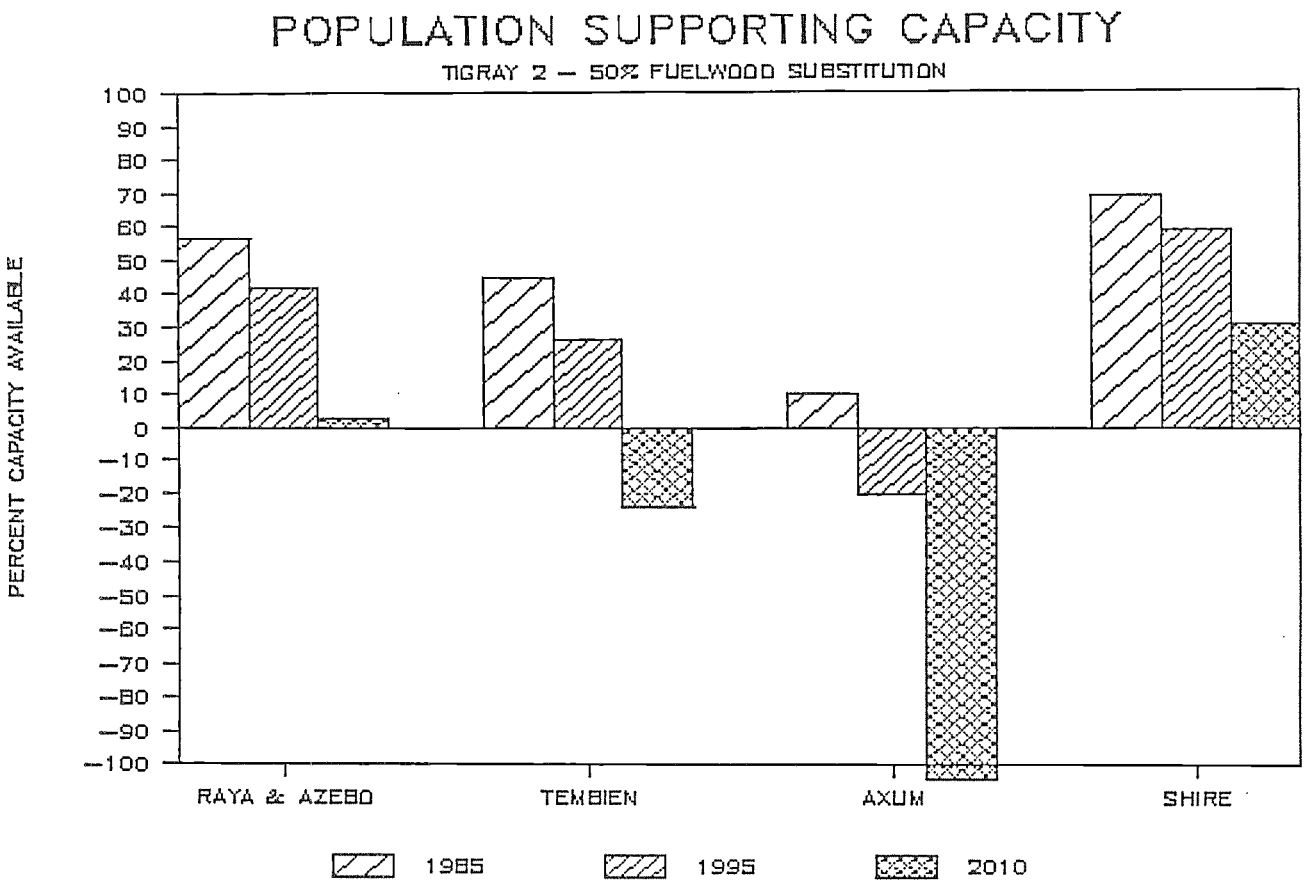
ADWA
AGAME
HULET AWLALO
ENDERTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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RAYA & AZEBO
TEMBIEN
AXUM
SHIRE
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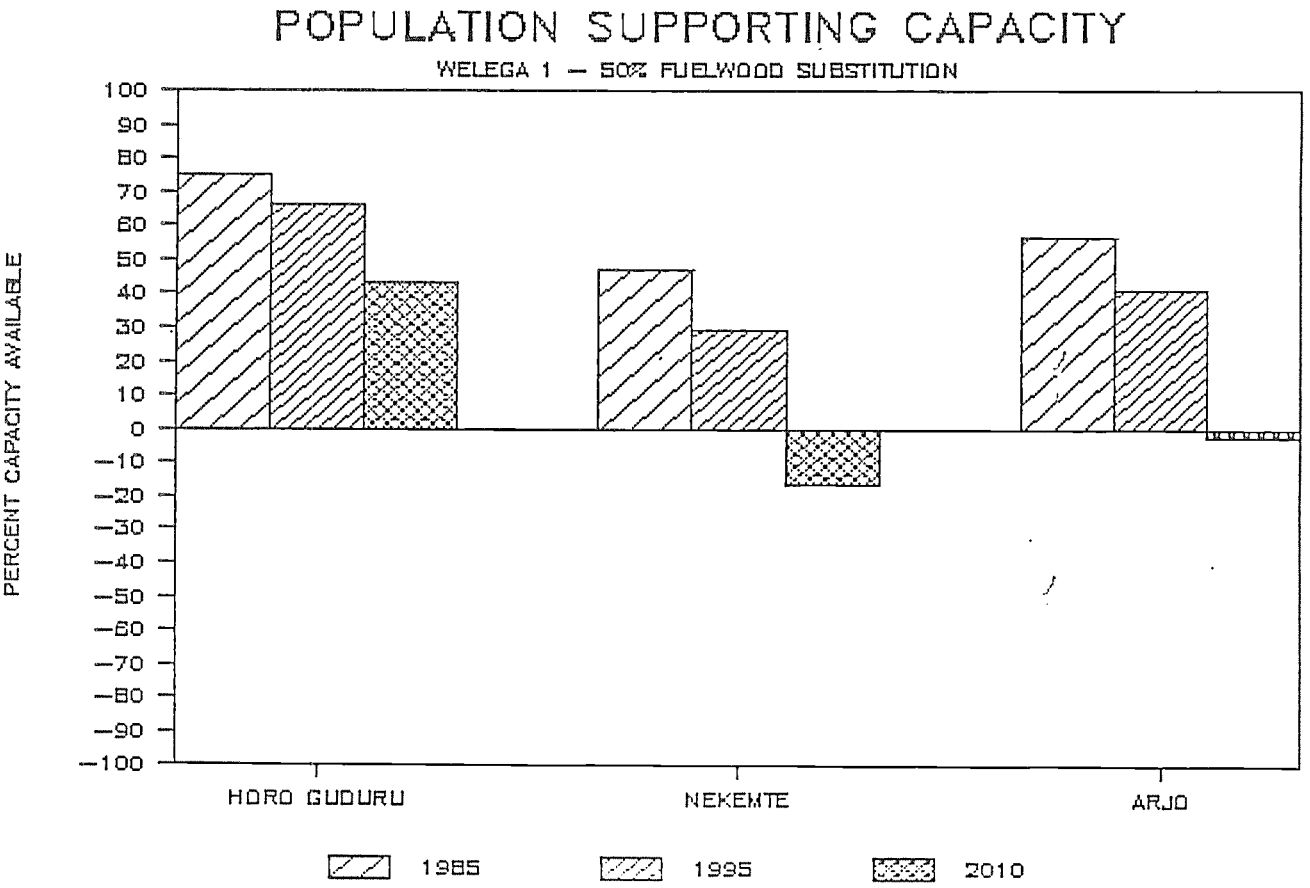
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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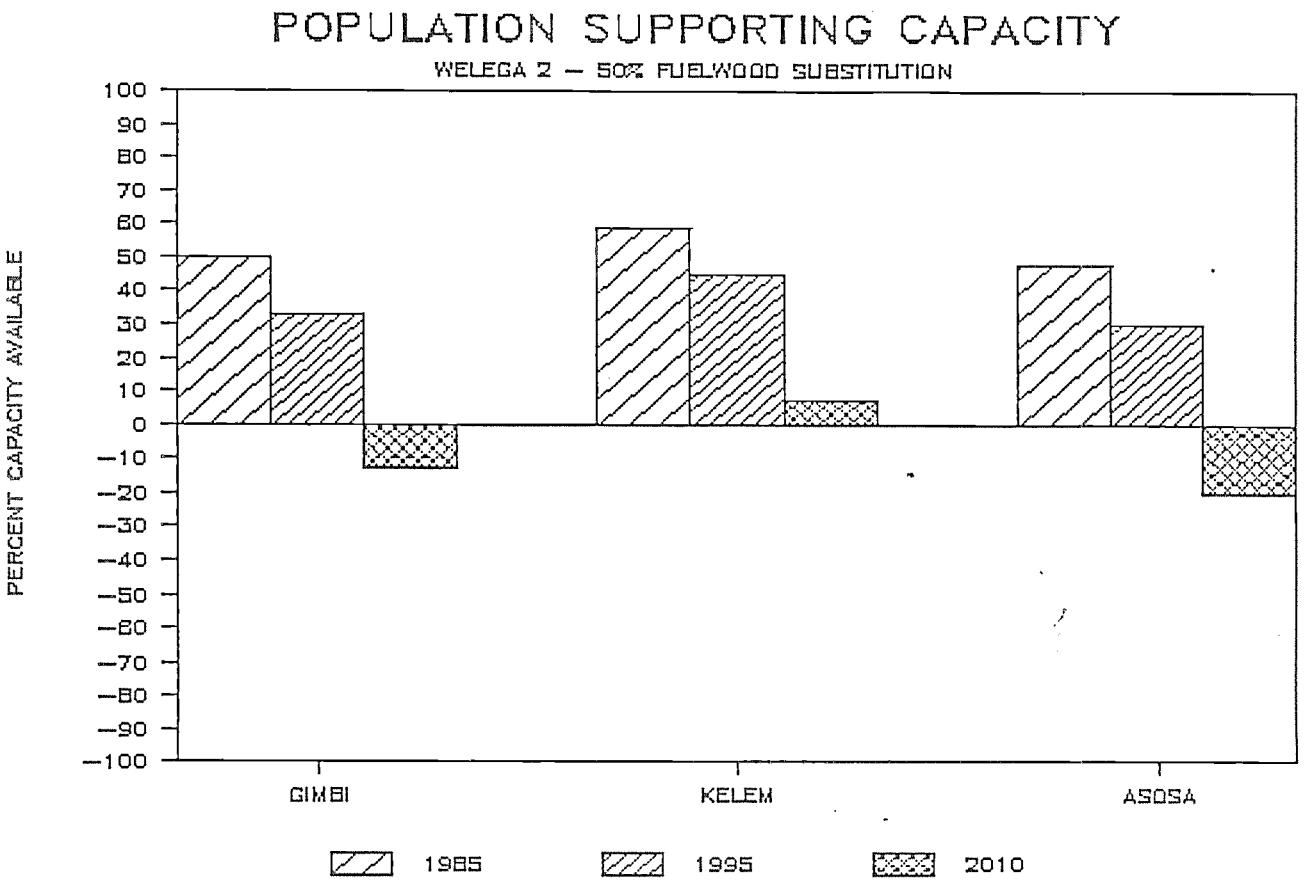
HORO GUDURU
NEKEMTE
ARJO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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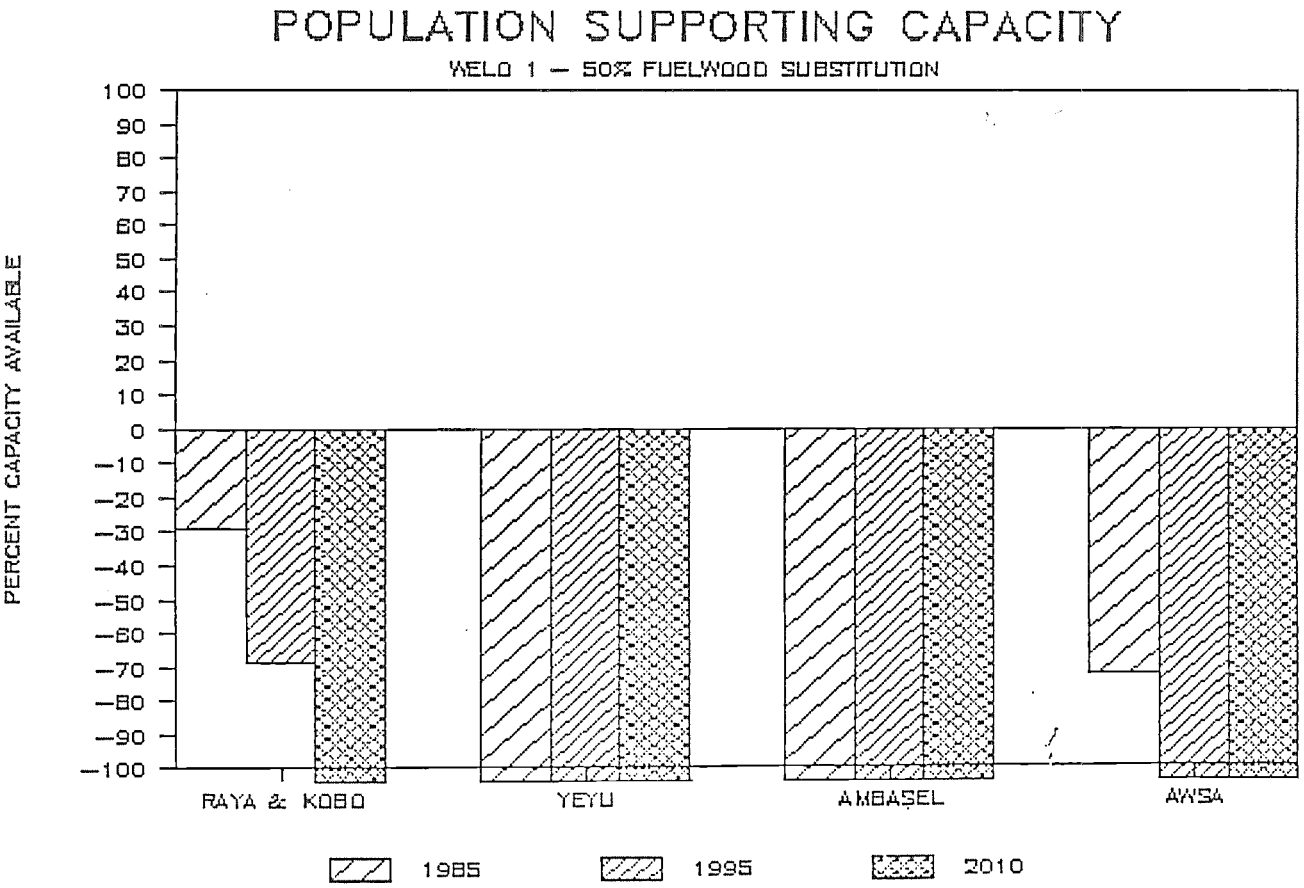
GIMBI
KELEM
ASOSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 1 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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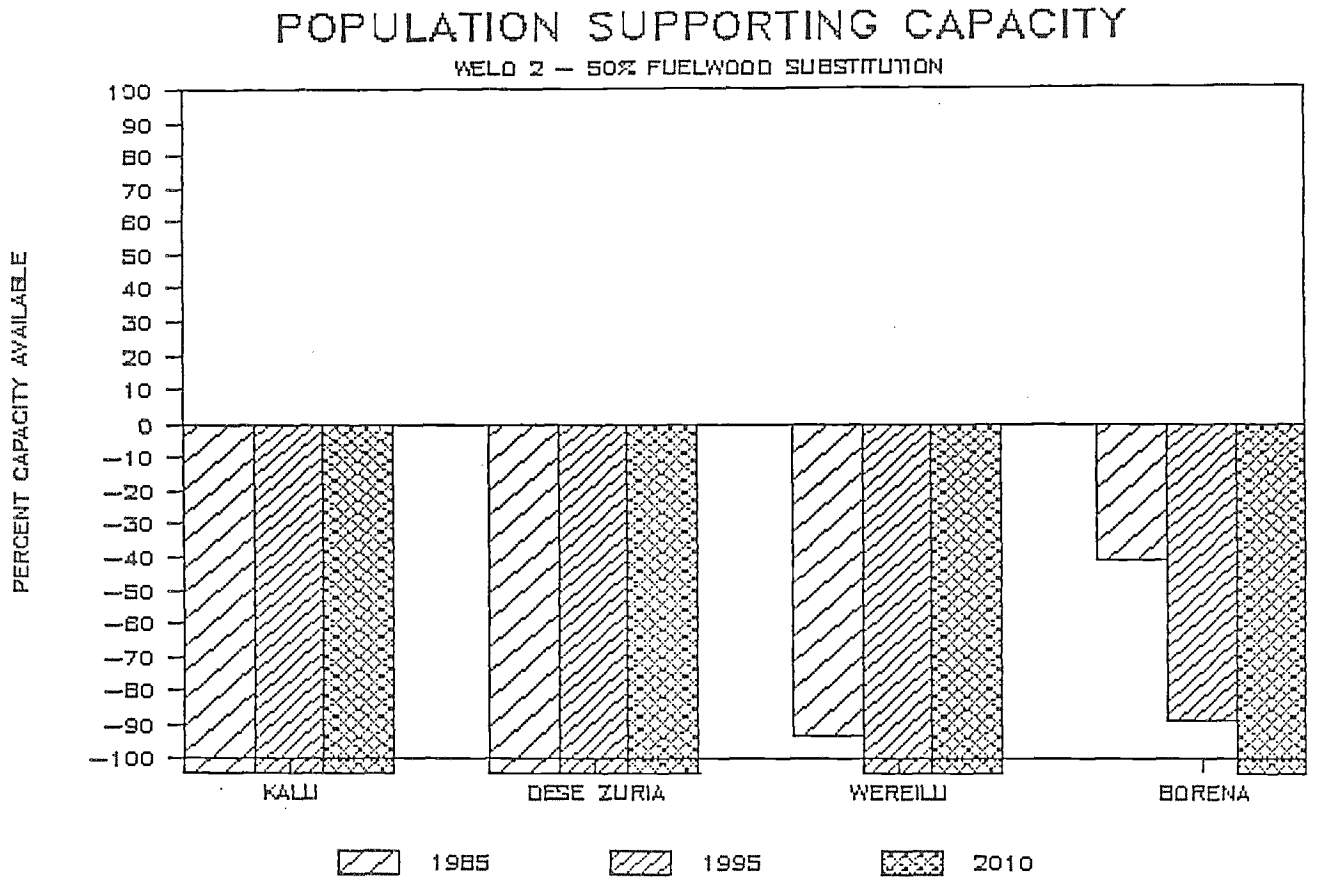
RAYA & KOBO
YEYU
AMBASEL
AWSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 2 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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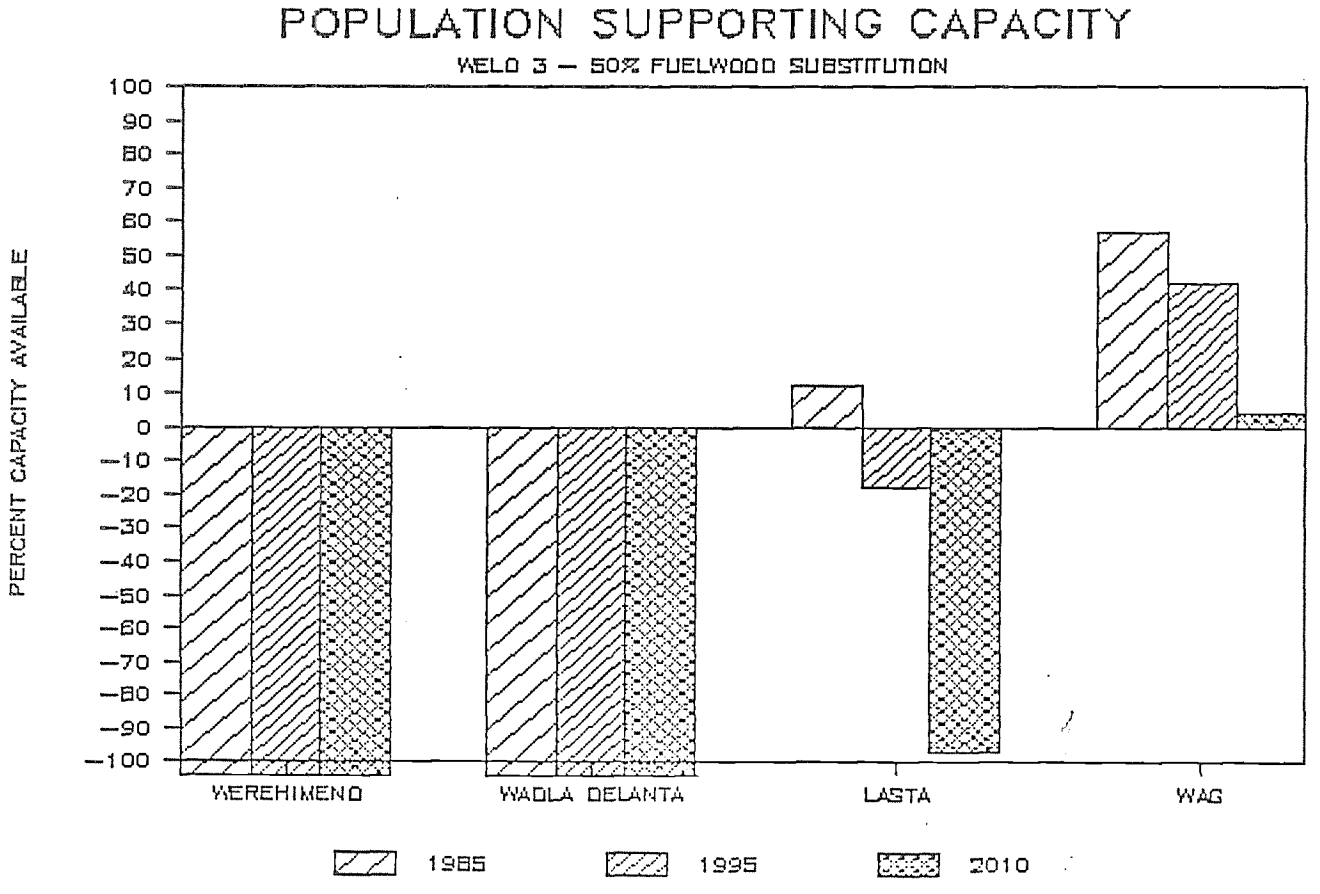
KALLI
DESE ZURIA
WEREILU
BORENA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 3 — 50% FUELWOOD SUBSTITUTION
PERCENT CAPACITY AVAILABLE
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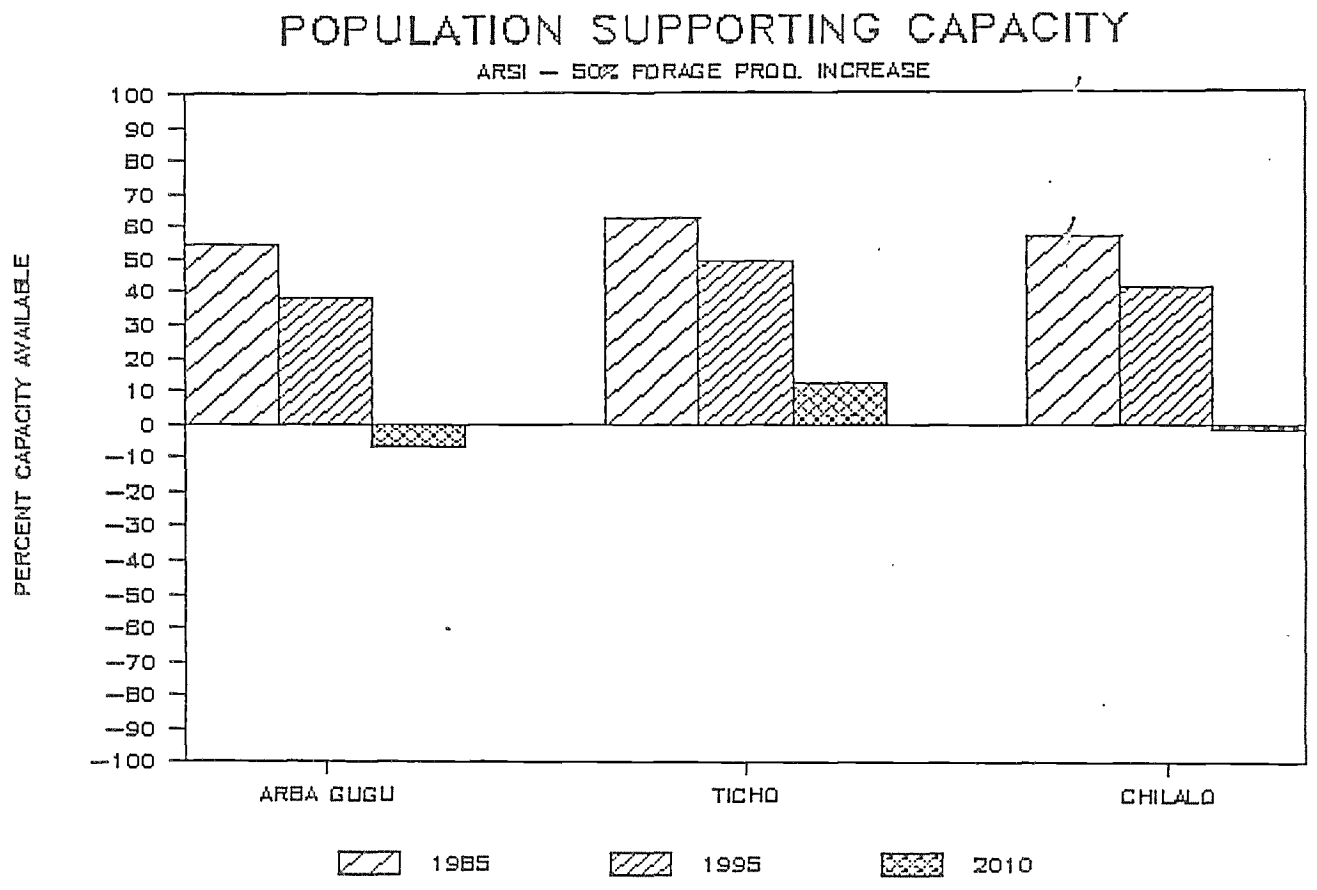
WEREHIMENO
WADLA DELANTA
LASTA
WAG
1985
1995
2010

POPULATION SUPPORTING CAPACITY

50% INCREASE IN FORAGE PRODUCTION


POPULATION SUPPORTING CAPACITY
ARSI — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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ARBA GUGU
TICHO
CHILALO
1985
1995
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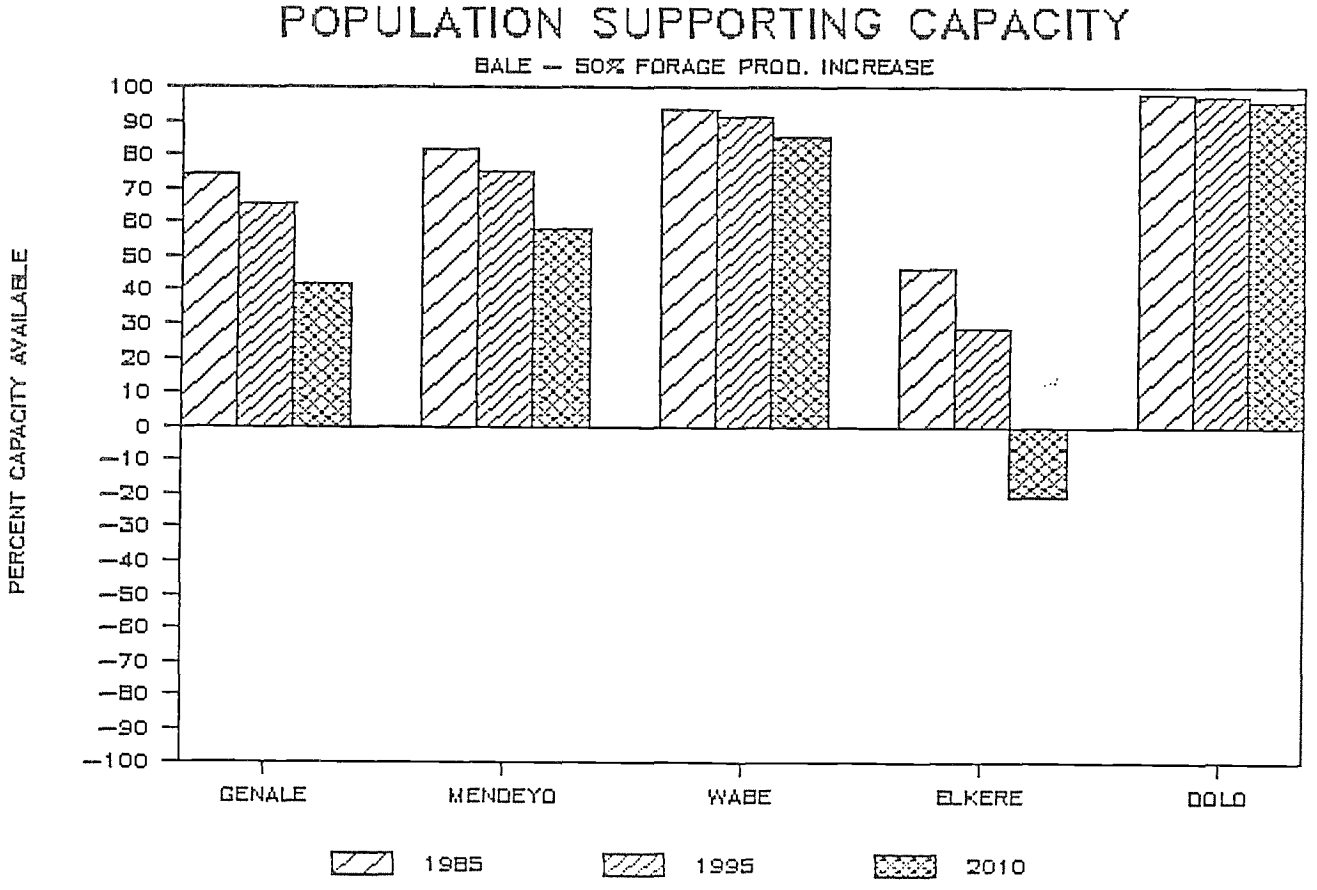
POPULATION SUPPORTING CAPACITY
BALE — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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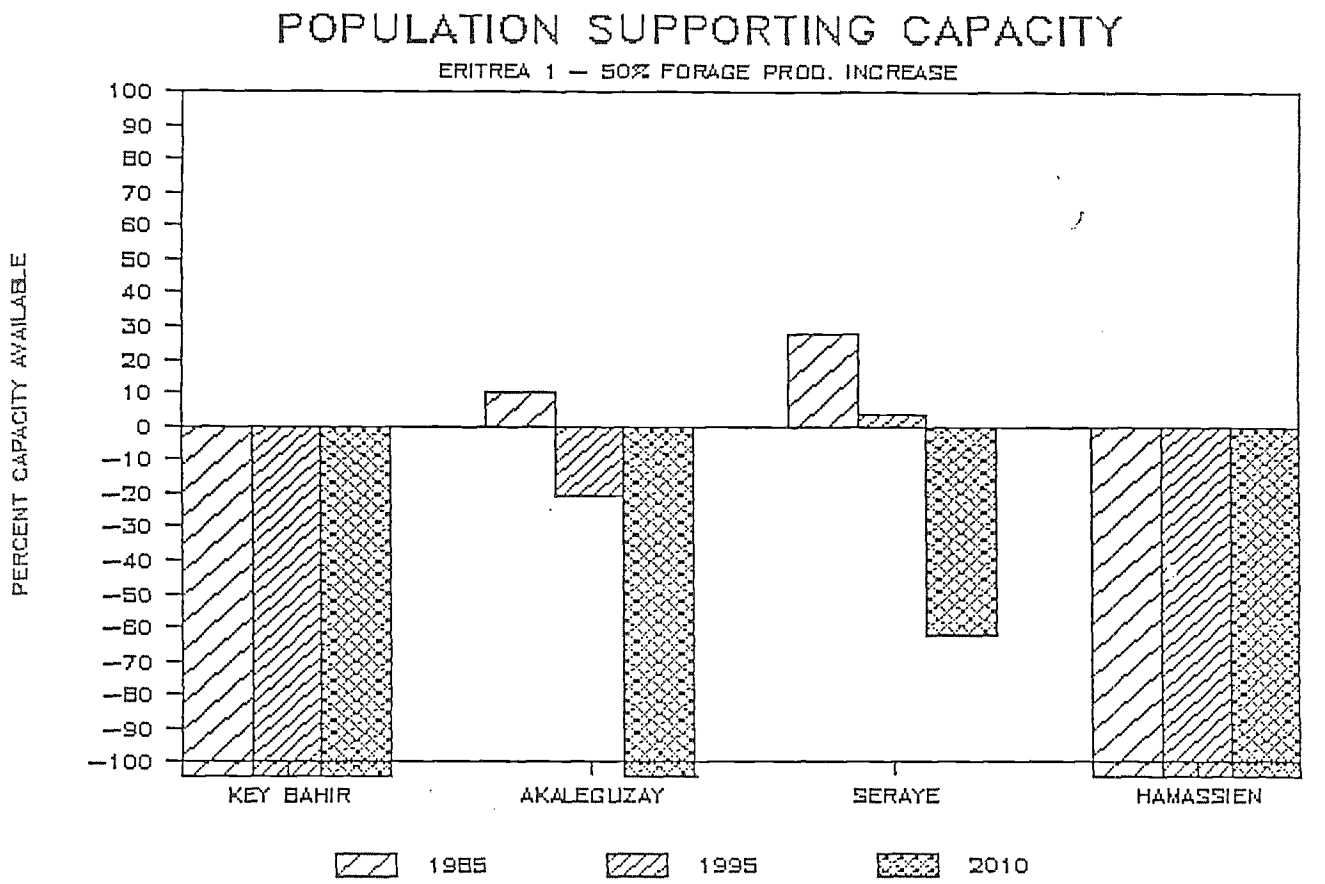
GENALE
MENDEYO
WABE
ELKERE
DOLO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 1 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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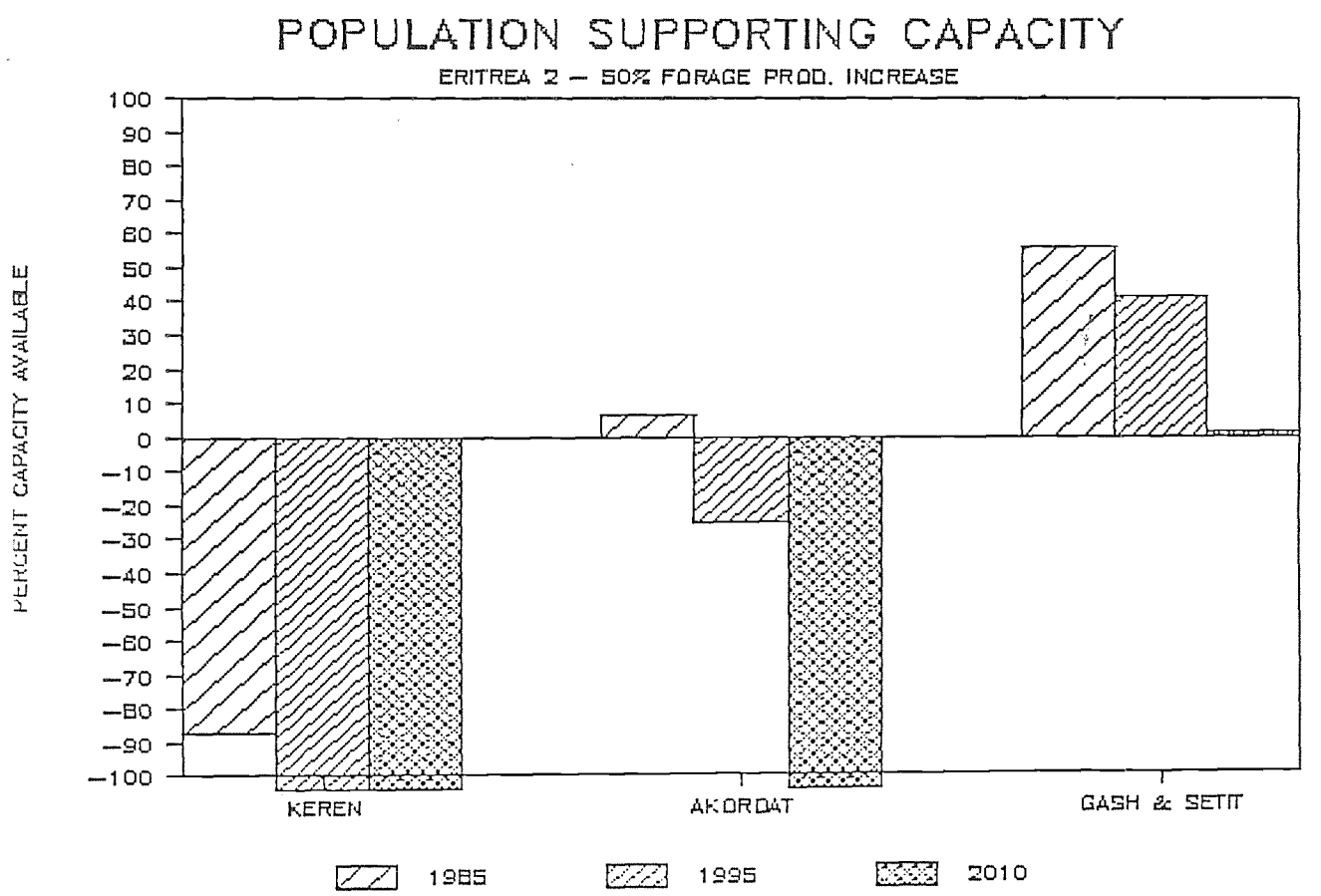
KEY BAHIR
AKALEGUZAY
SERAYE
HAMASSIEN
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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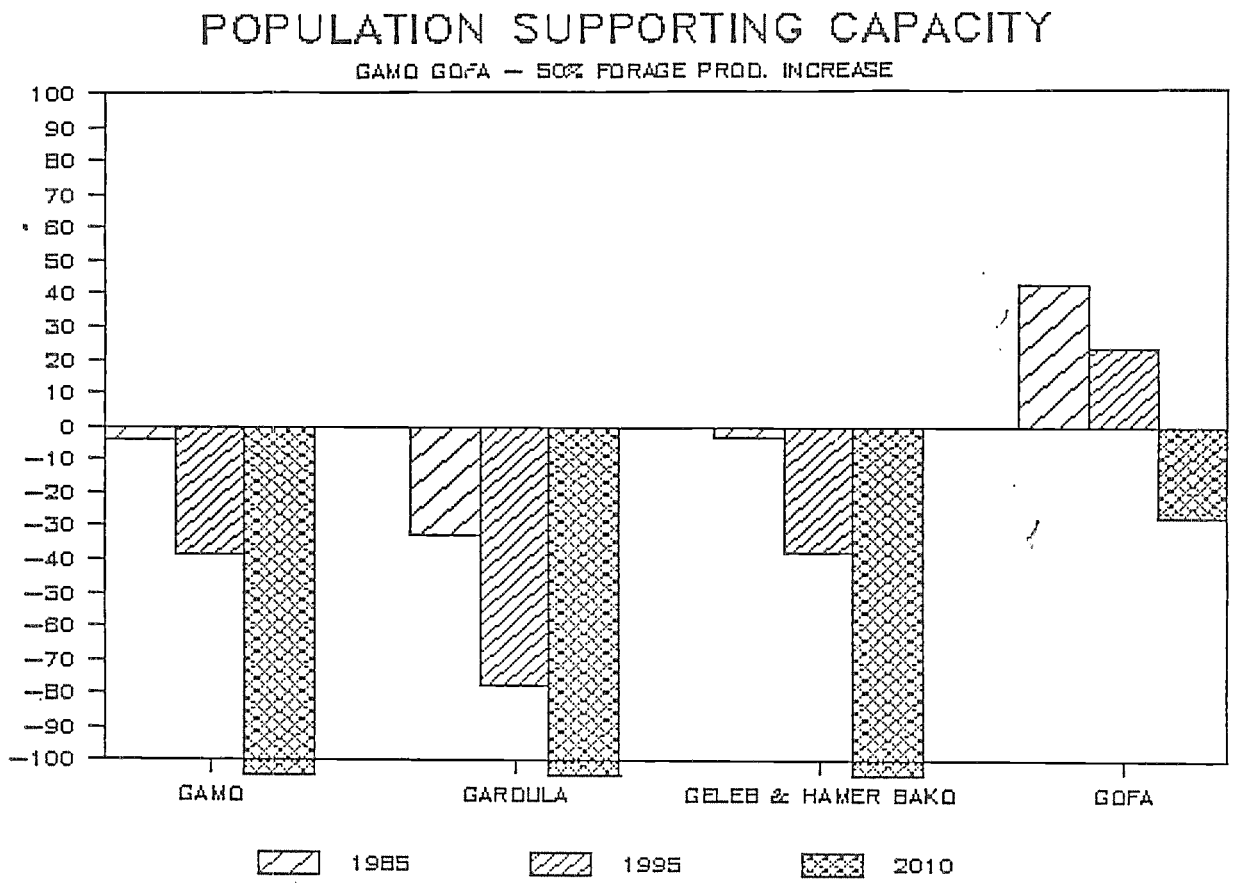
KEREN
AKORDAT
GASH & SETIT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GAMO GOFA — 50% FORAGE PROD. INCREASE
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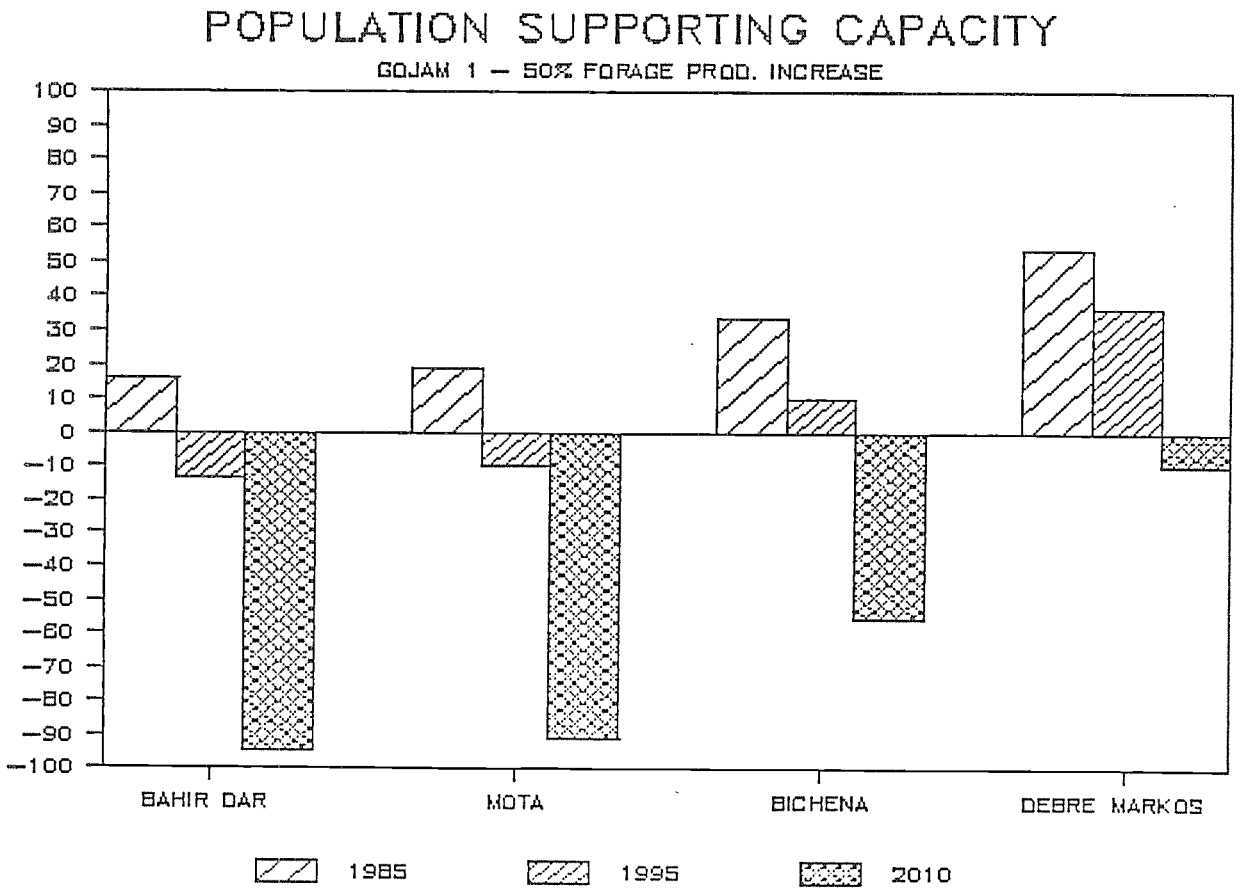
GAMO
GARDULA
GELEB & HAMER BAKO
GOFA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 1 — 50% FORAGE PROD. INCREASE
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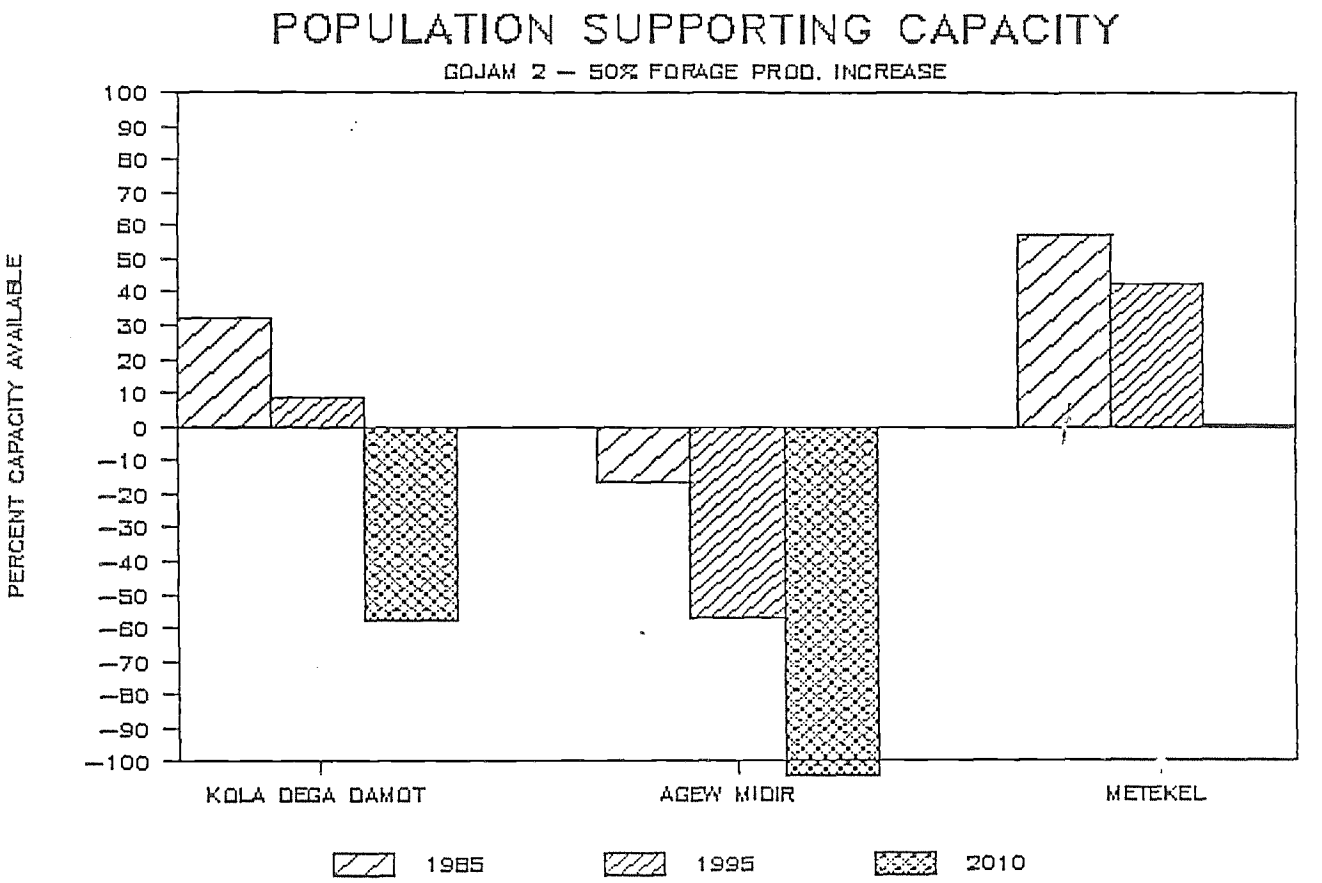
BAHIR DAR
MOTA
BICHENA
DEBRE MARKOS
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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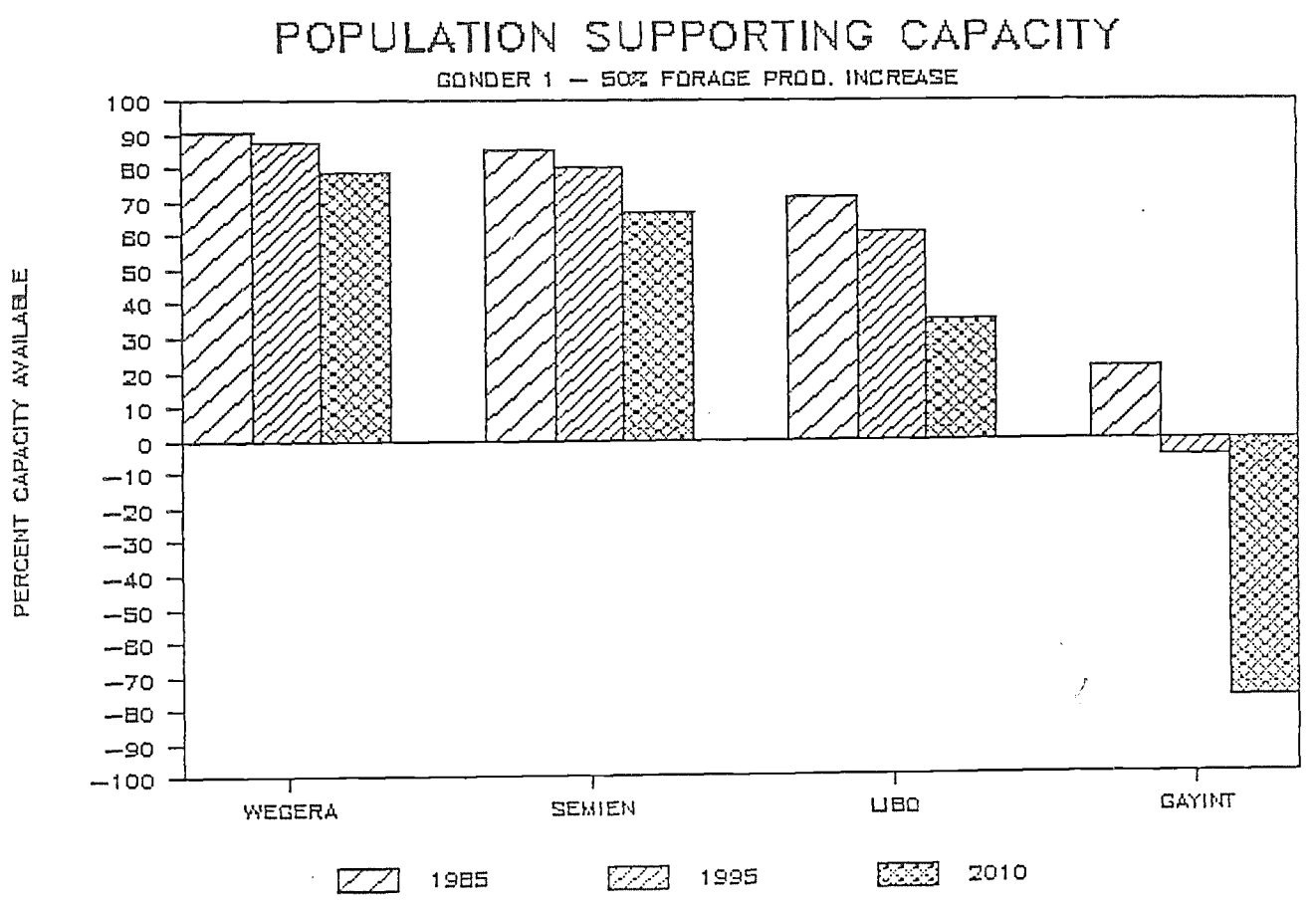
KOLA DEGA DAMOT
AGEW MIDIR
METEKEL
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 1 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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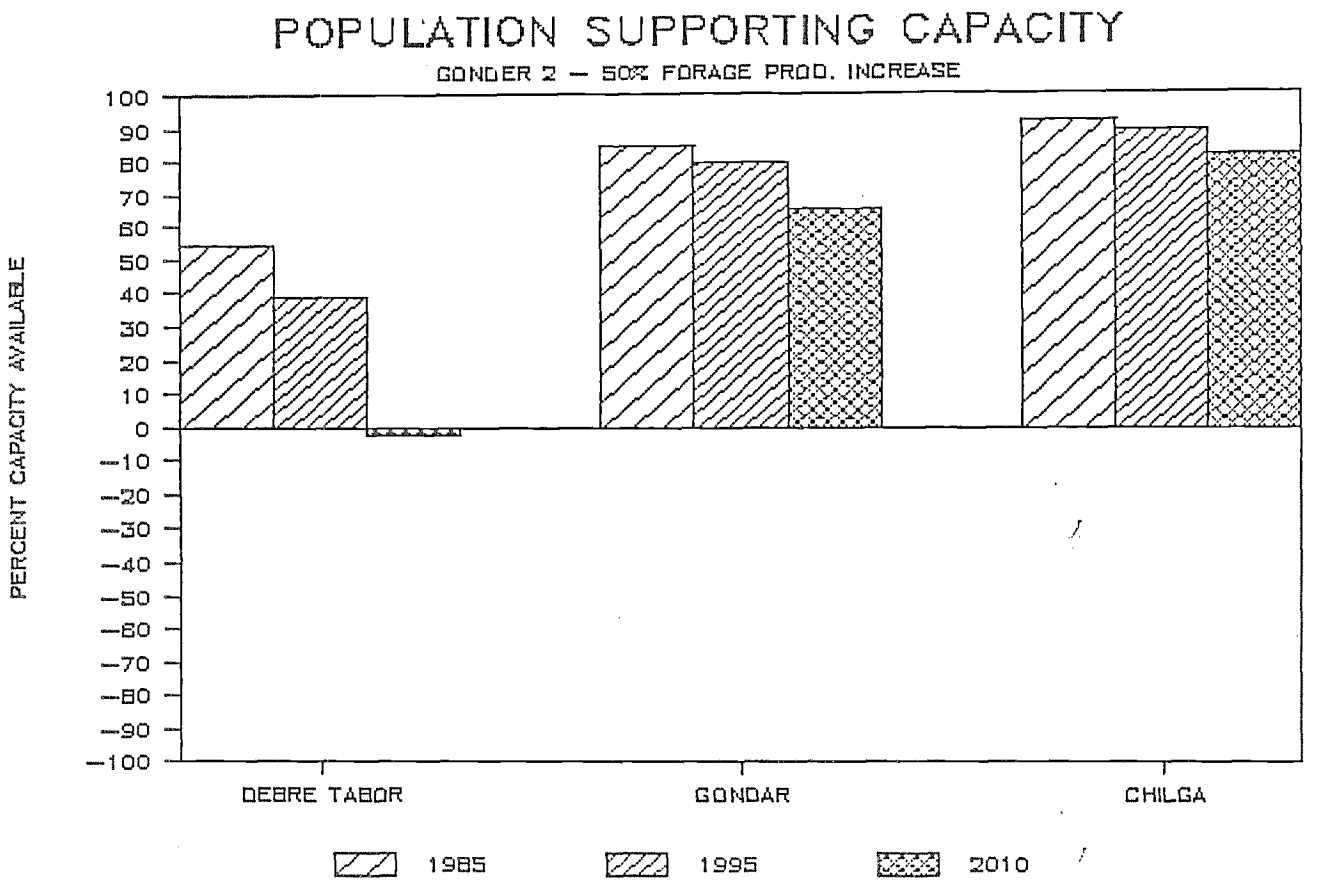
WEGERA
SEMIEN
UBO
GAYINT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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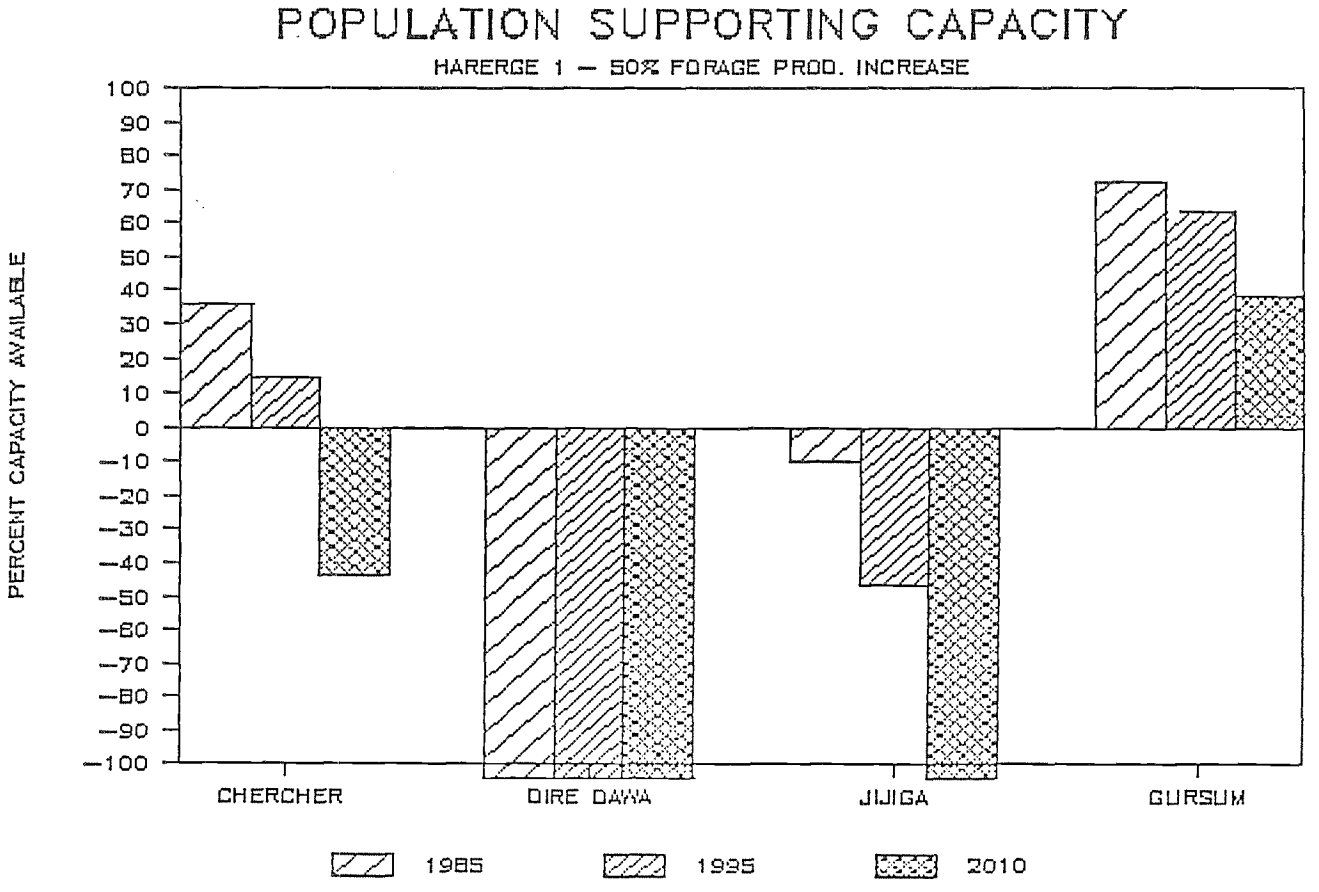
DEBRE TABOR
GONDAR
CHILGA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 1 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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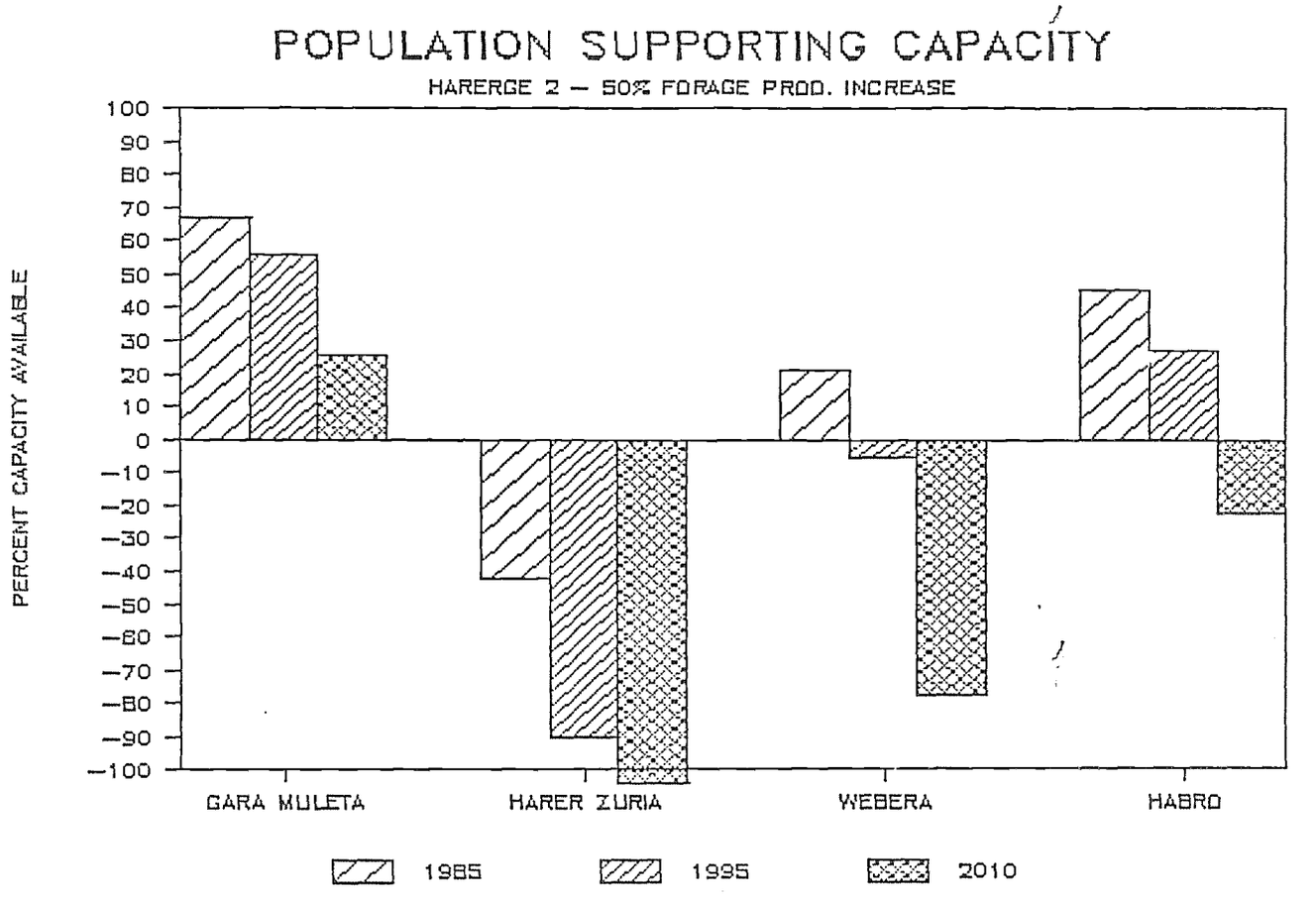
CHERCHER
DIRE DAWA
JIJIGA
GURSUM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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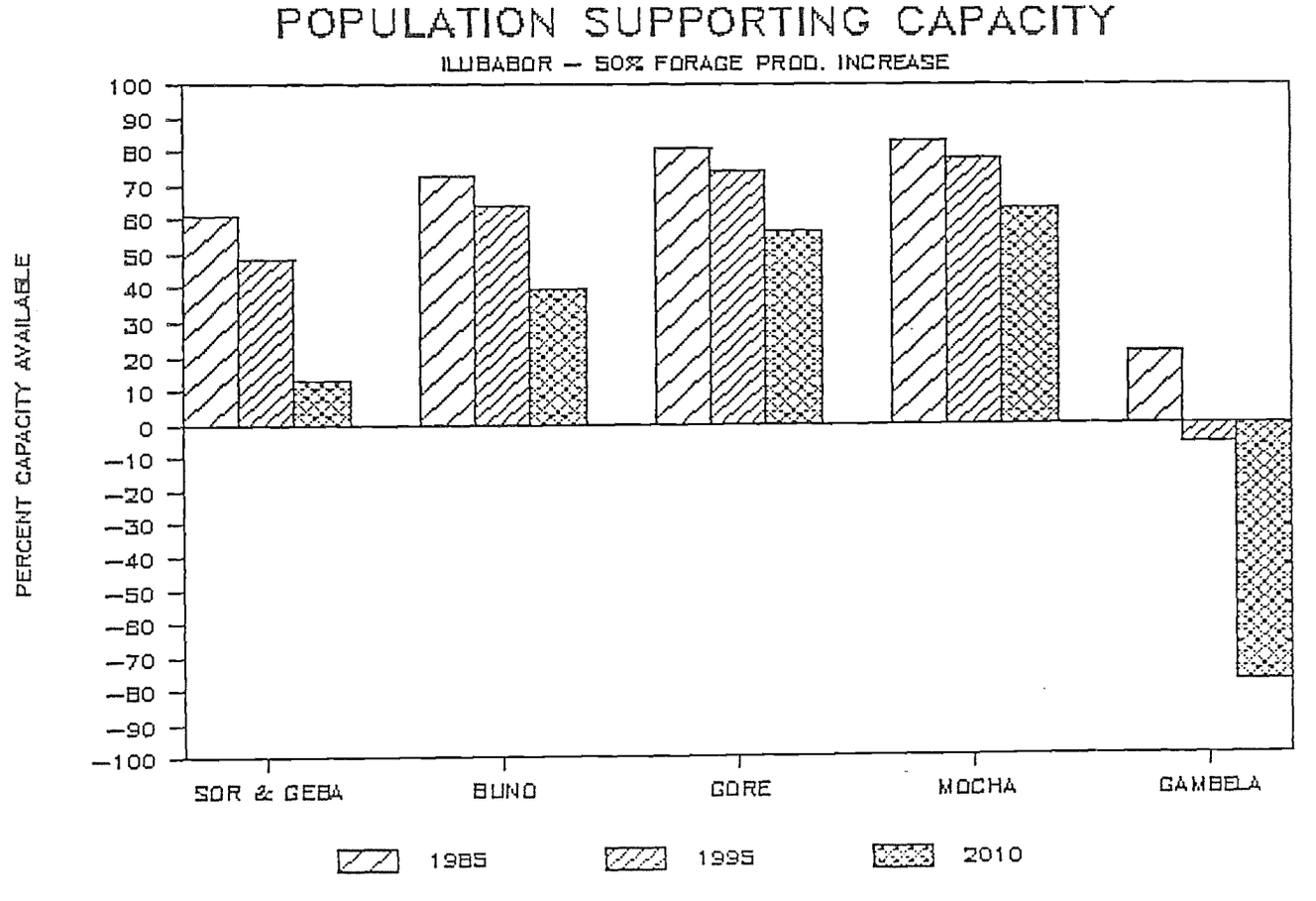
GARA MULETA
HARER ZURIA
WEBERA
HABRO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ILUBABOR — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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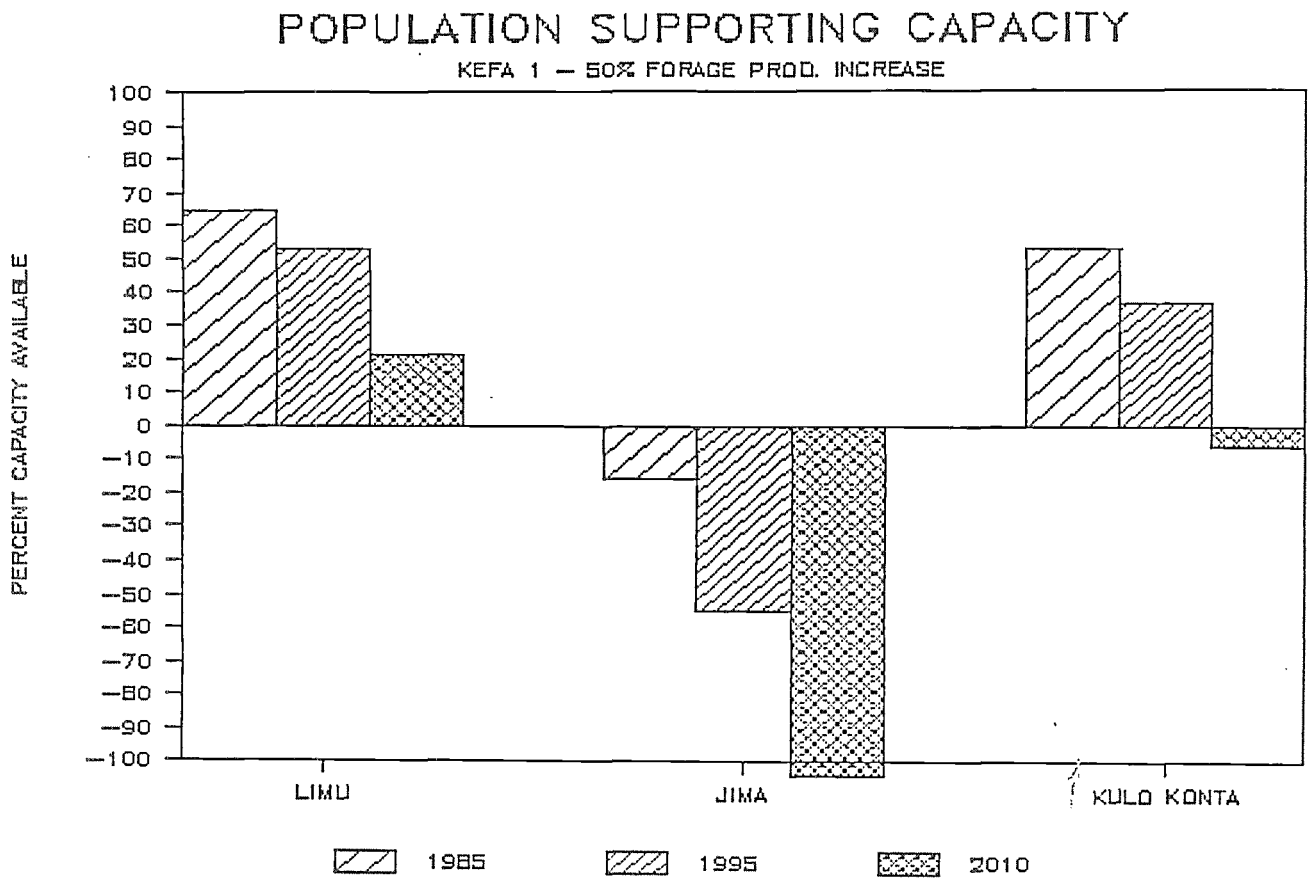
SOR & GEBA
BUNO
GORE
MOCHA
GAMBELA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 1 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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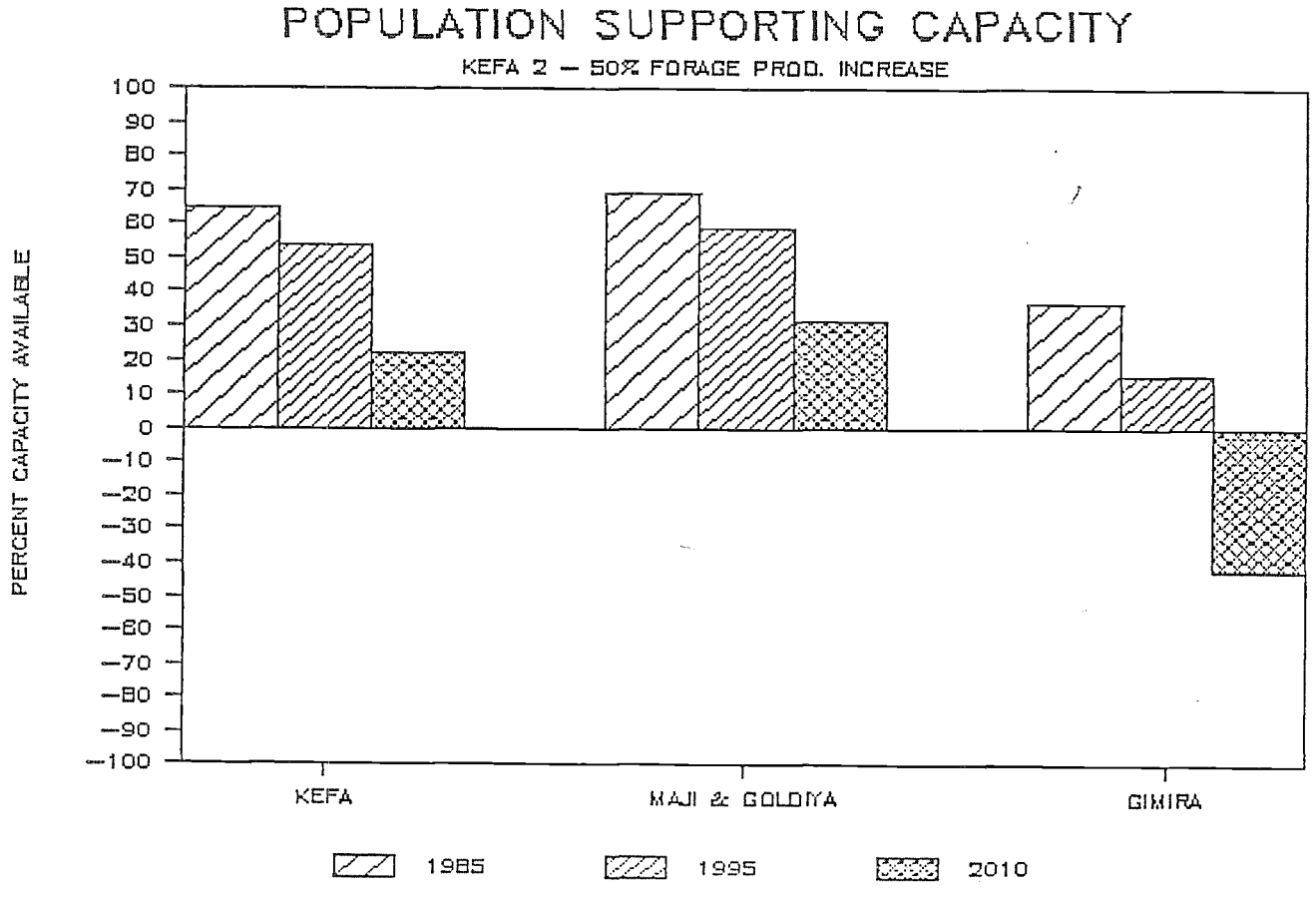
LIMU
JIMA
KULO KONTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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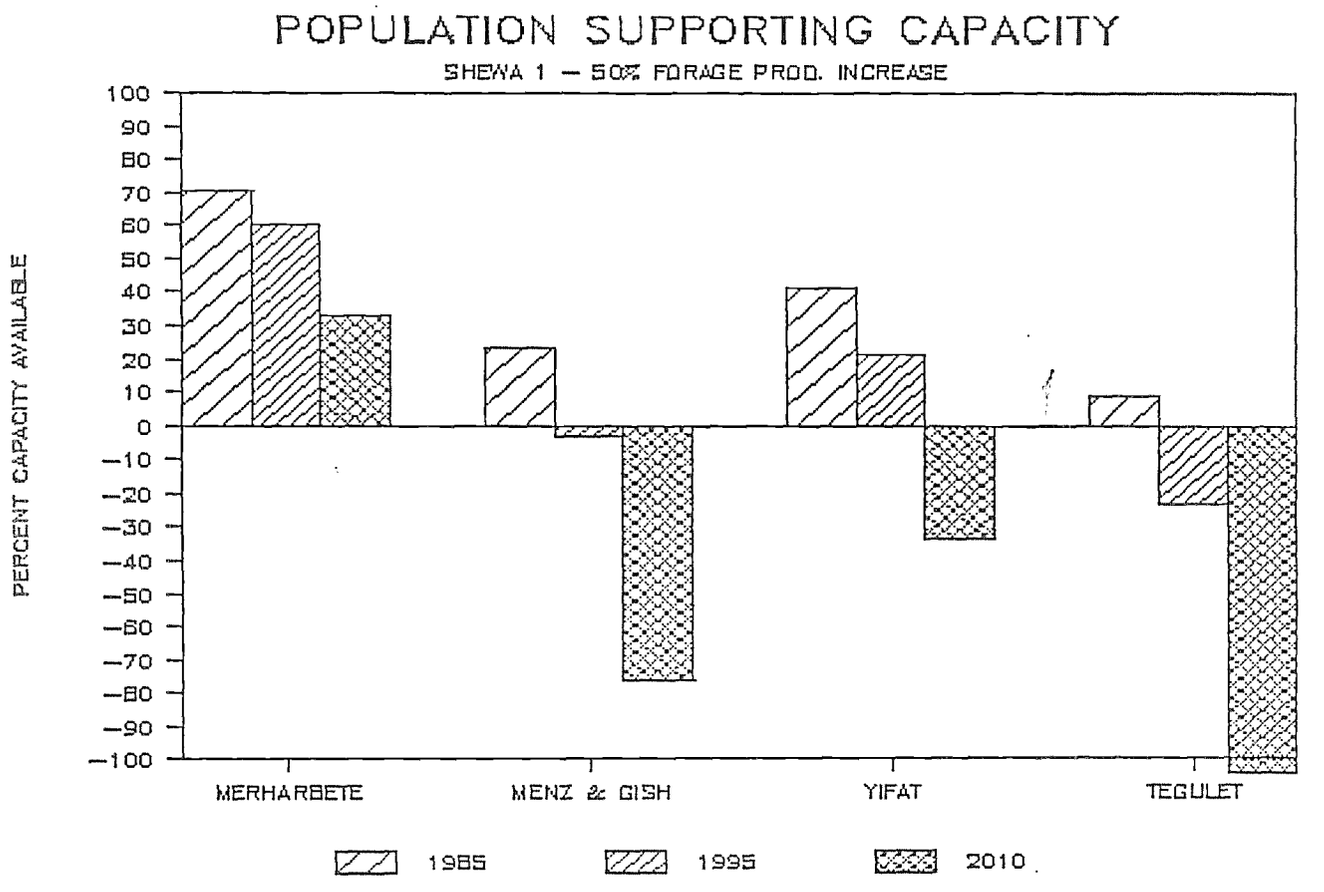
KEFA
MAJI & GOLDIYA
GIMIRA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 1 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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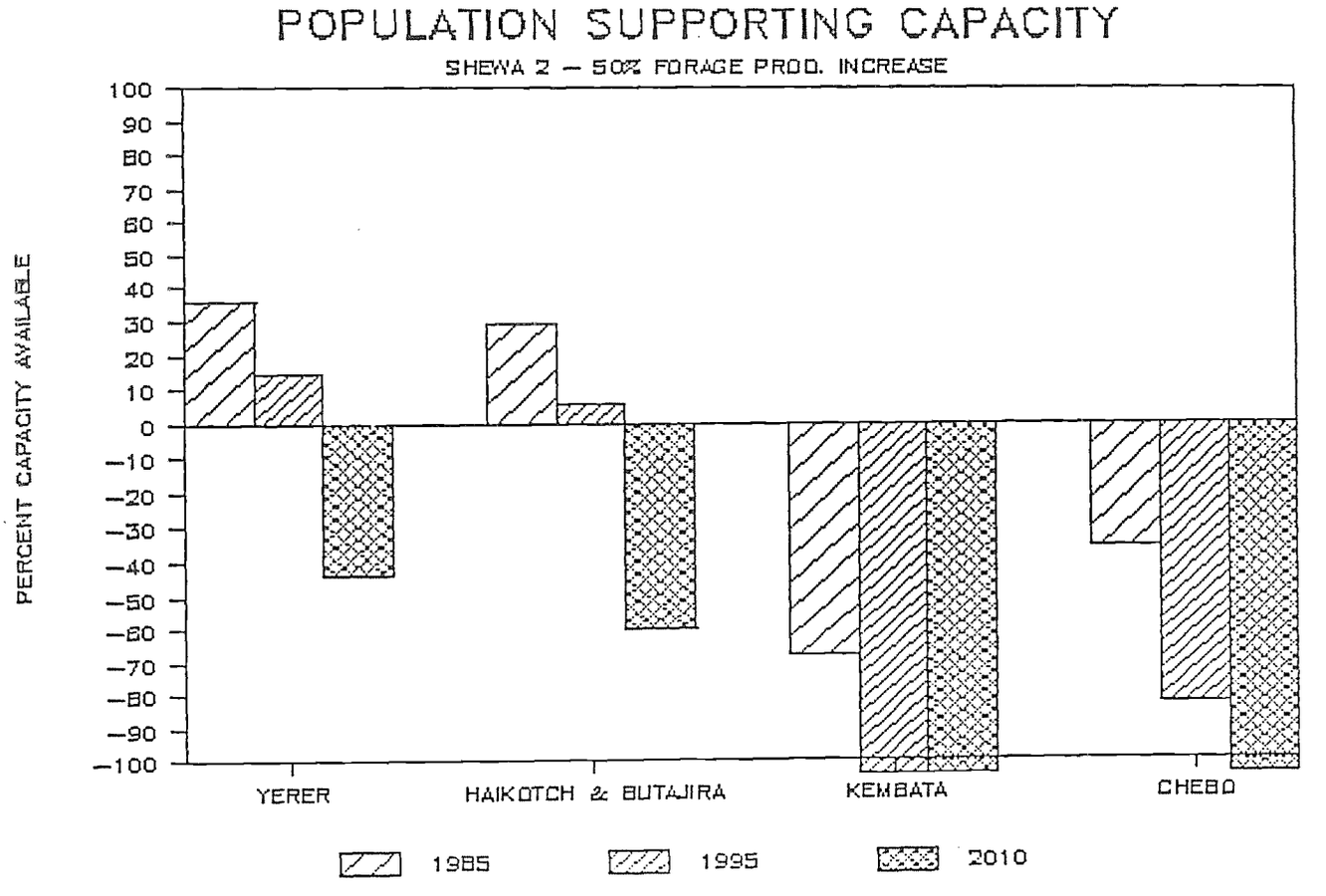
MERHARBETE
MENZ & GISH
YIFAT
TEGULET
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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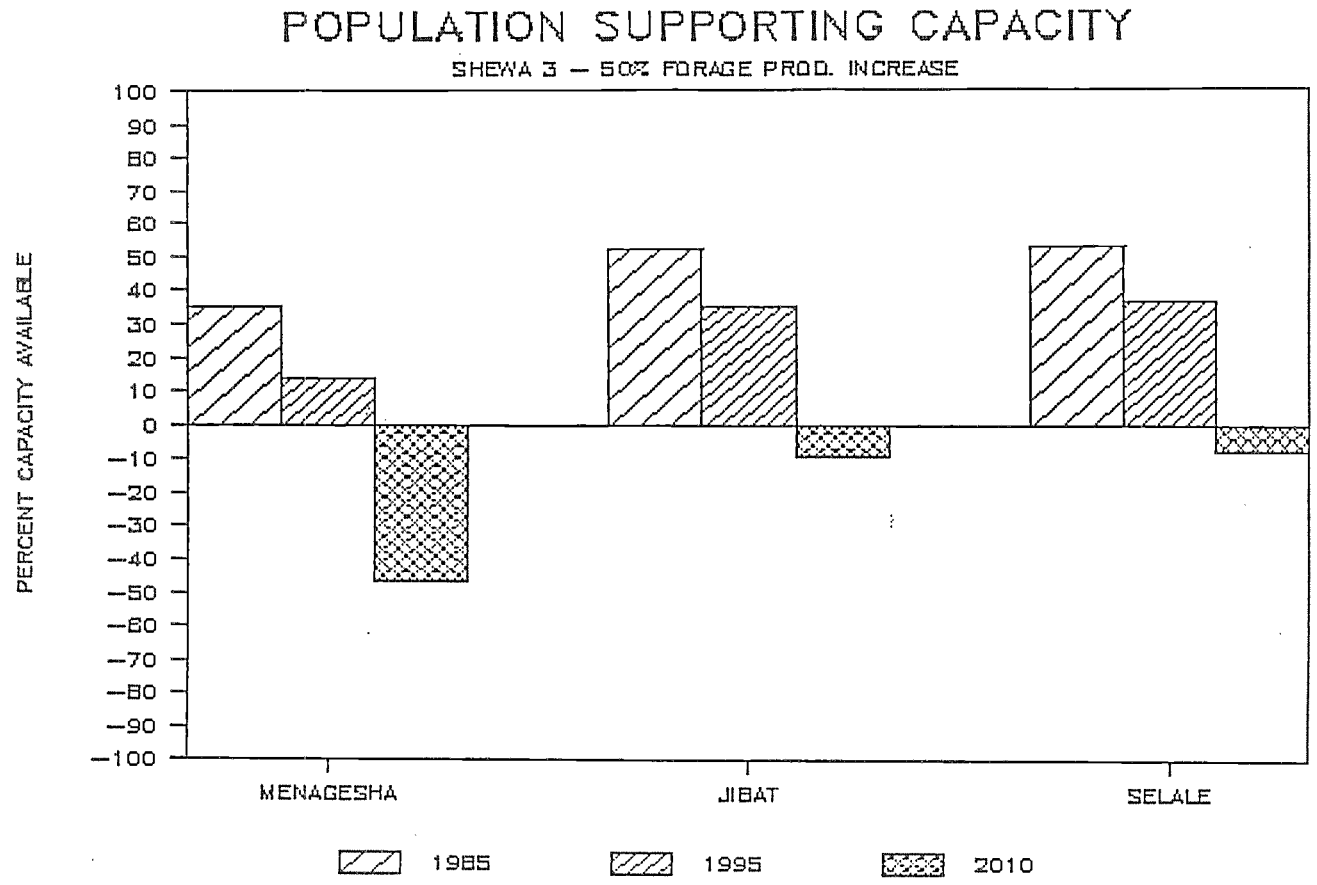
YERER
HAIKOTCH & BUTAJIRA
KEMBATA
CHEBO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 3 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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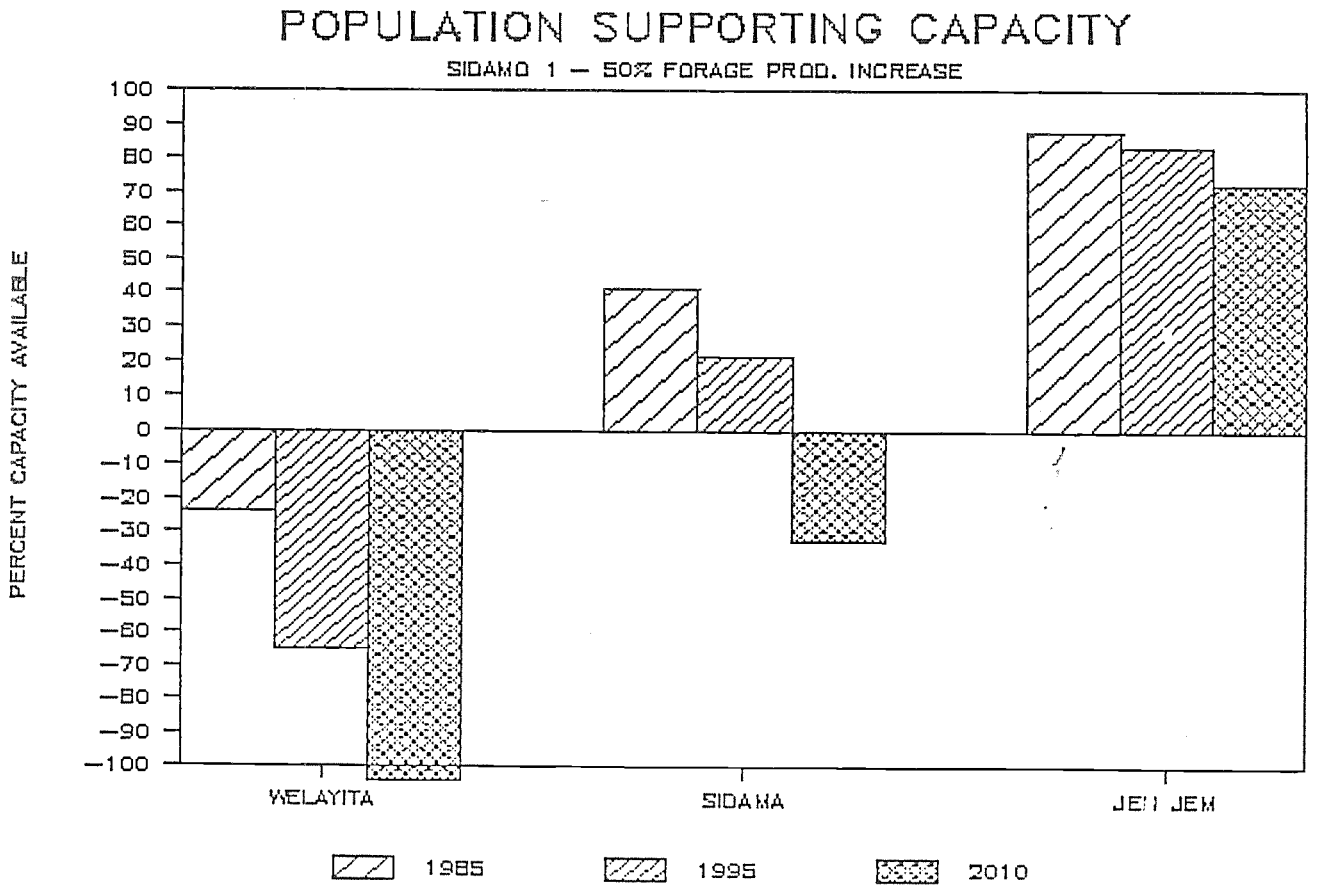
MENAGESHA
JIBAT
SELALE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 1 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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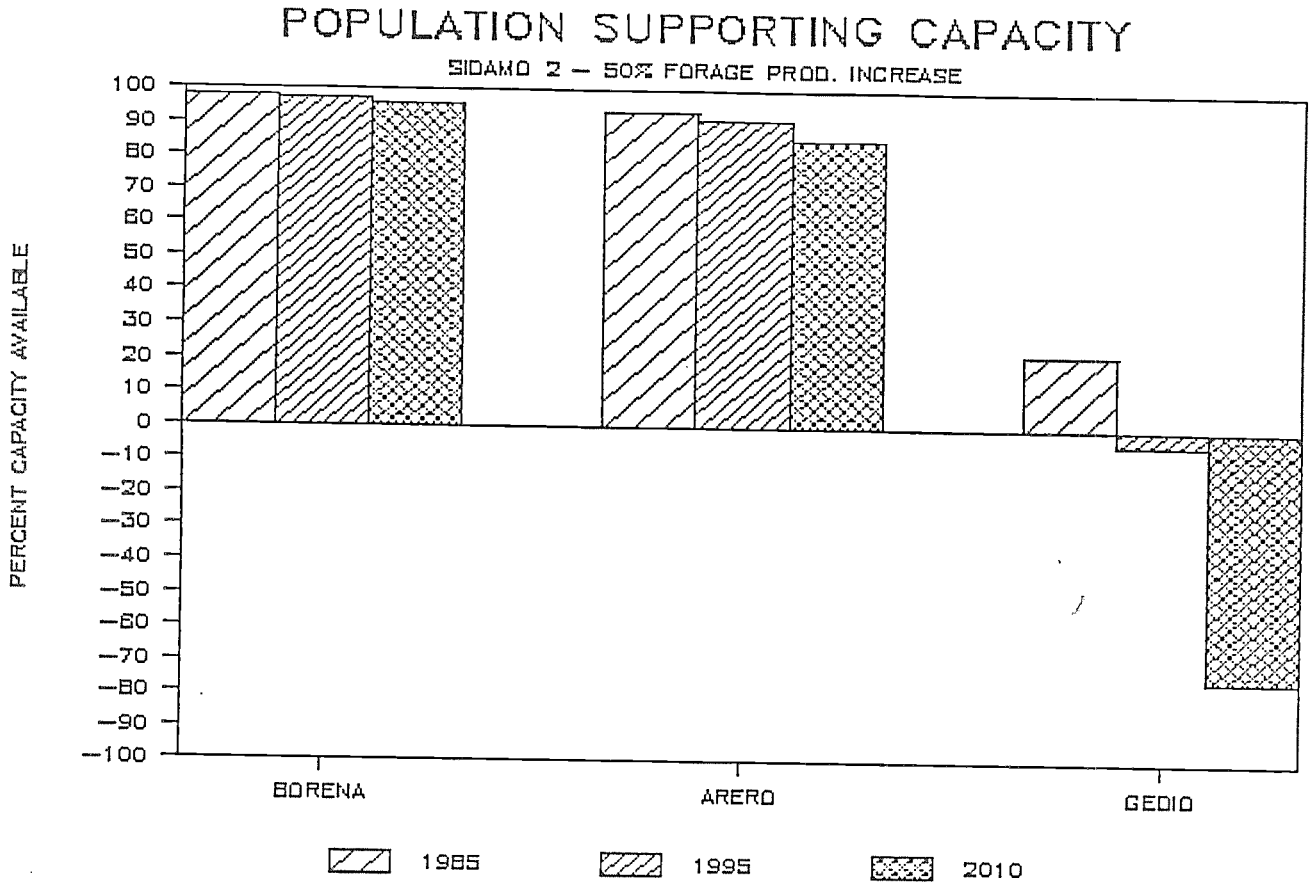
WELAYITA
SIDAMA
JEN JEM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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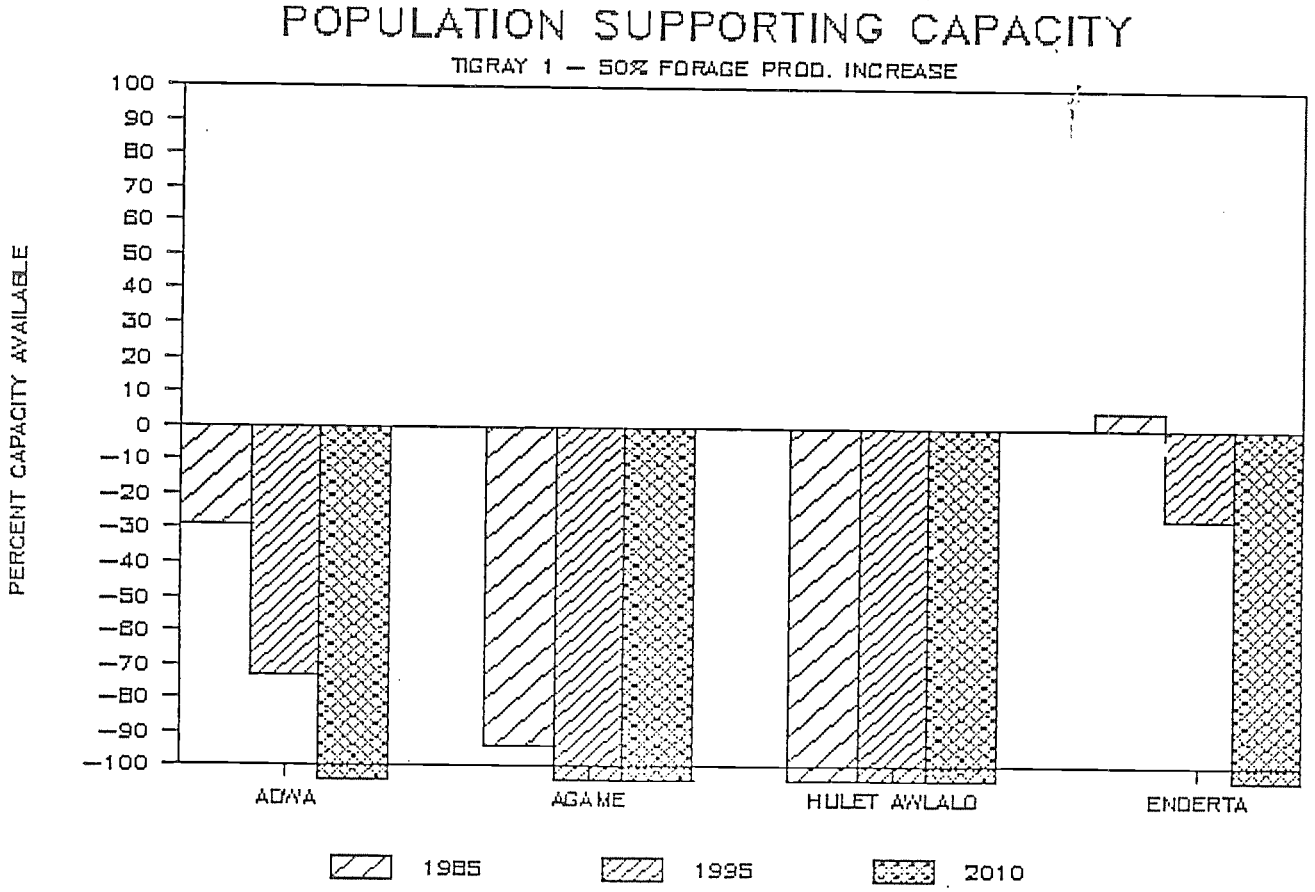
BORENA
ARERO
GEDIO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 1 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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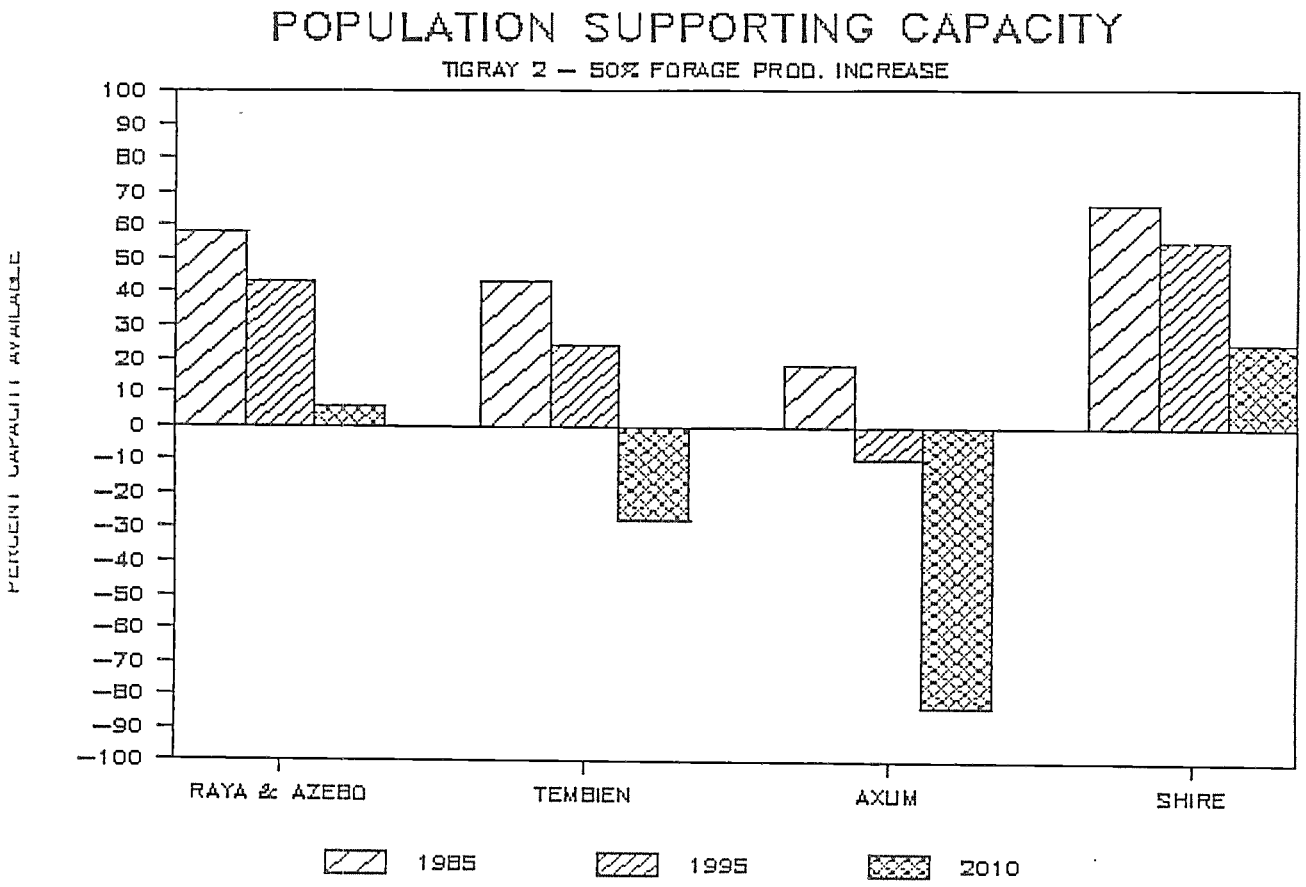
ADWA
AGAME
HULET AWLALO
ENDERTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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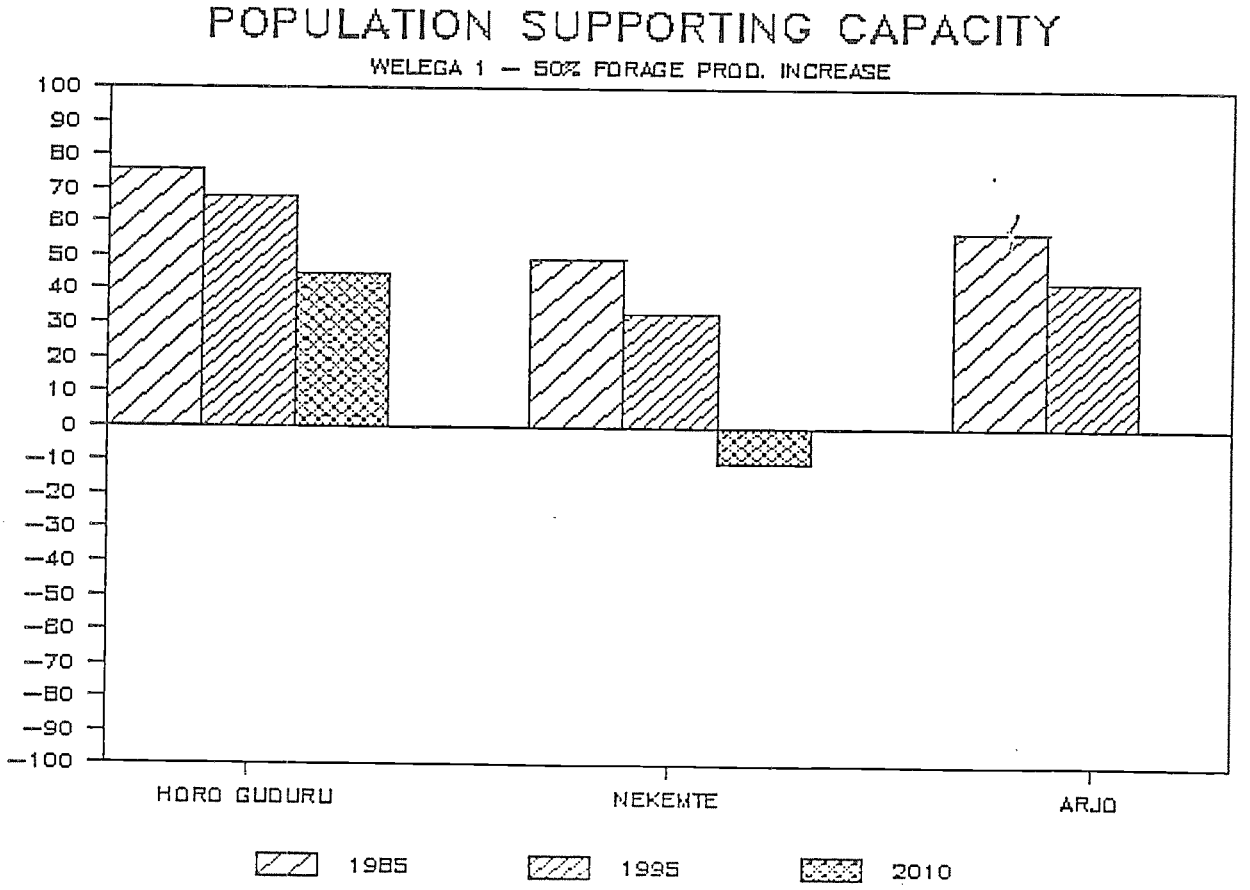
RAYA & AZEBO
TEMBIEN
AXUM
SHIRE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 1 — 50% FORAGE PROD. INCREASE
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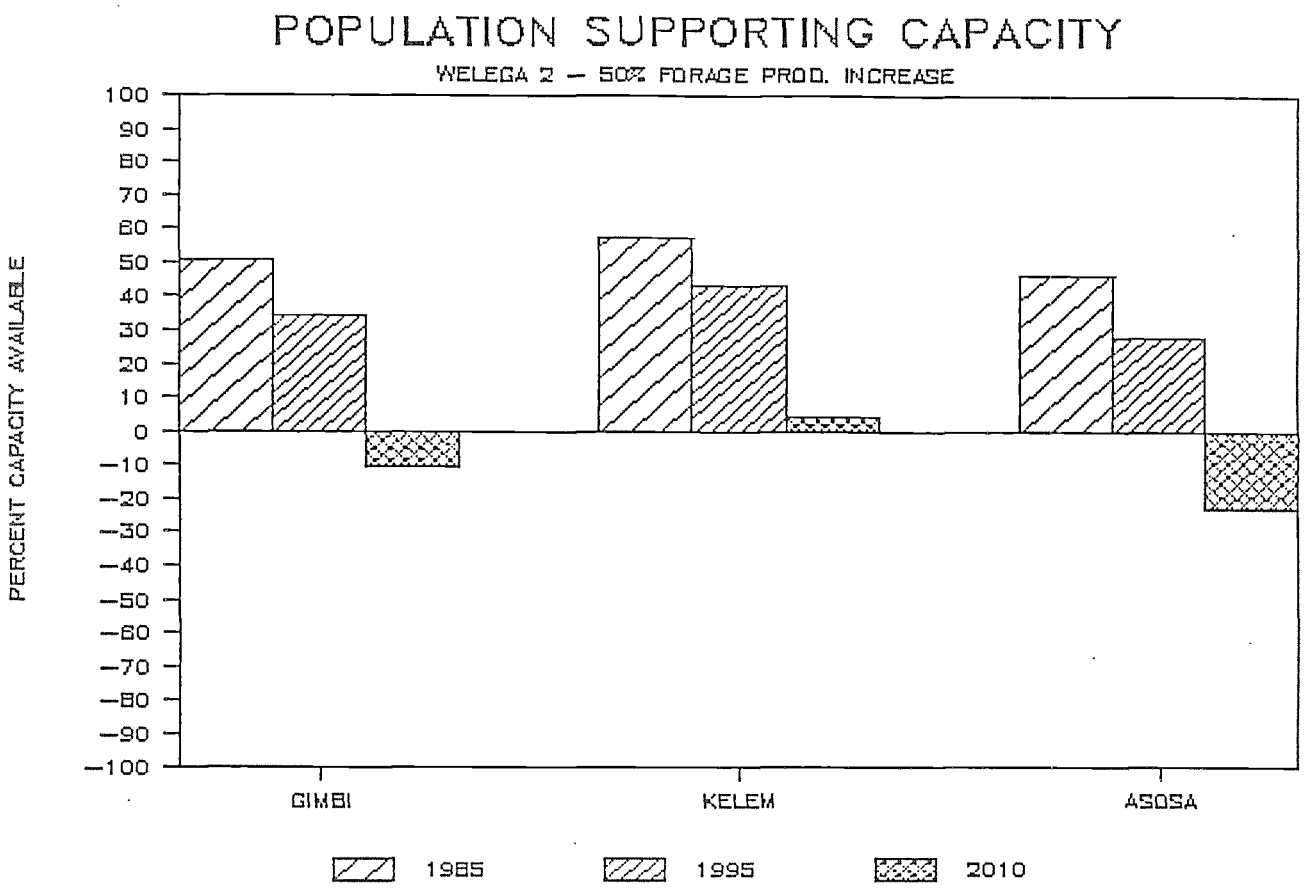
HORO GUDURU
NEKEMTE
ARJO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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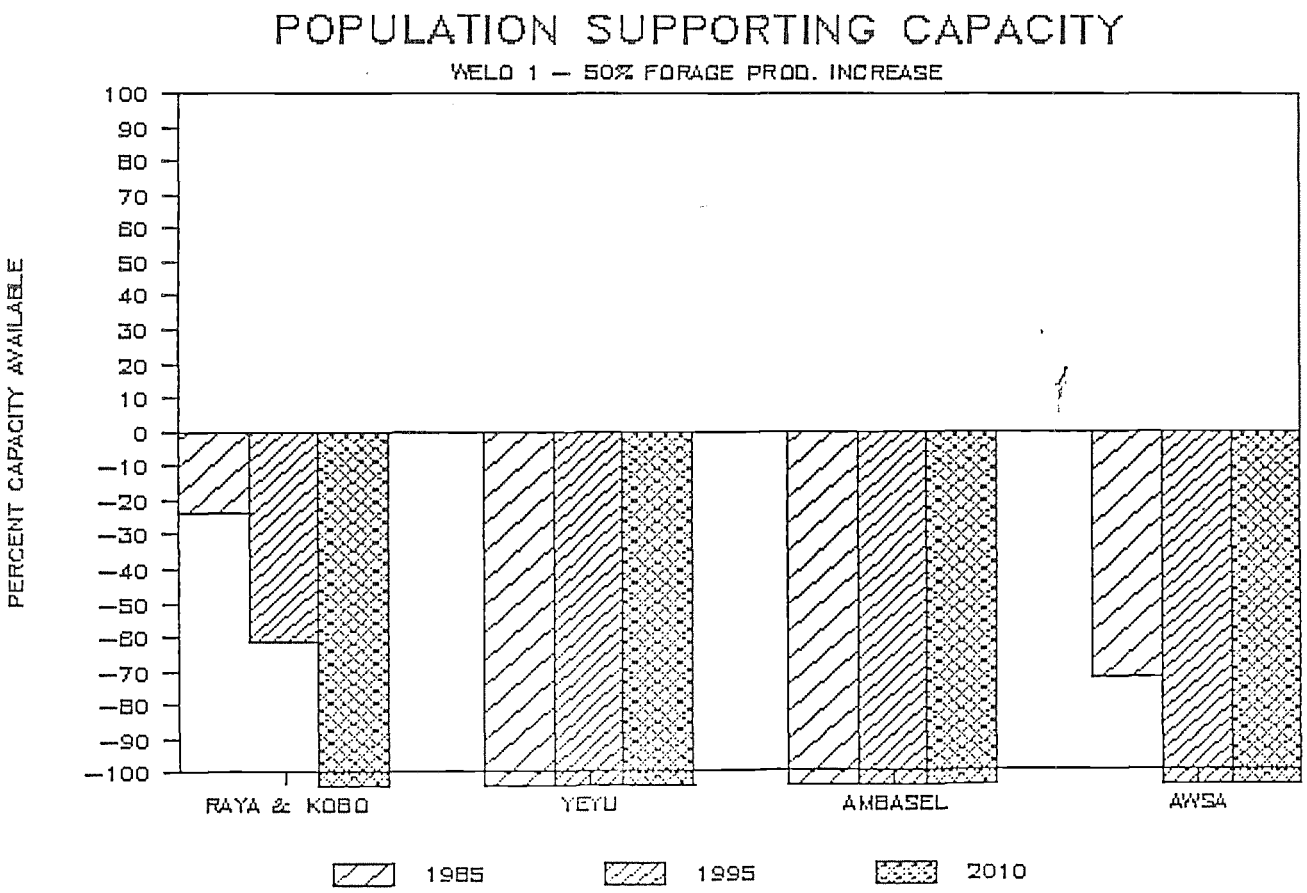
GIMBI
KELEM
ASOSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 1 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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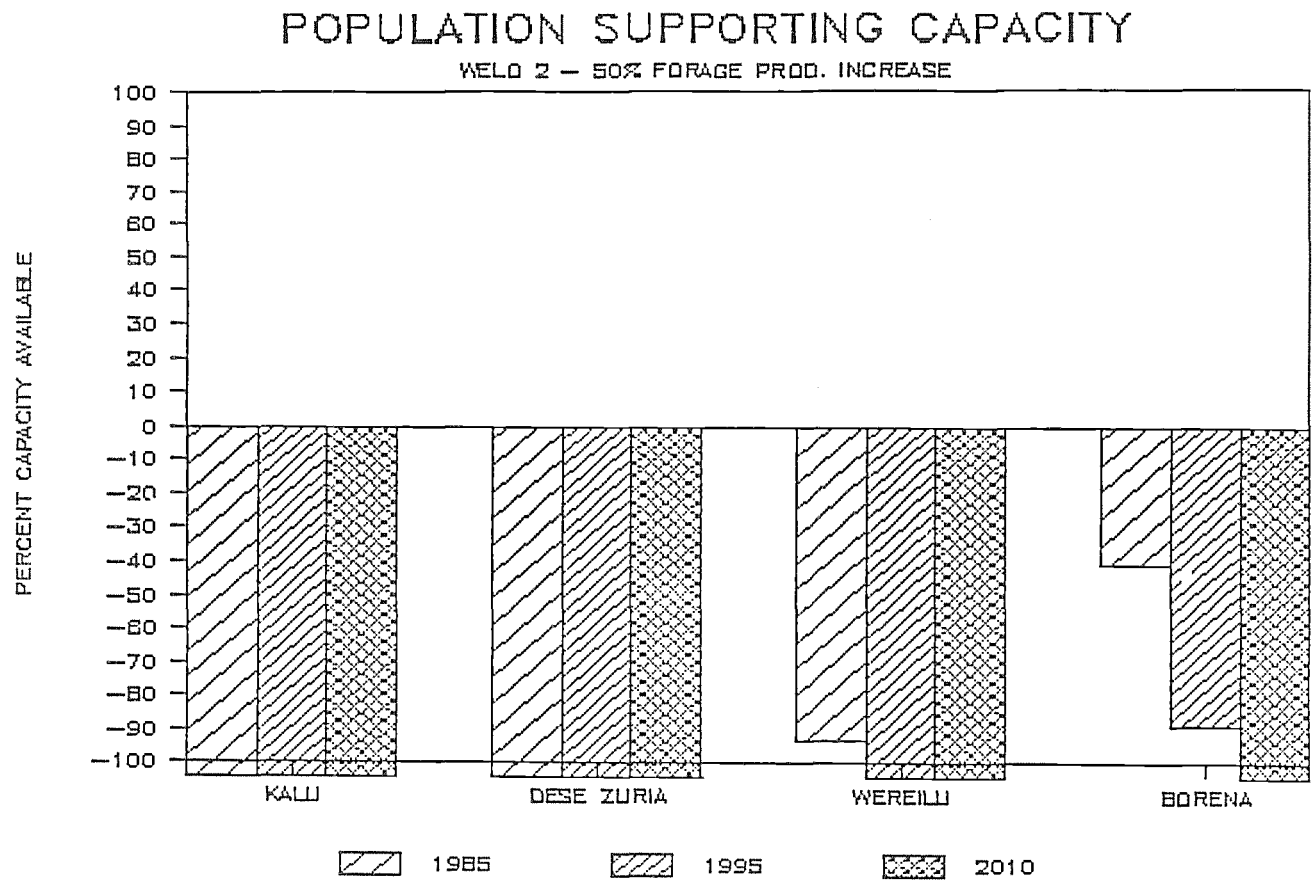
RAYA & KOBO
YEYU
AMBASEL
AWSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 2 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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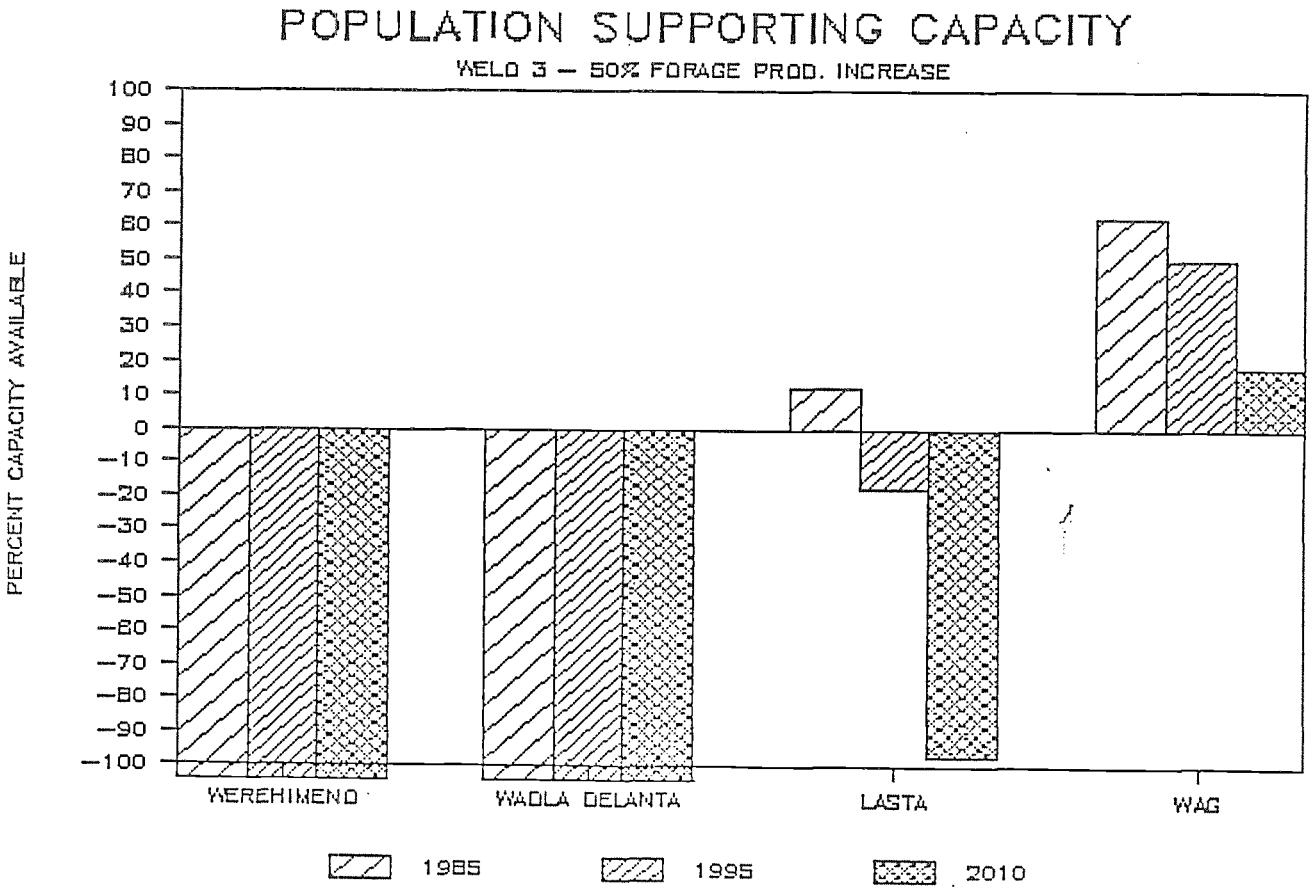
KALU
DESE ZURIA
WEREILU
BORENA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 3 — 50% FORAGE PROD. INCREASE
PERCENT CAPACITY AVAILABLE
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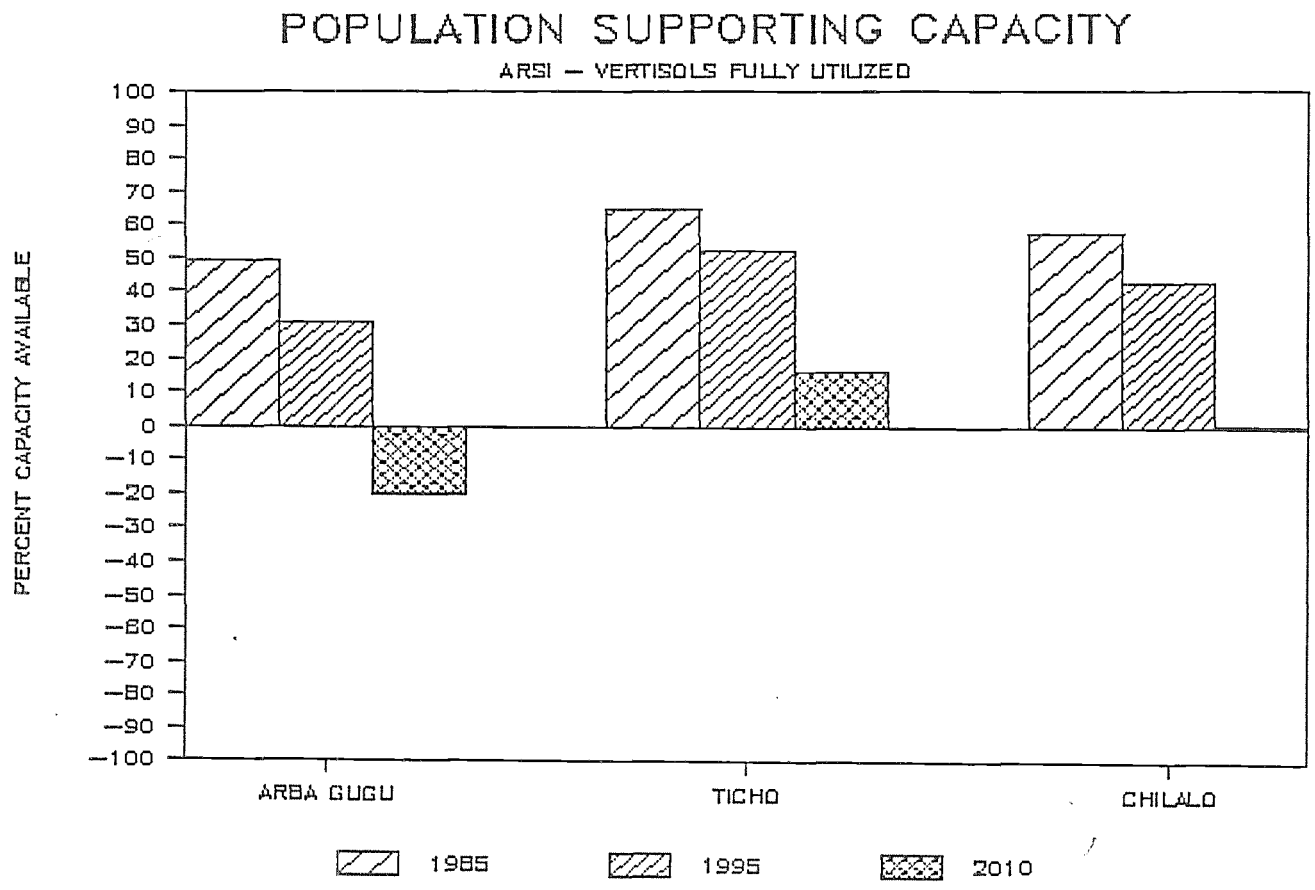
WEREHIMENO
WADLA DELANTA
LASTA
WAG
1985
1995
2010

POPULATION SUPPORTING CAPACITY

VERTISOLS FULLY UTILIZED

FOR CROP PRODUCTION


POPULATION SUPPORTING CAPACITY
ARSI — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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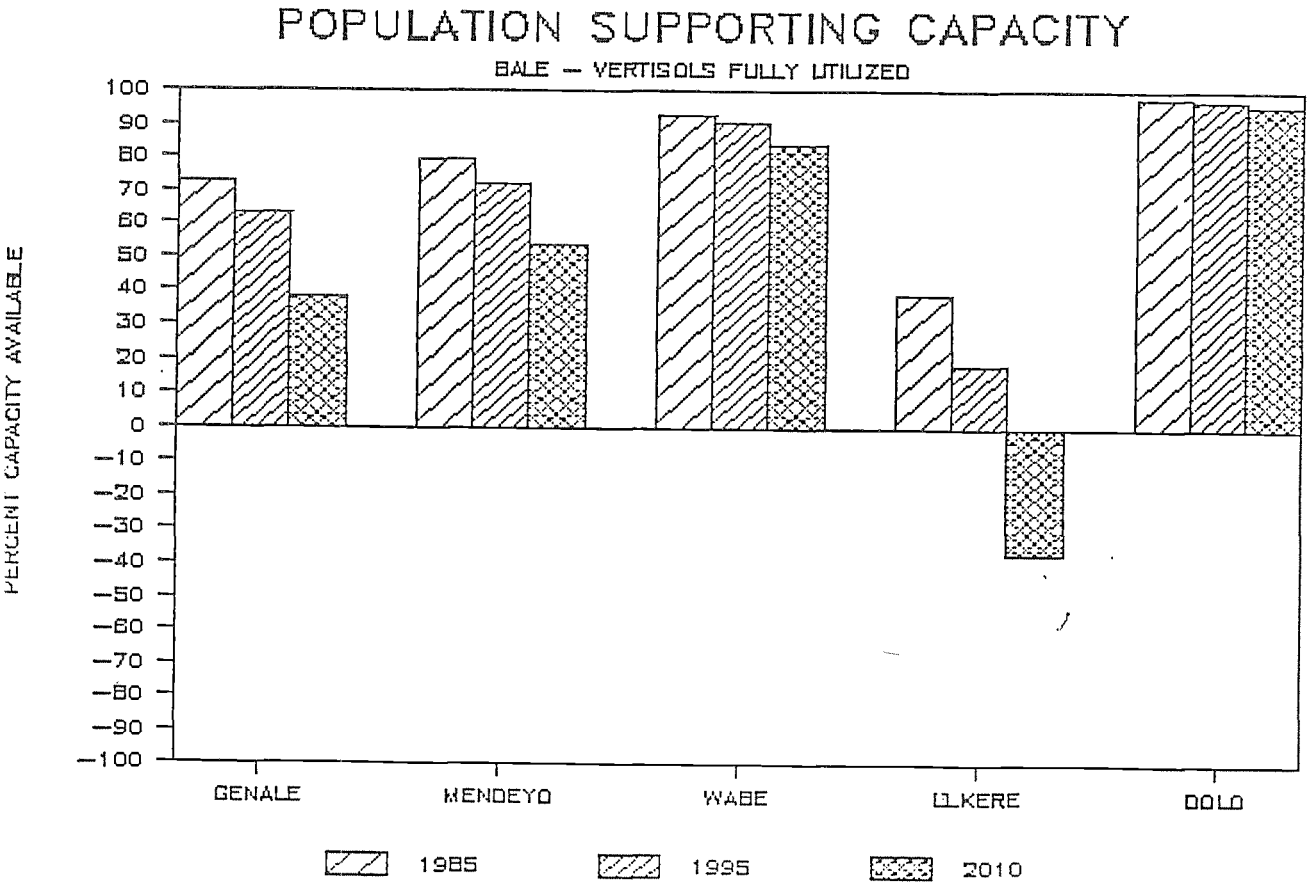
ARBA GUGU
TICHO
CHILALO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
BALE — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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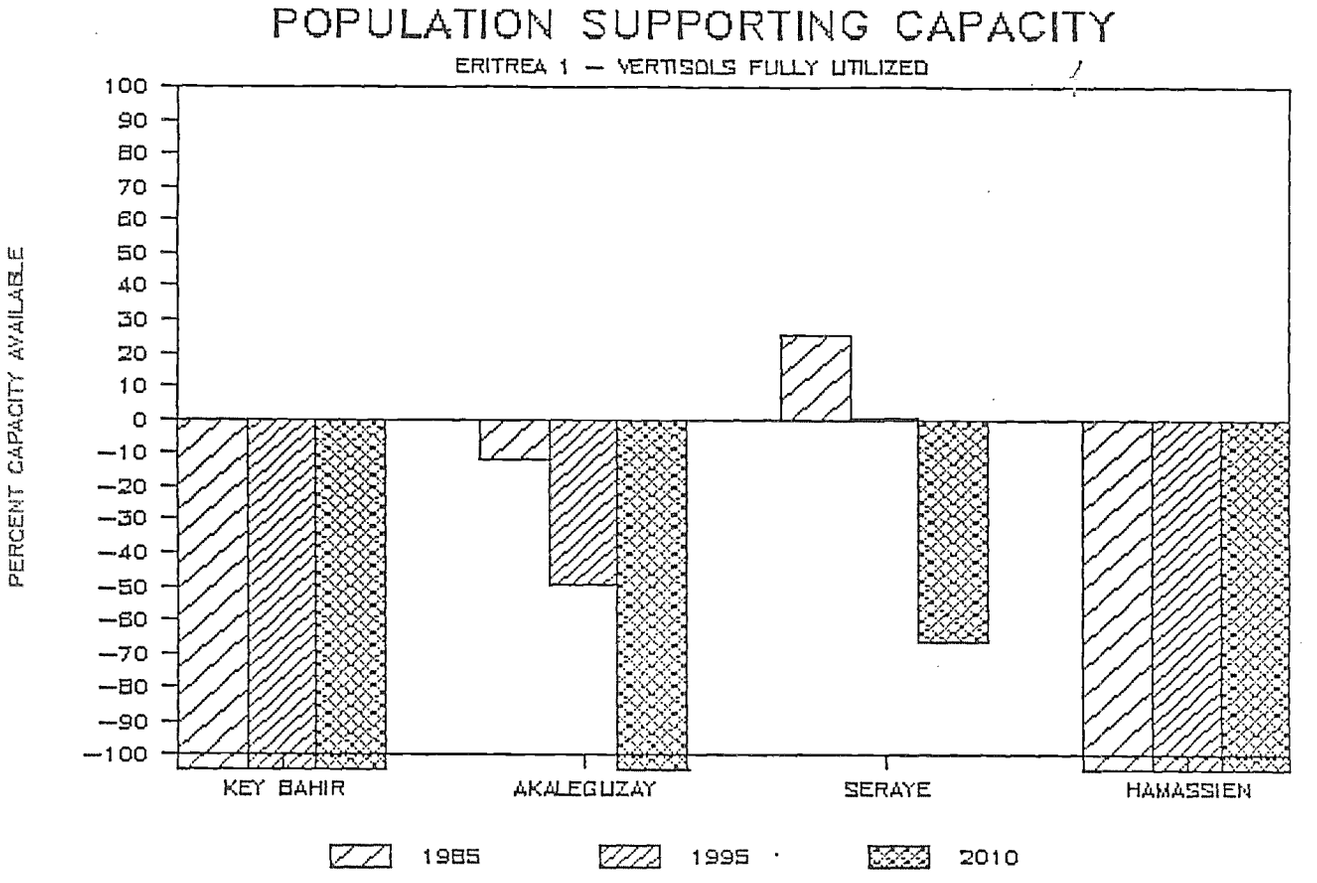
GENALE
MENDEYO
WABE
LLKERE
DOLO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 1 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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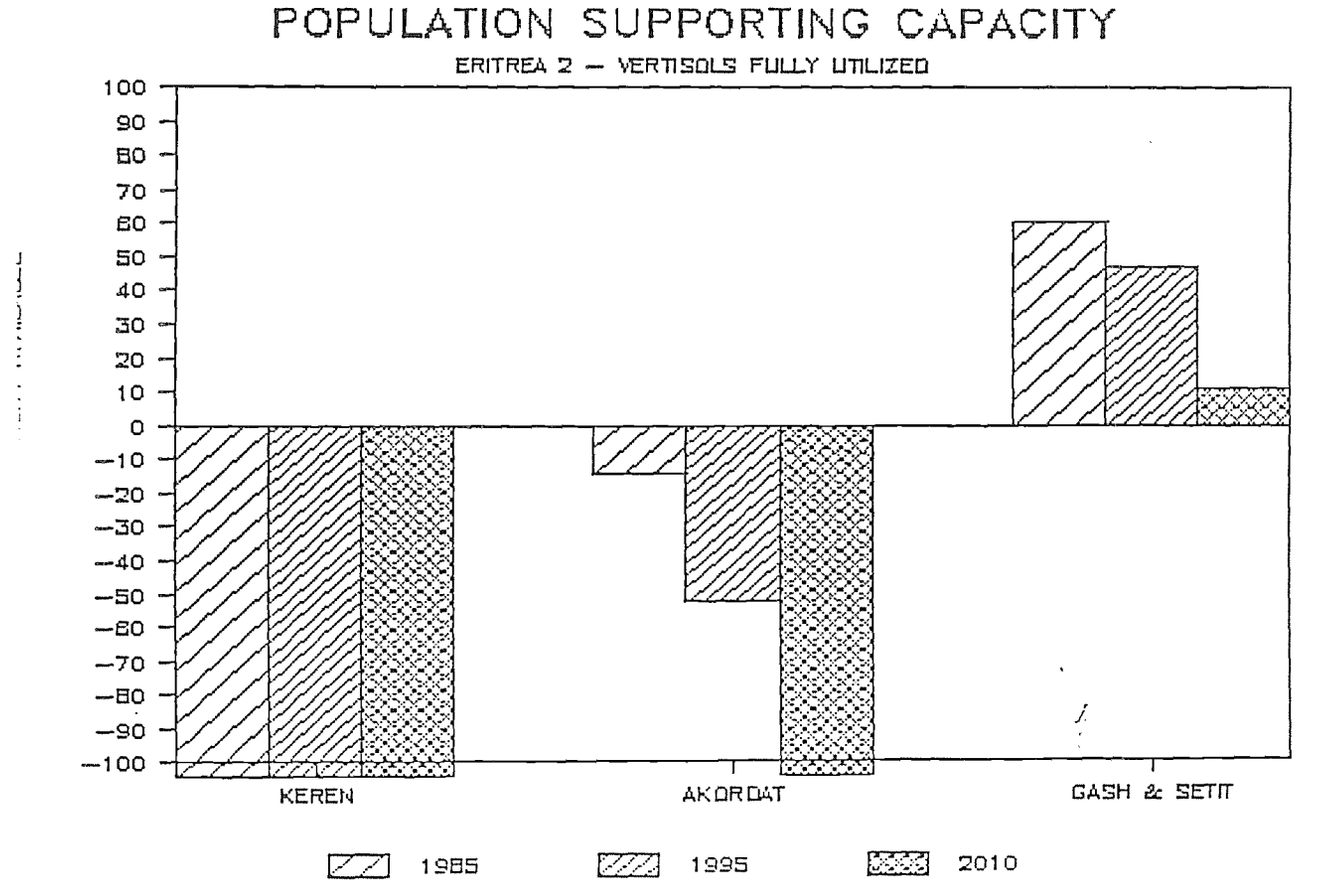
KEY BAHIR
AKALEGUZAY
SERAYE
HAMASSIEN
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 2 — VERTISOLS FULLY UTILIZED
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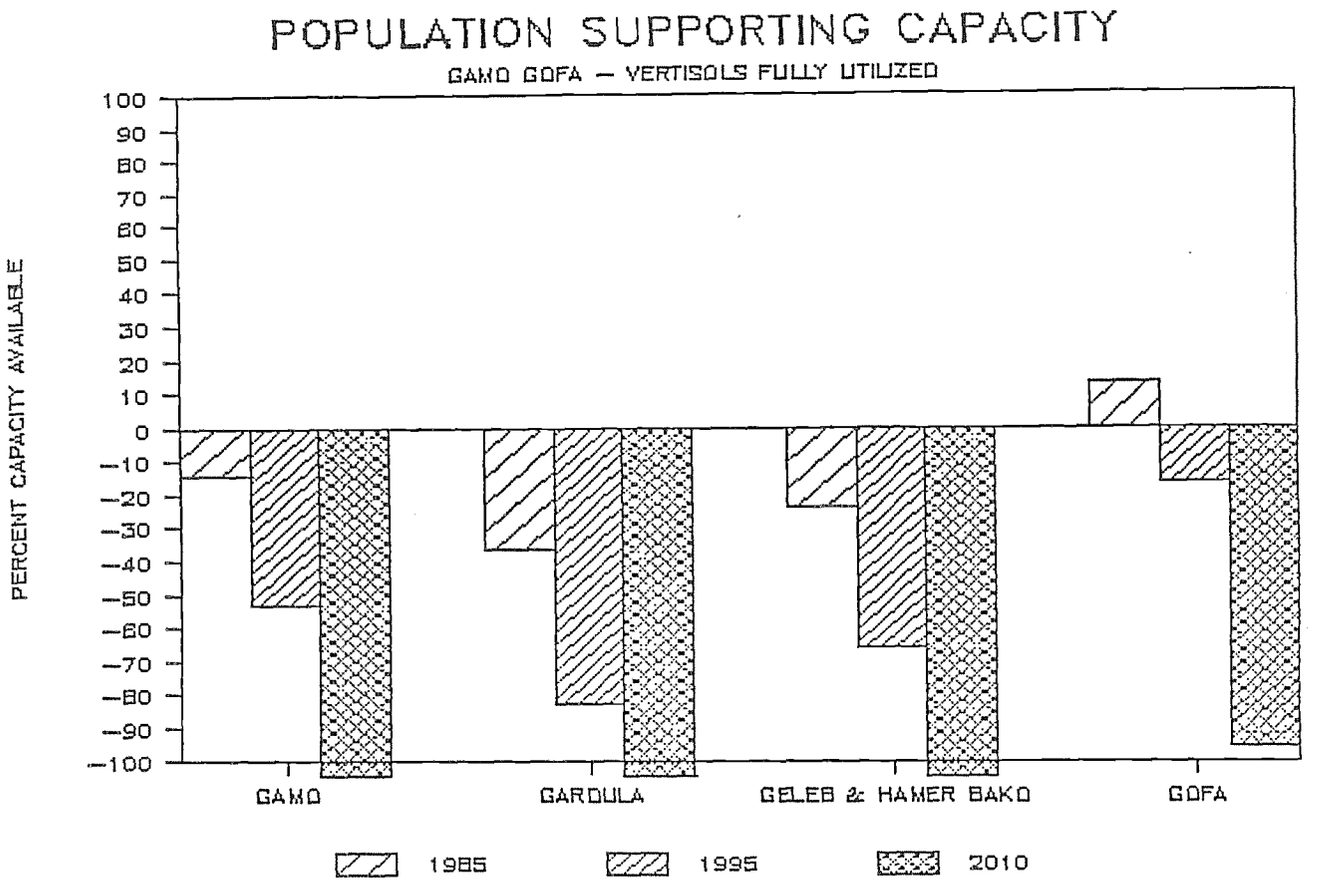
KEREN
AKORDAT
GASH & SETIT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GAMO GOFA — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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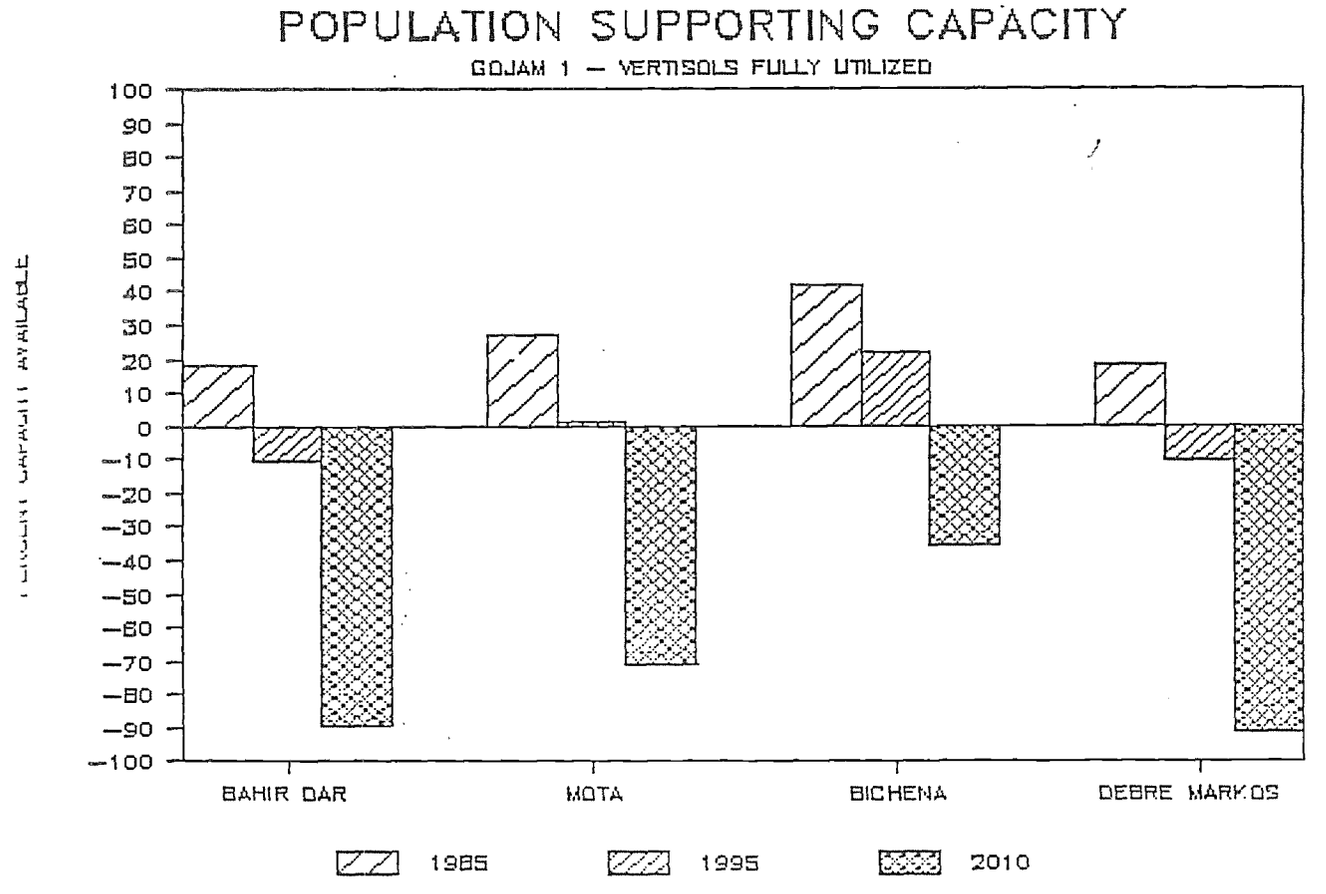
GAMO
GARDULA
GELEB & HAMER BAKO
GOFA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 1 — VERTISOLS FULLY UTILIZED
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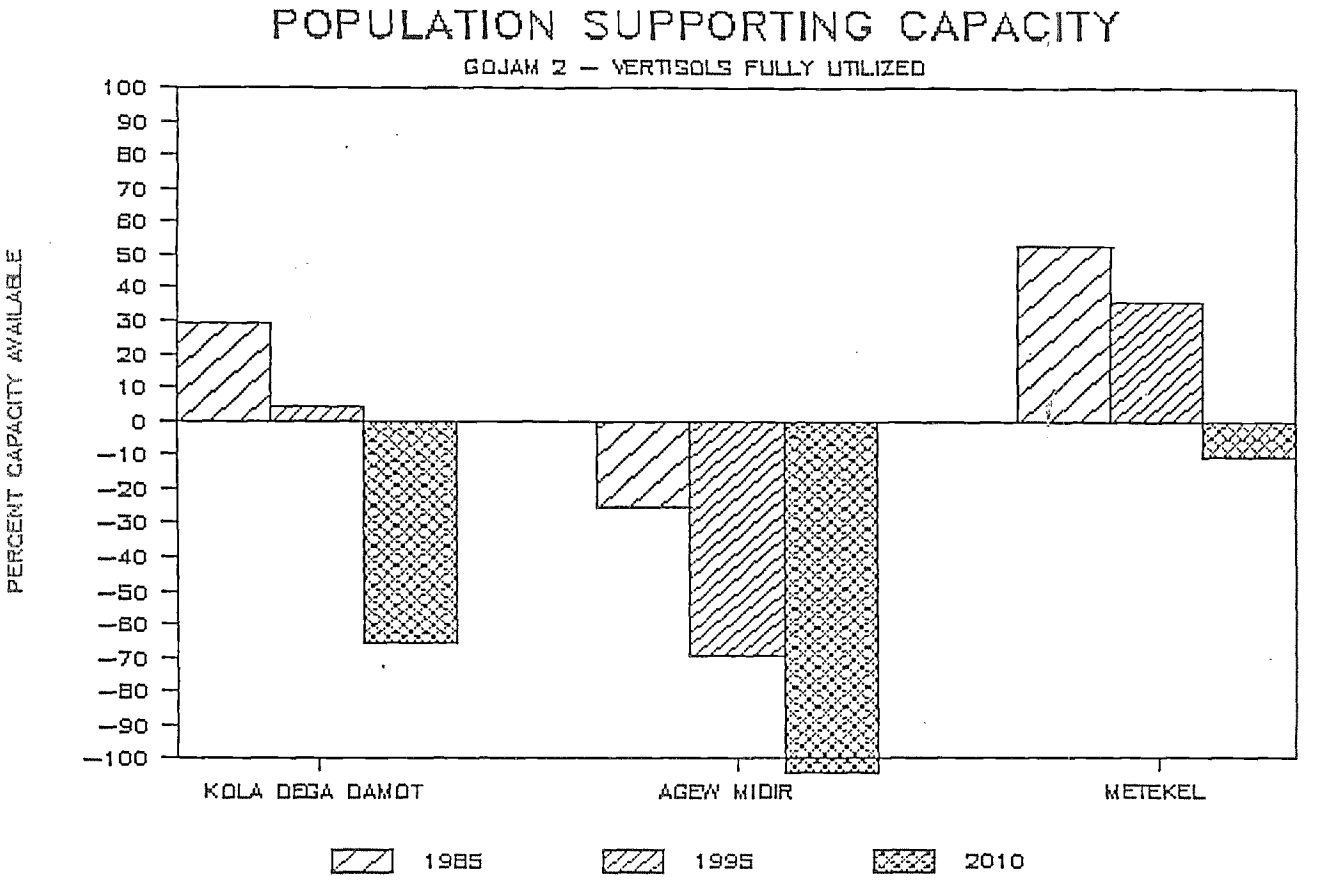
BAHIR DAR
MOTA
BICHENA
DEBRE MARKOS
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 2 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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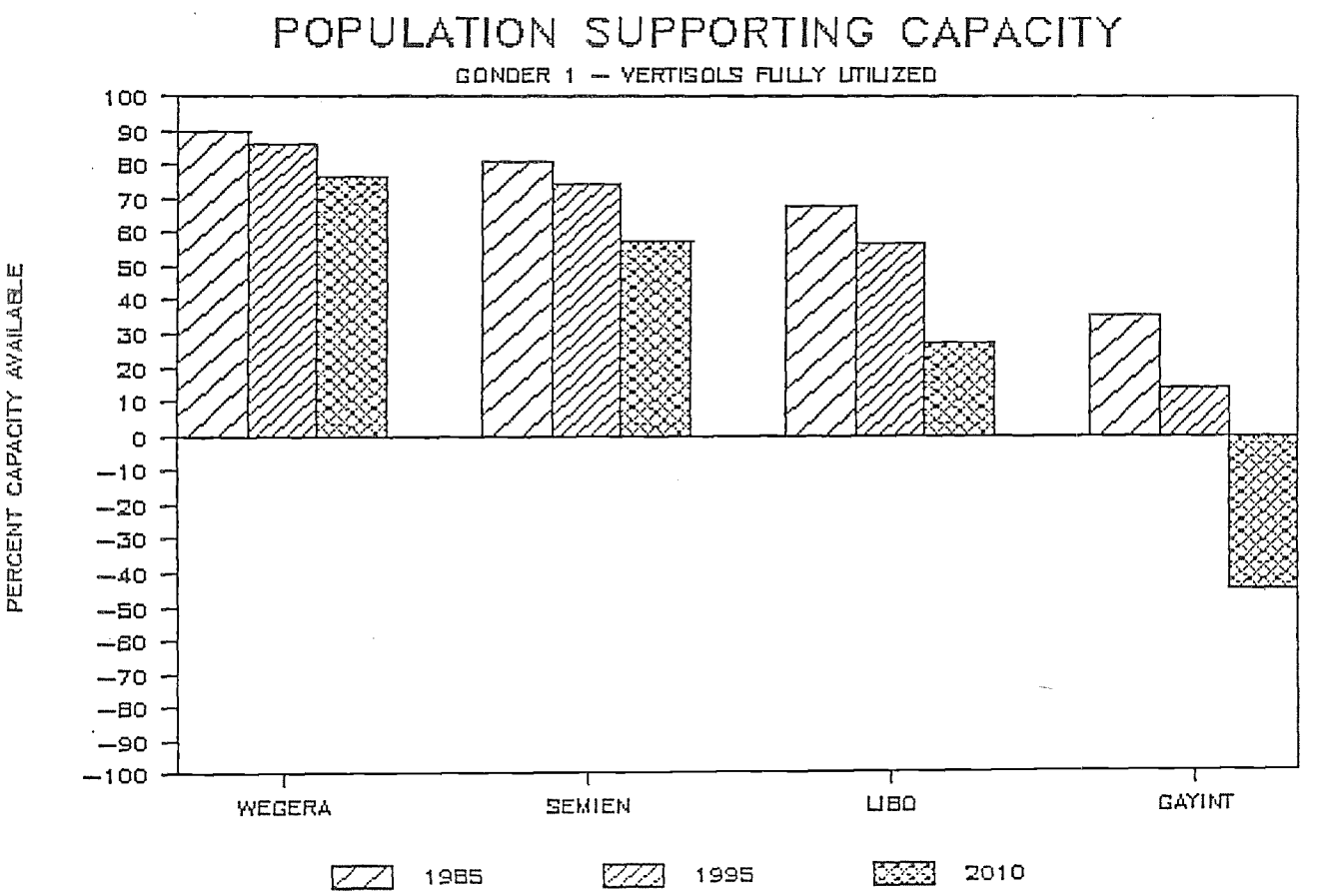
KOLA DEGA DAMOT
AGEW MIDIR
METEKEL
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 1 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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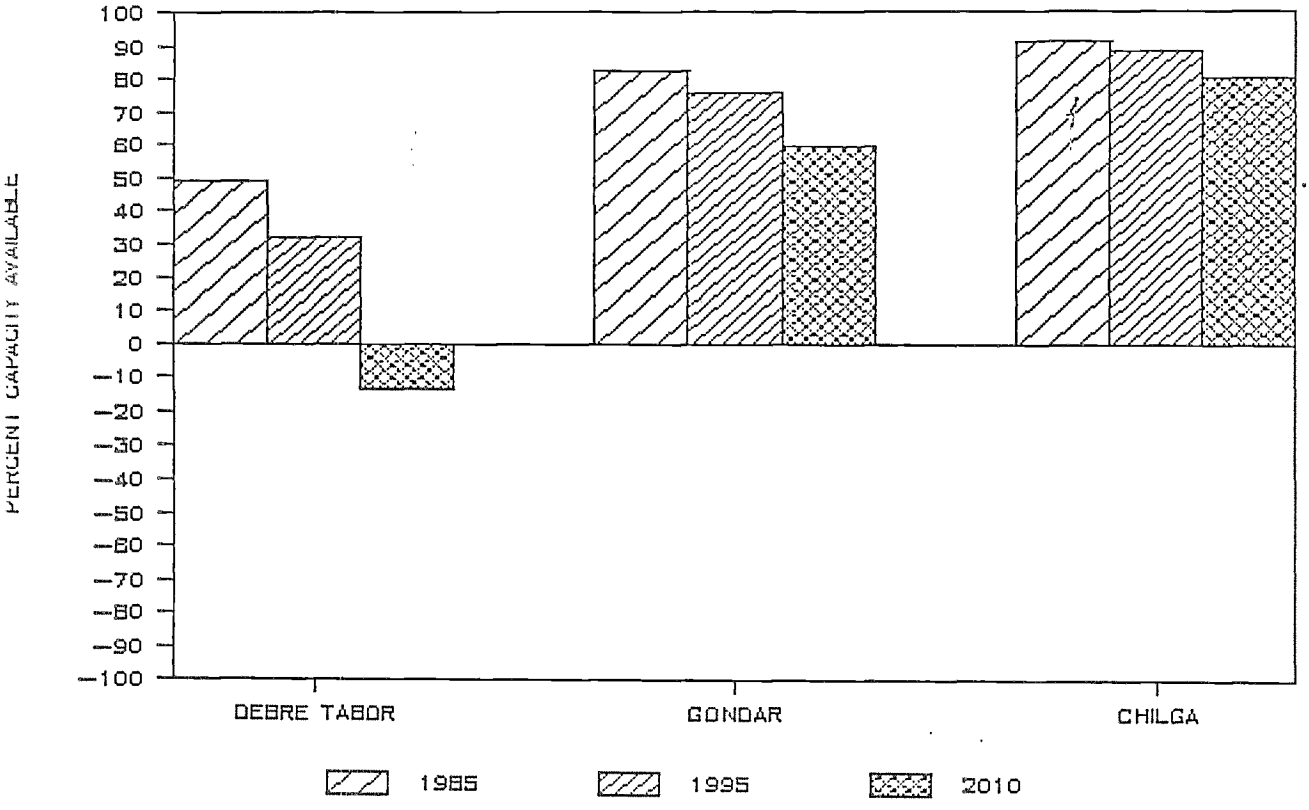
WEGERA
SEMIEN
LIBO
GAYINT
1985
1995
2010

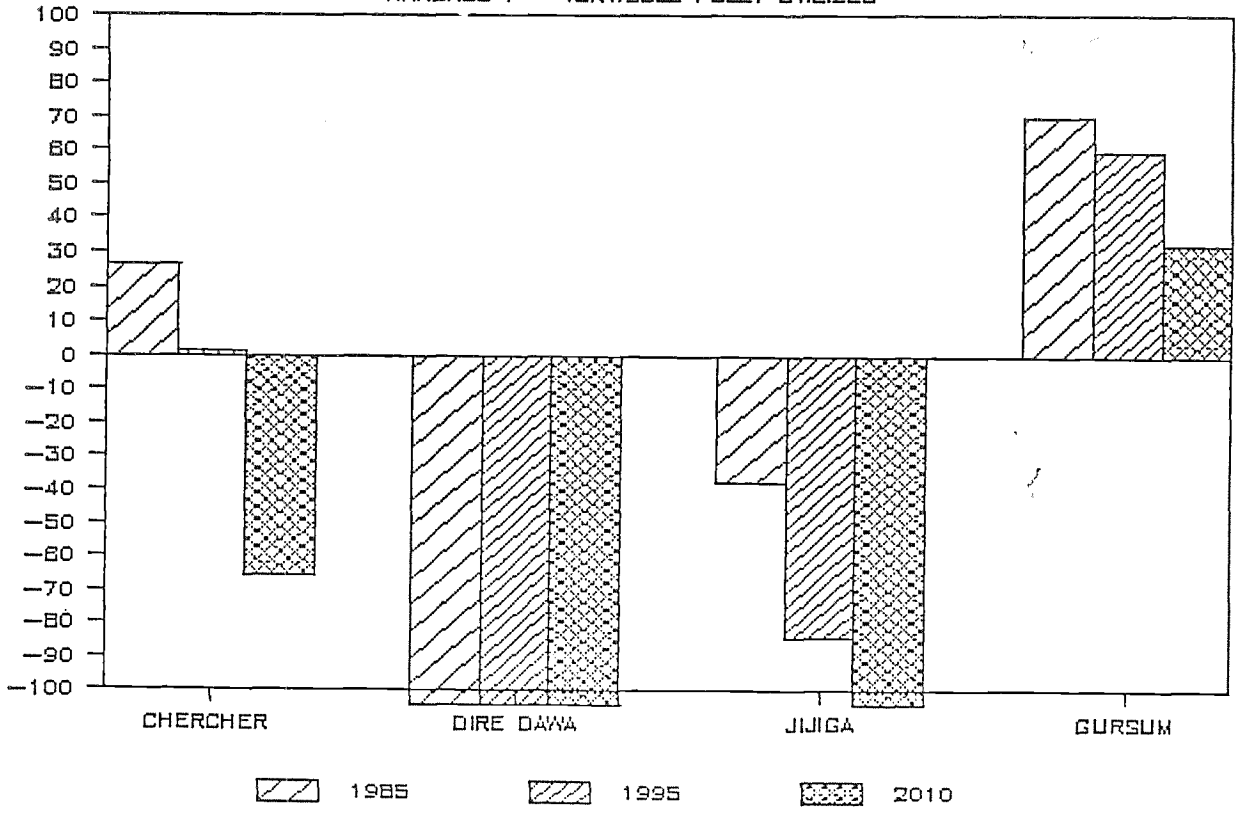
POPULATION SUPPORTING CAPACITY

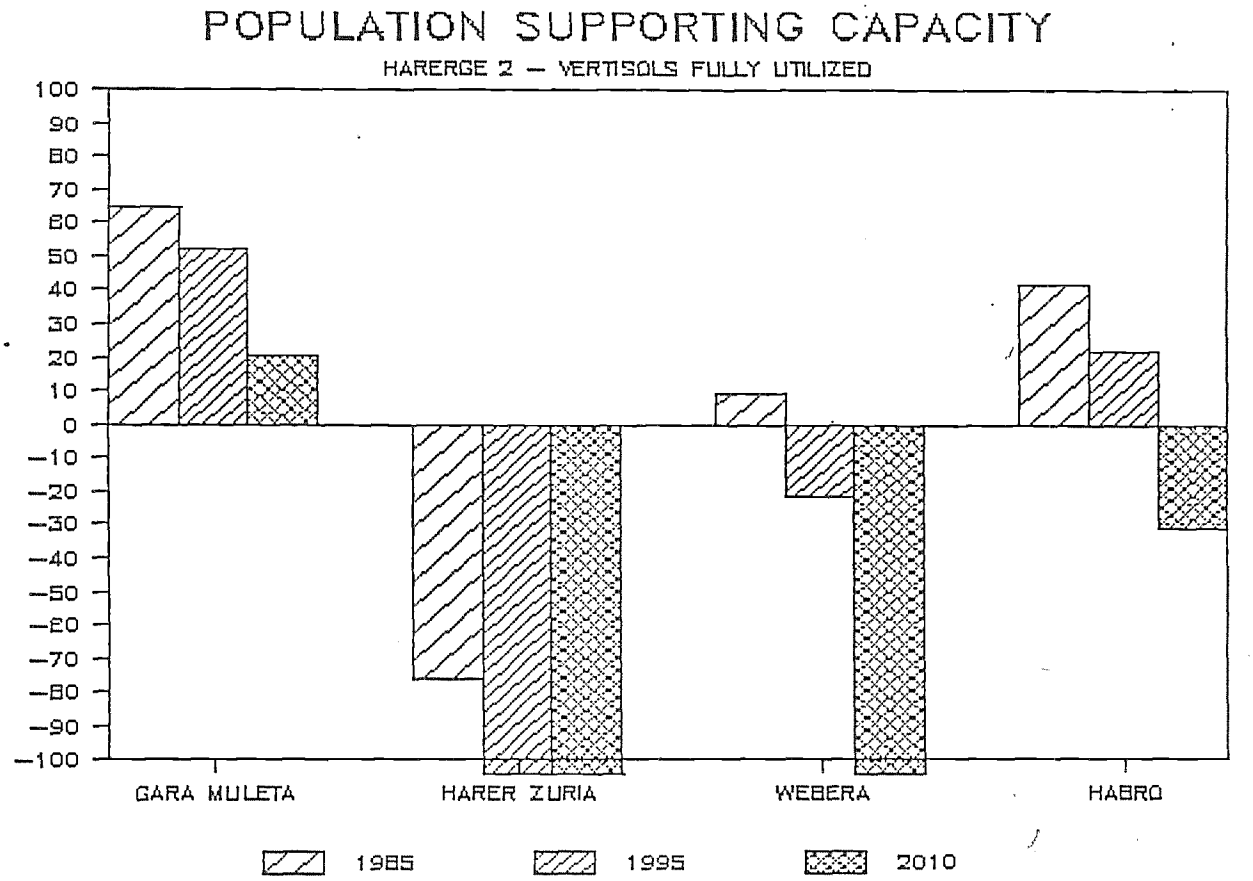
GONDER 2 — VERTISOLS FULLY UTILIZED



POPULATION SUPPORTING CAPACITY

HARERGE 1 — VERTISOLS FULLY UTILIZED




POPULATION SUPPORTING CAPACITY
HARERGE 2 — VERTISOLS FULLY UTILIZED
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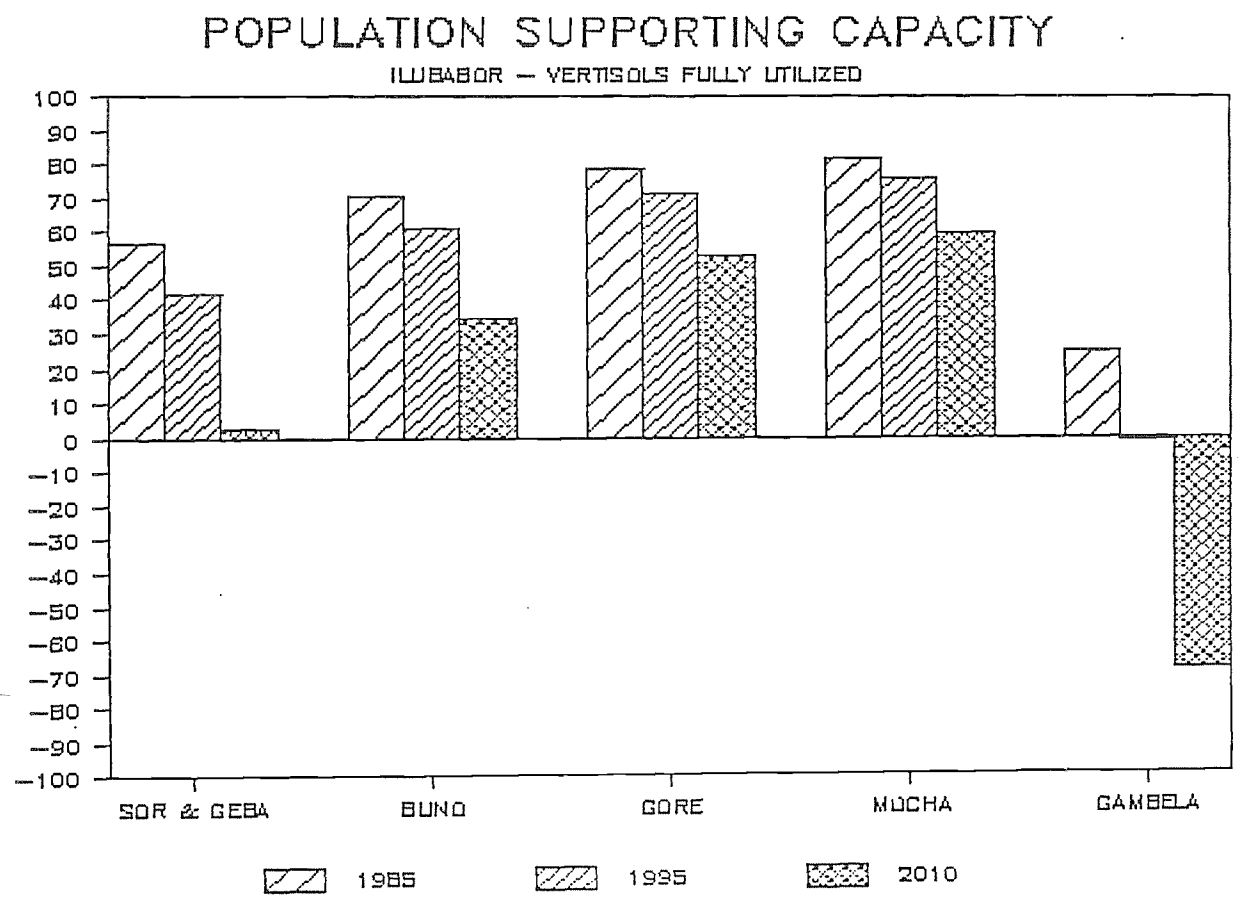
GARA MULETA
HARER ZURIA
WEBERA
HABRO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ILUBABOR — VERTISOLS FULLY UTILIZED
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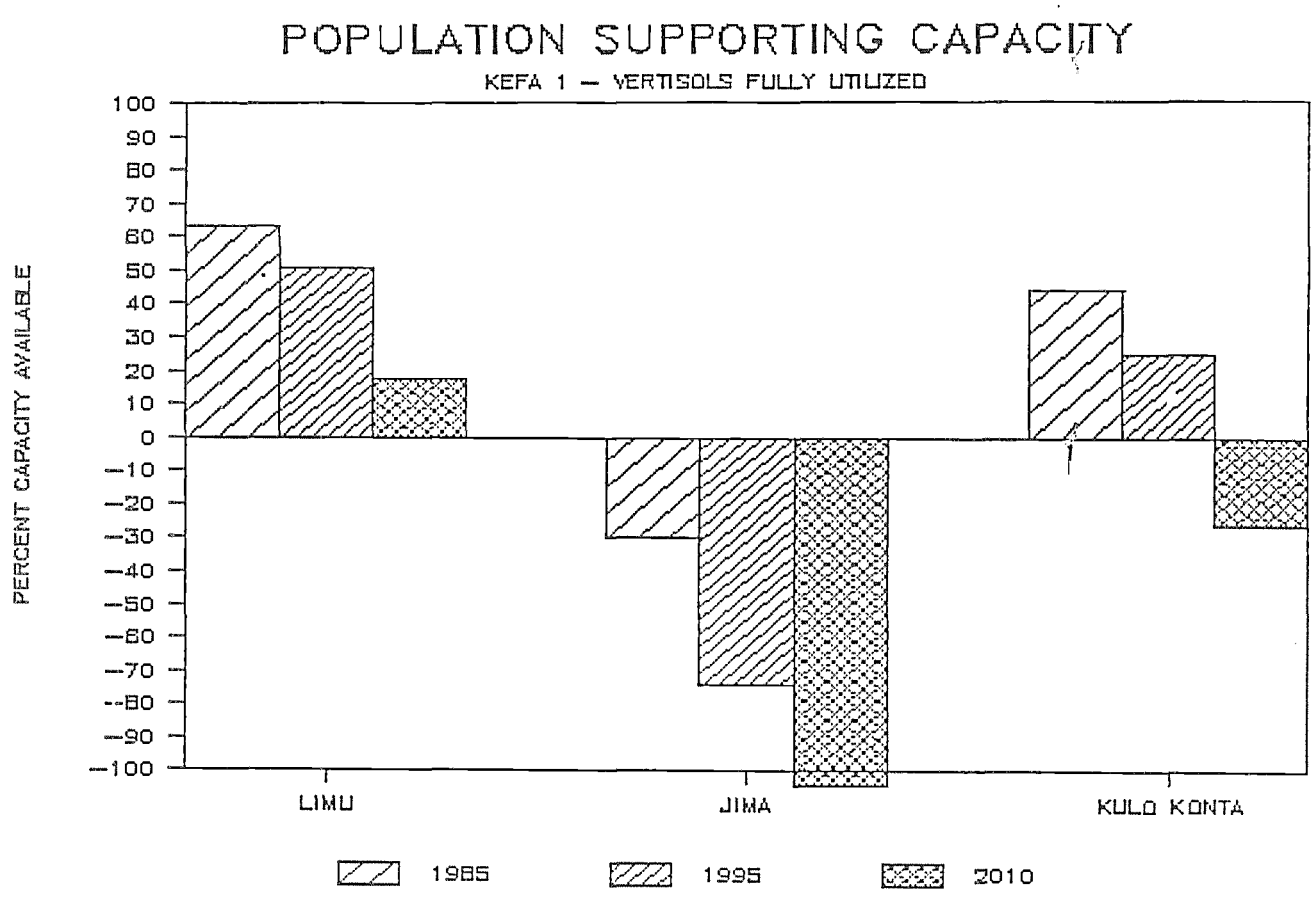
SOR & GEBA
BUNO
GORE
MUCHA
GAMBELA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 1 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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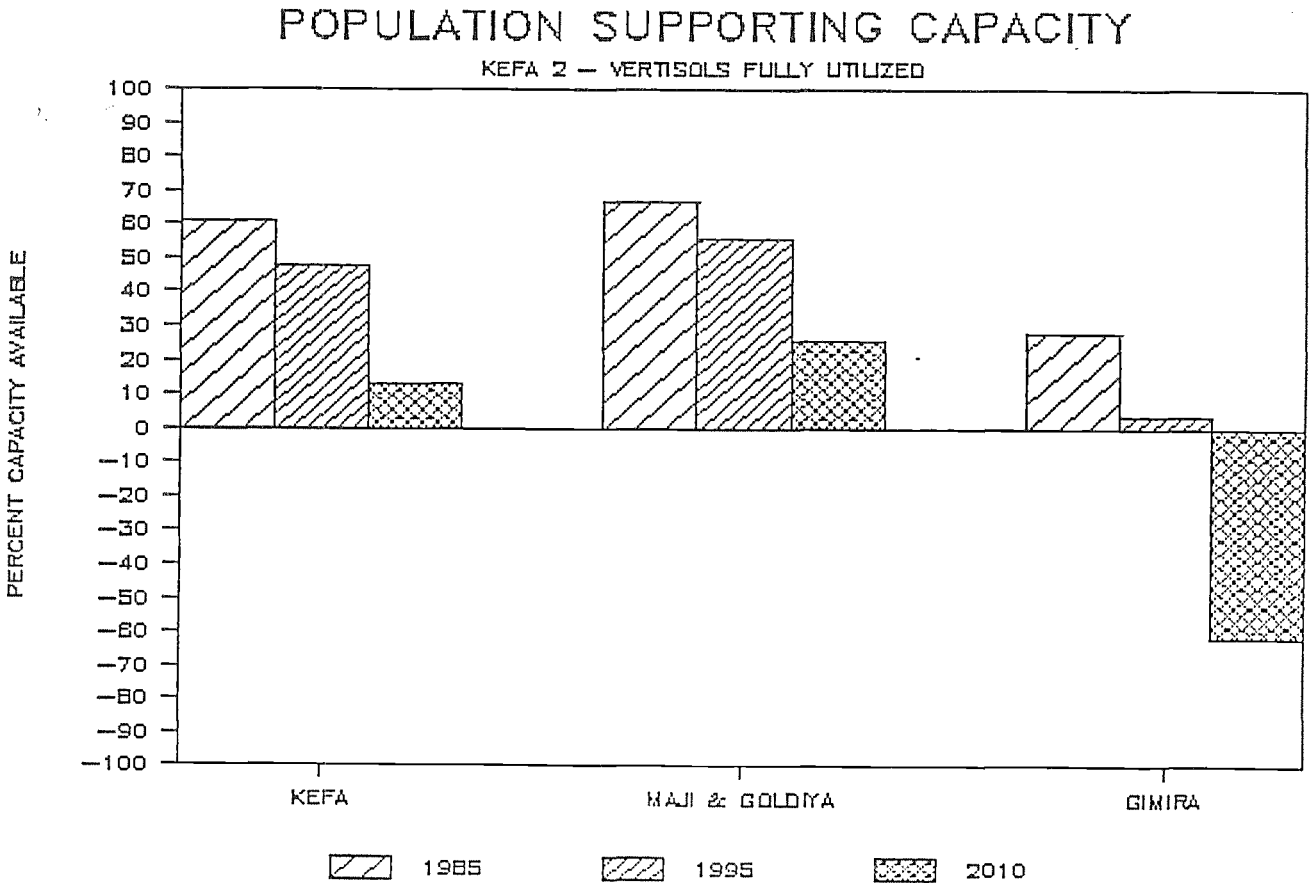
LIMU
JIMA
KULO KONTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 2 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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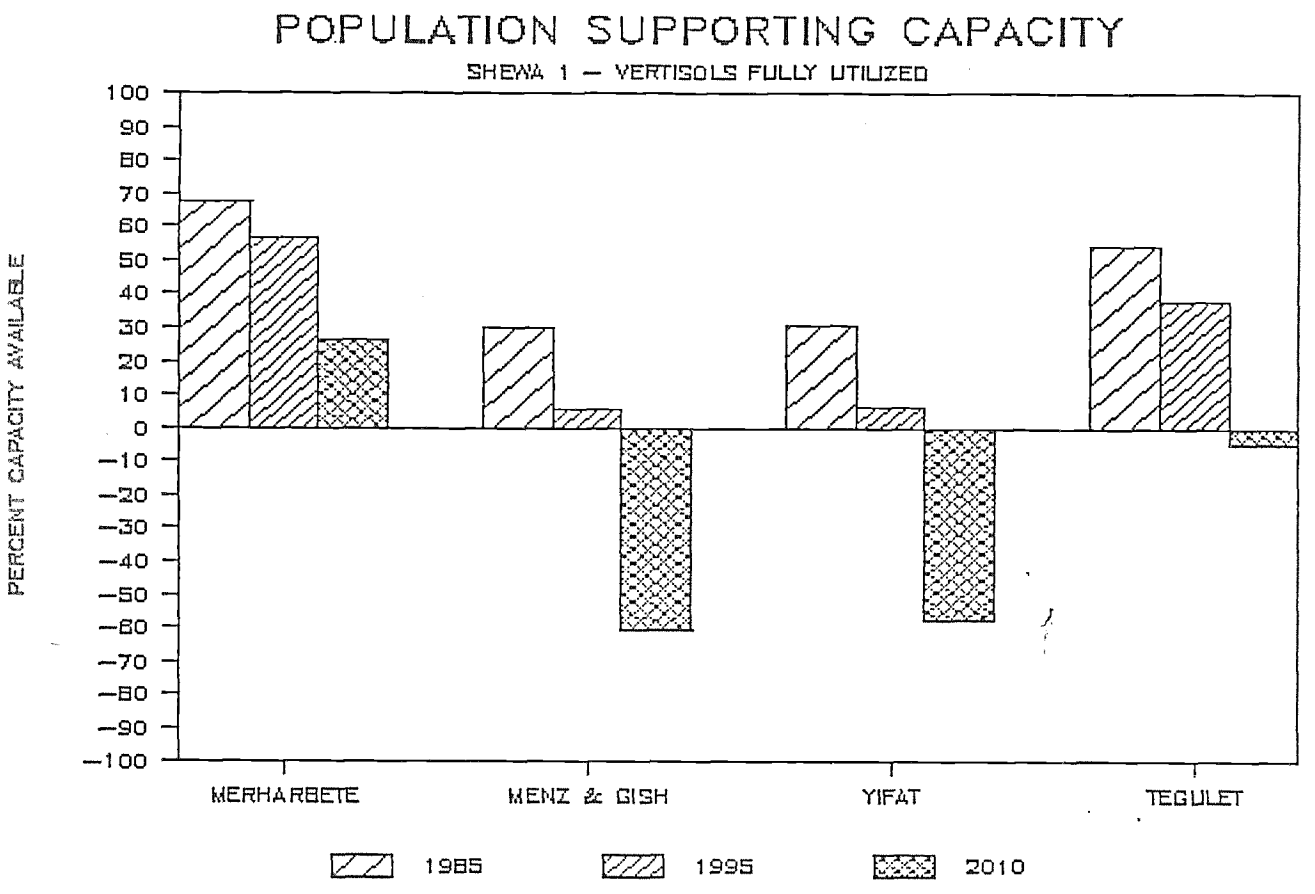
KEFA
MAJI & GOLDIYA
GIMIRA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 1 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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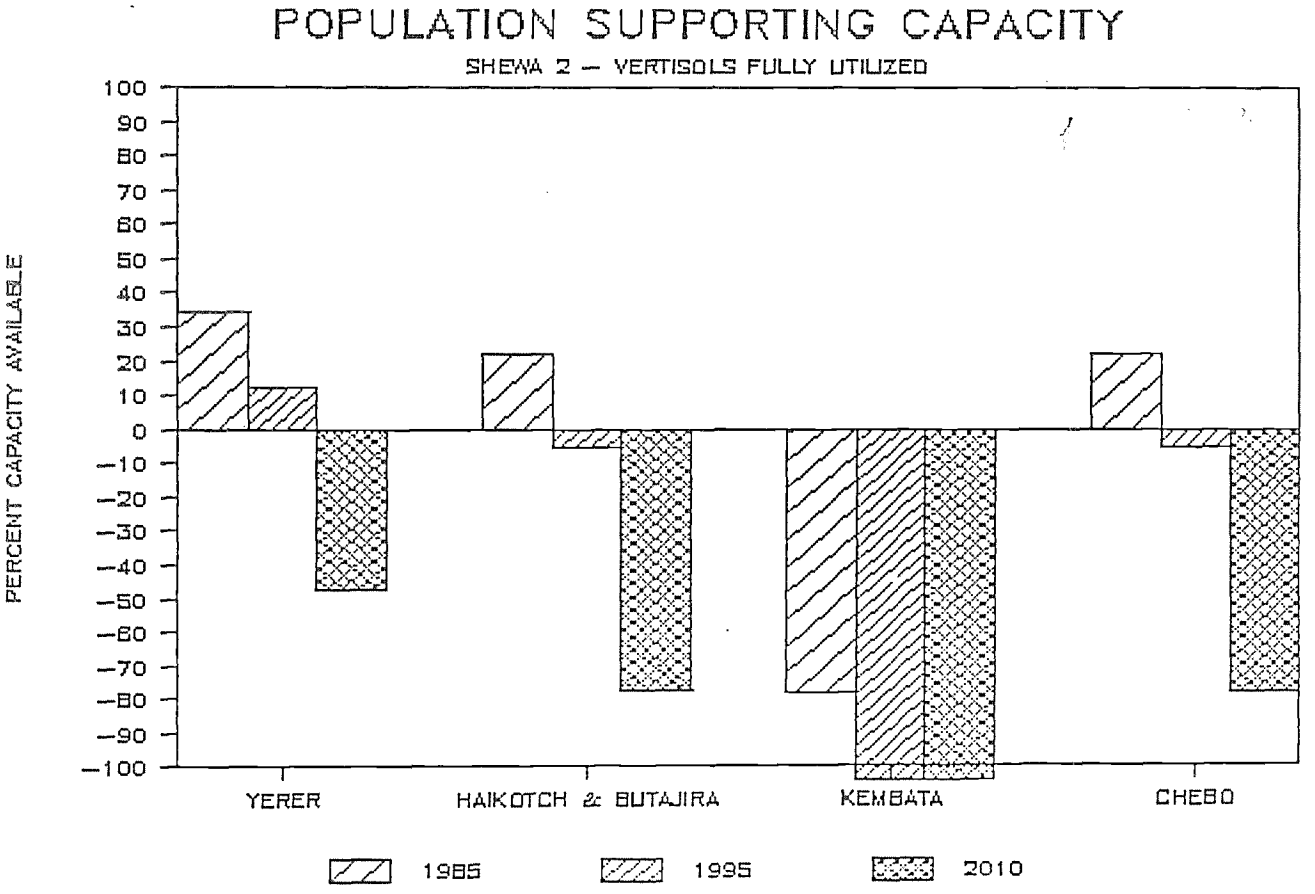
MERHABETE
MENZ & GISH
YIFAT
TEGULET
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 2 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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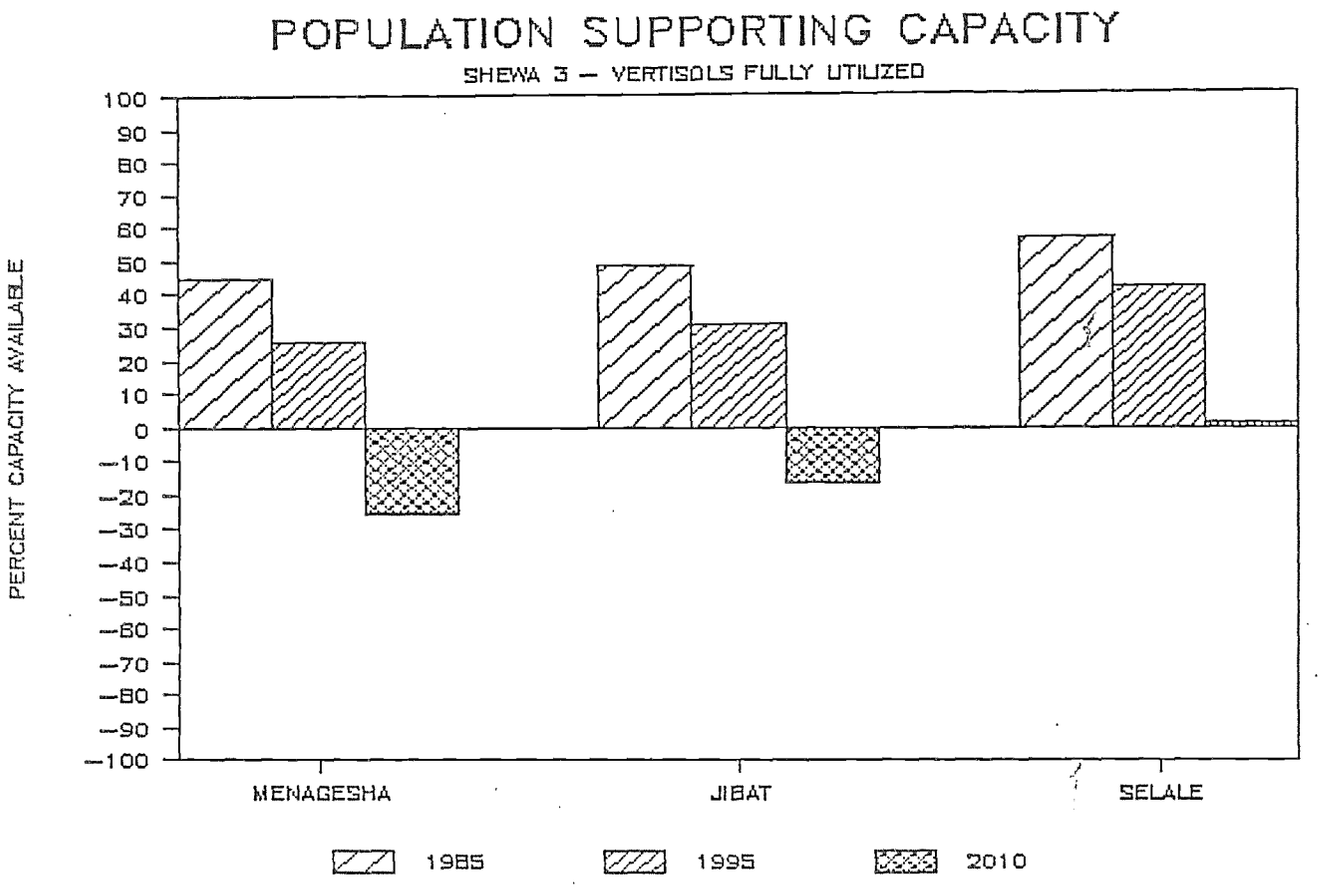
YERER
HAIKOTCH & BUTAJIRA
KEMBATA
CHEBO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 3 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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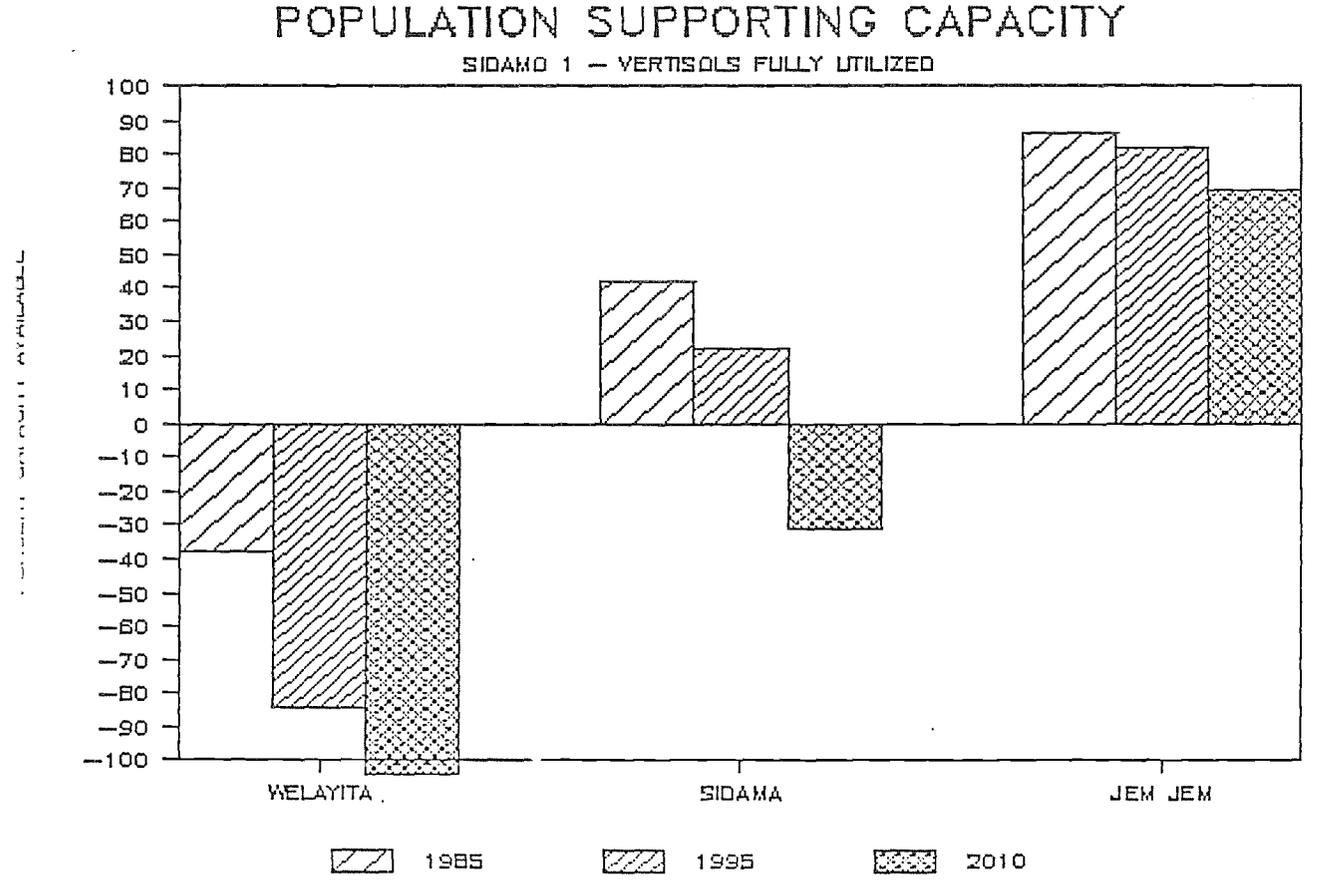
MENAGESHA
JIBAT
SELALE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 1 — VERTISOLS FULLY UTILIZED
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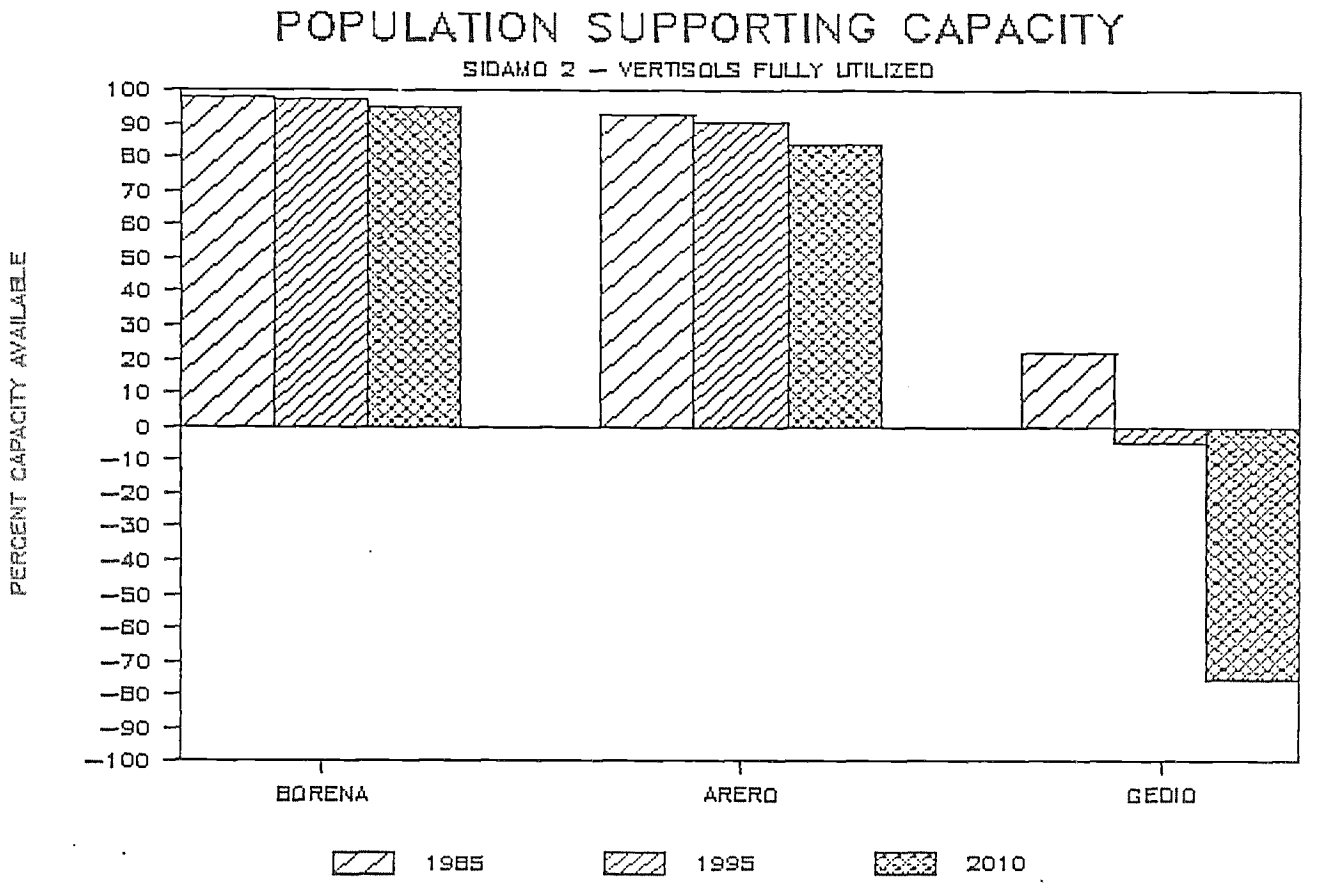
WELAYITA
SIDAMA
JEM JEM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 2 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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BORENA
ARERO
GEDIO
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1995
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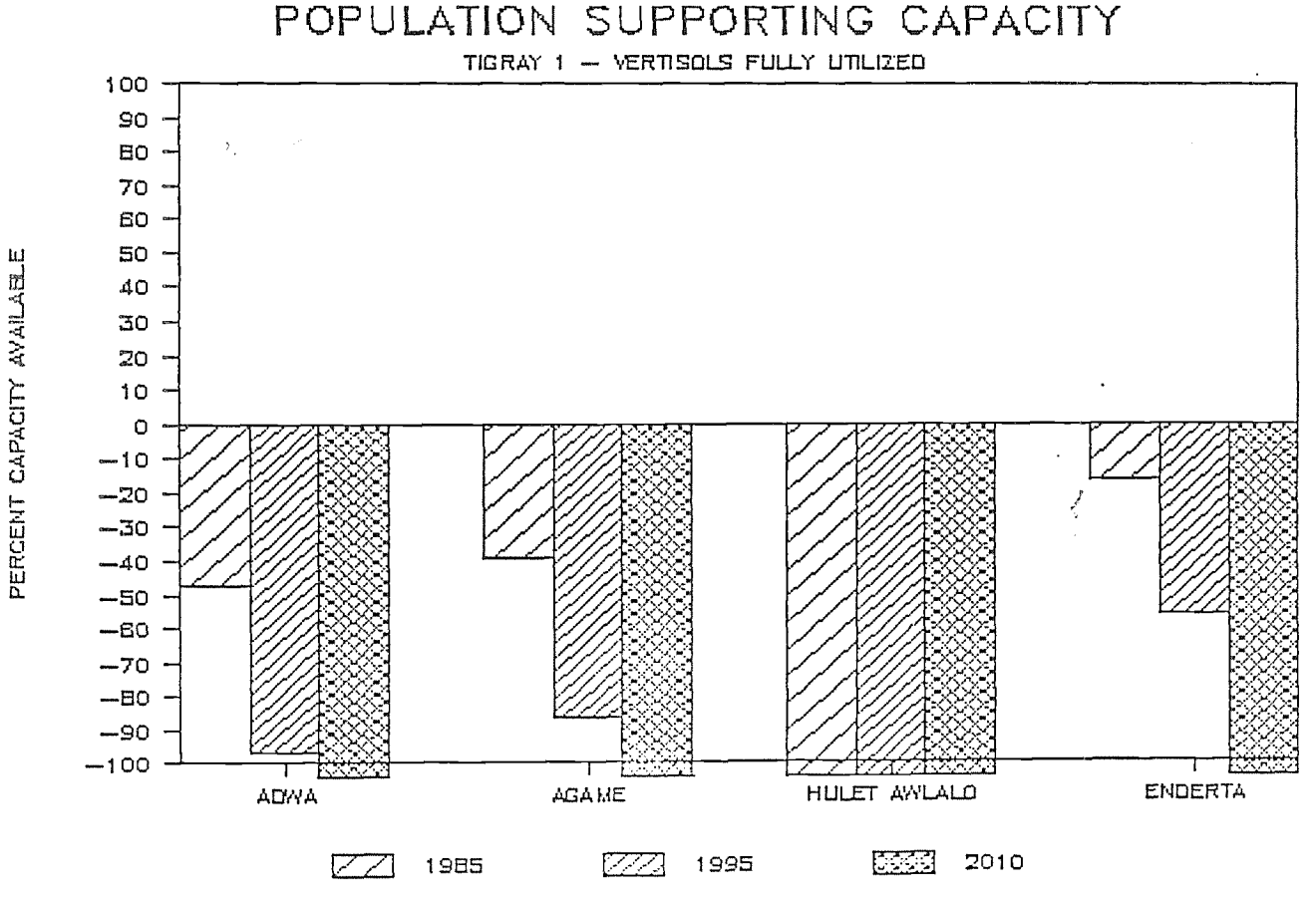
POPULATION SUPPORTING CAPACITY
TIGRAY 1 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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HULET AWLALO
ENDERTA
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1995
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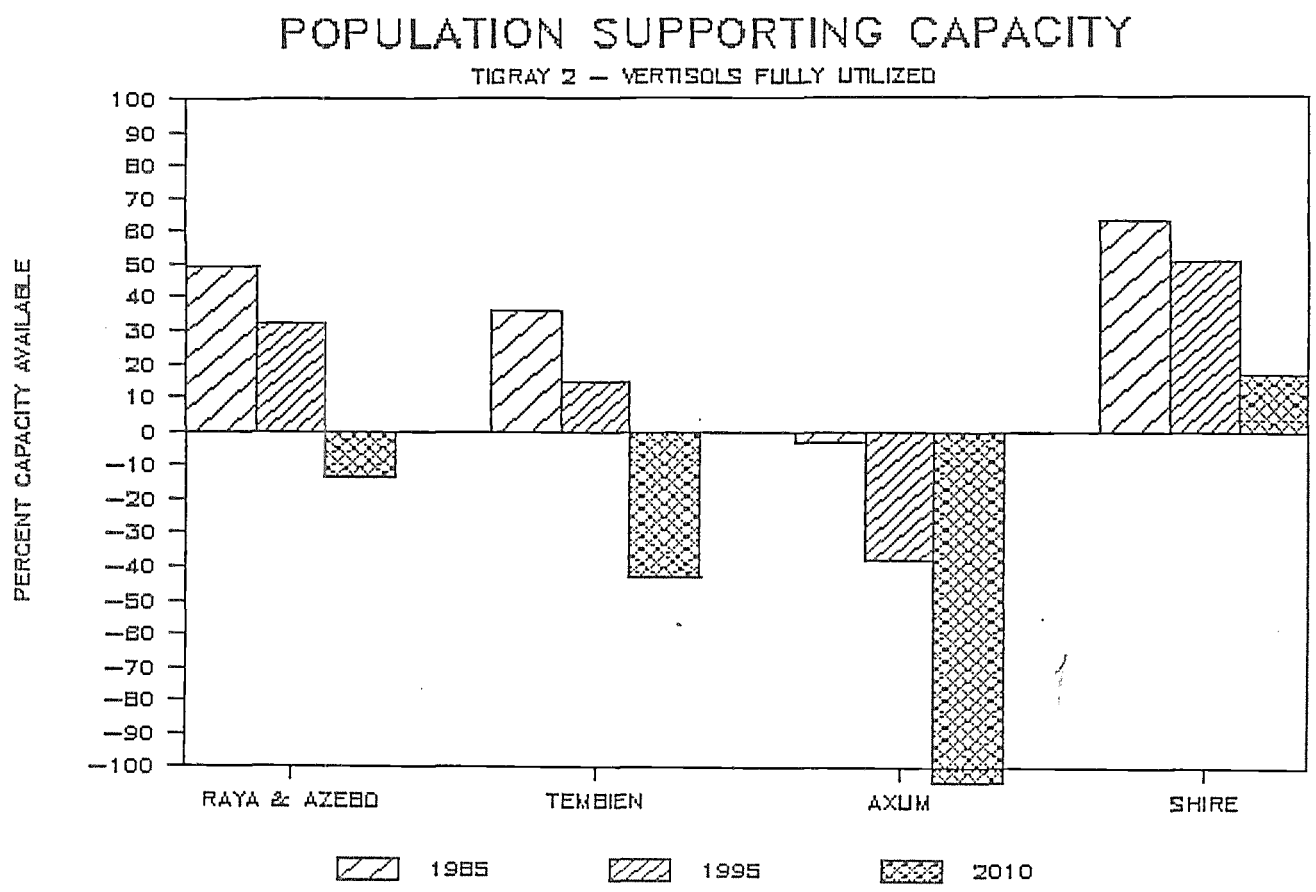
POPULATION SUPPORTING CAPACITY
TIGRAY 2 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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TEMBIEN
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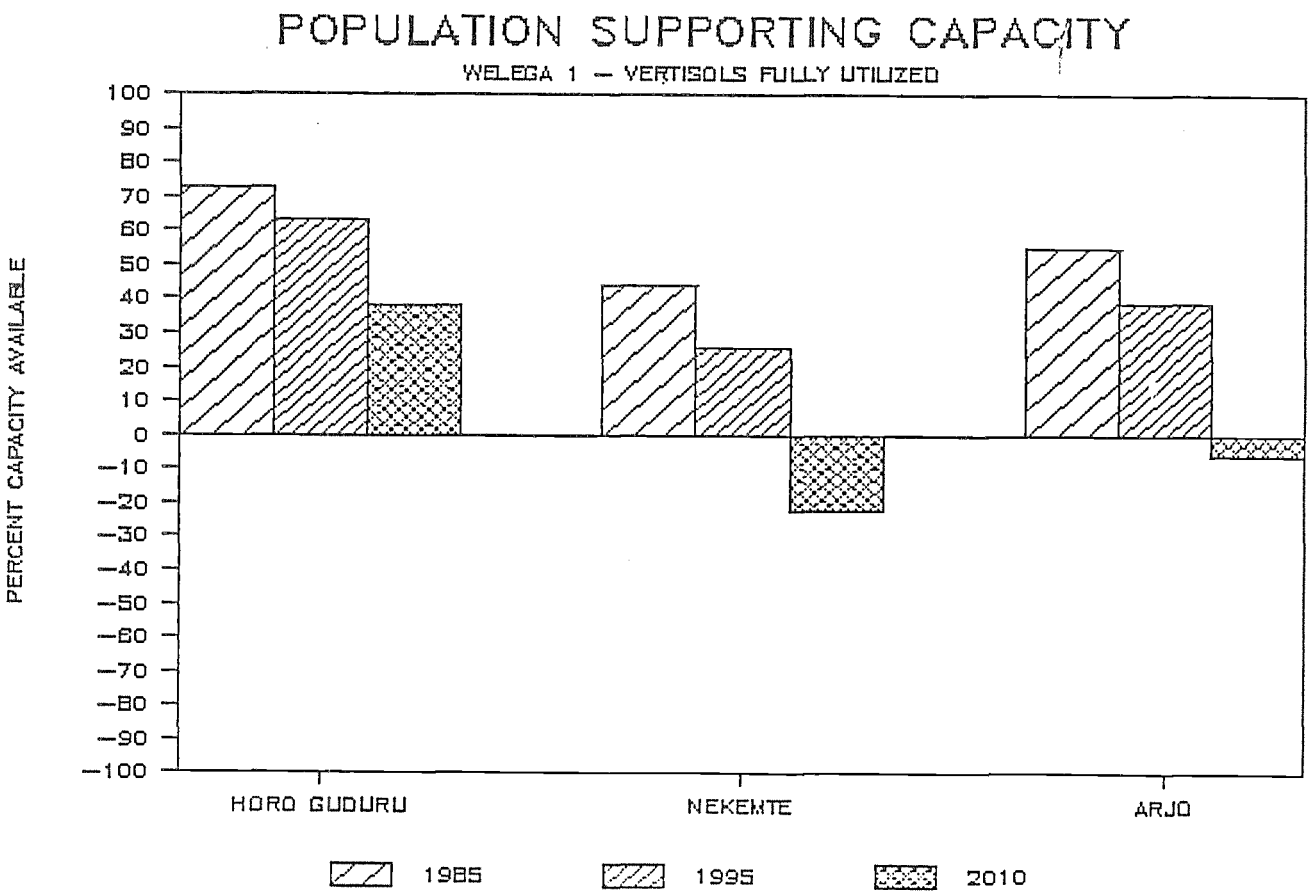
SHIRE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 1 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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NEKEMTE
ARJO
1985
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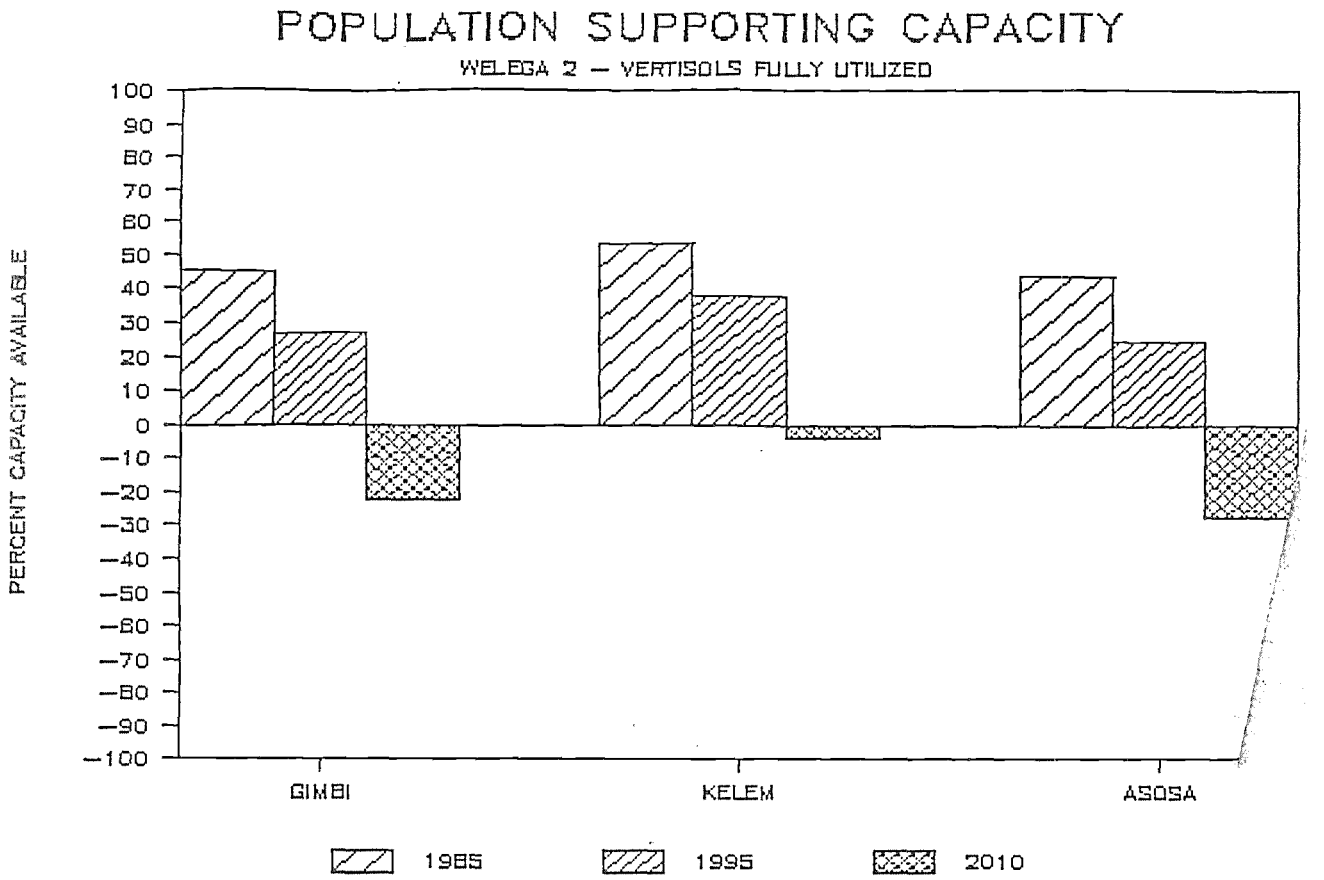
POPULATION SUPPORTING CAPACITY
WELEGA 2 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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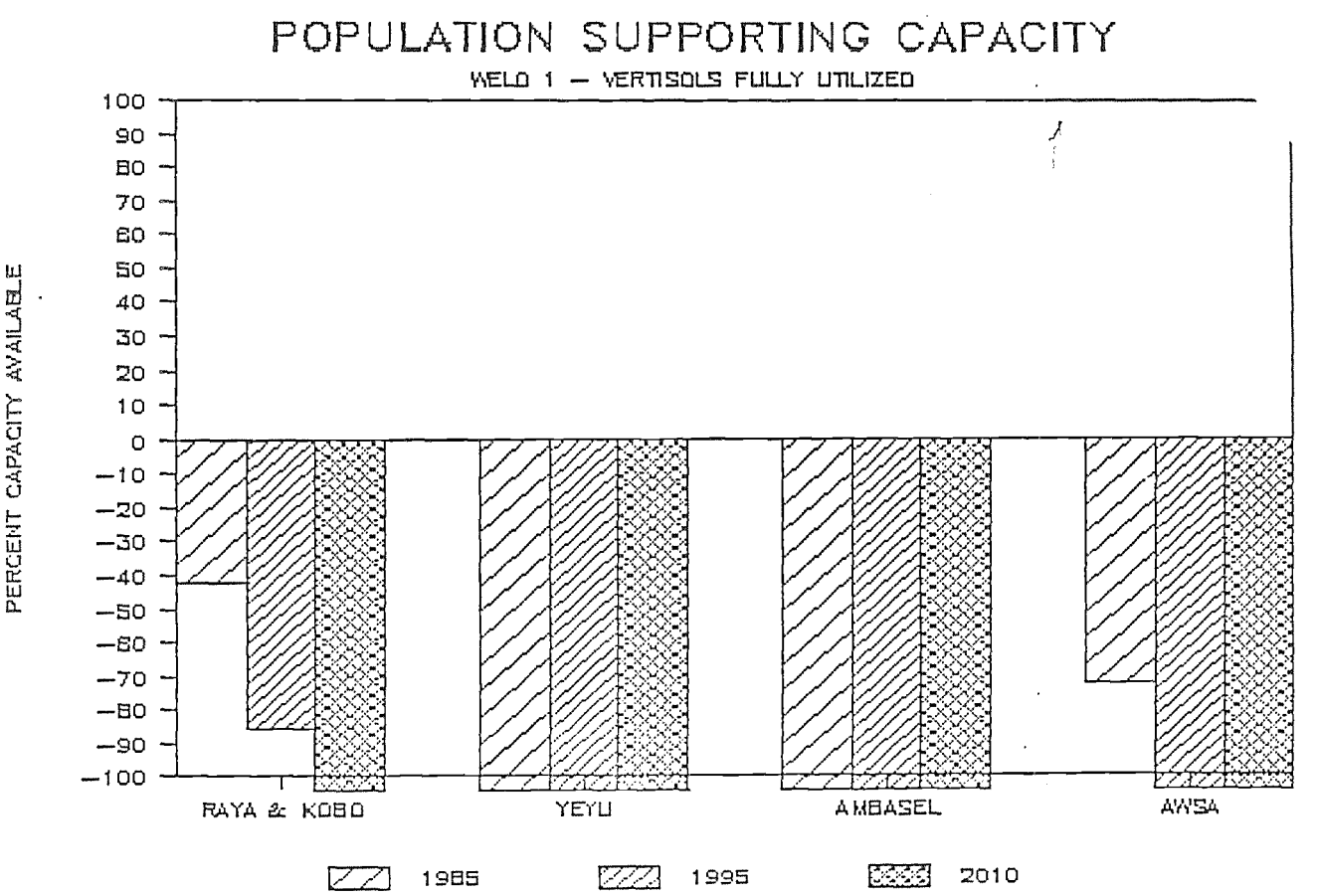
KELEM
ASOSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 1 — VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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RAYA & KOBO
YEYU
AMBASEL
AWSA
1985
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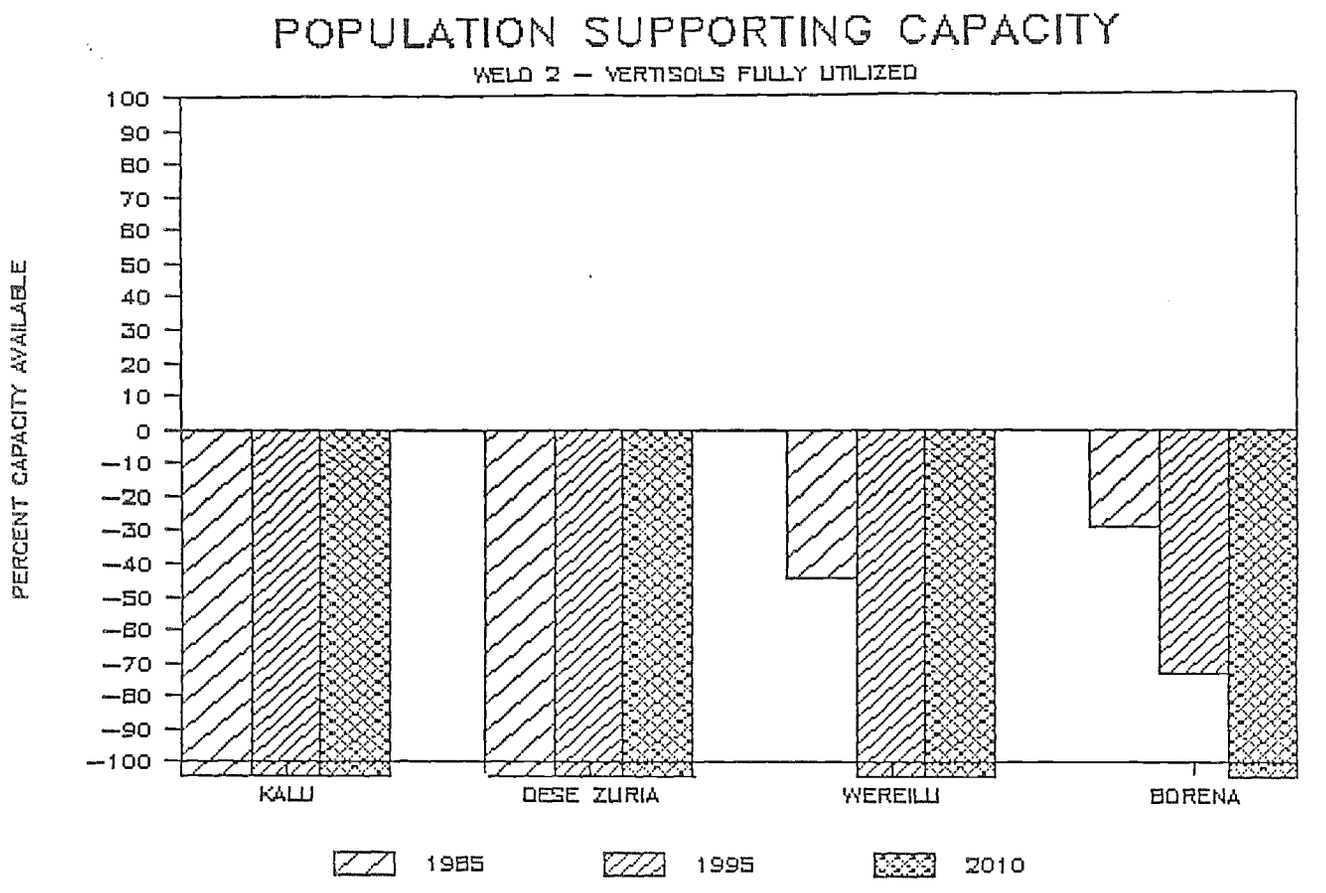
POPULATION SUPPORTING CAPACITY
WELO 2 – VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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KALU
DESE ZURIA
WEREILU
BORENA
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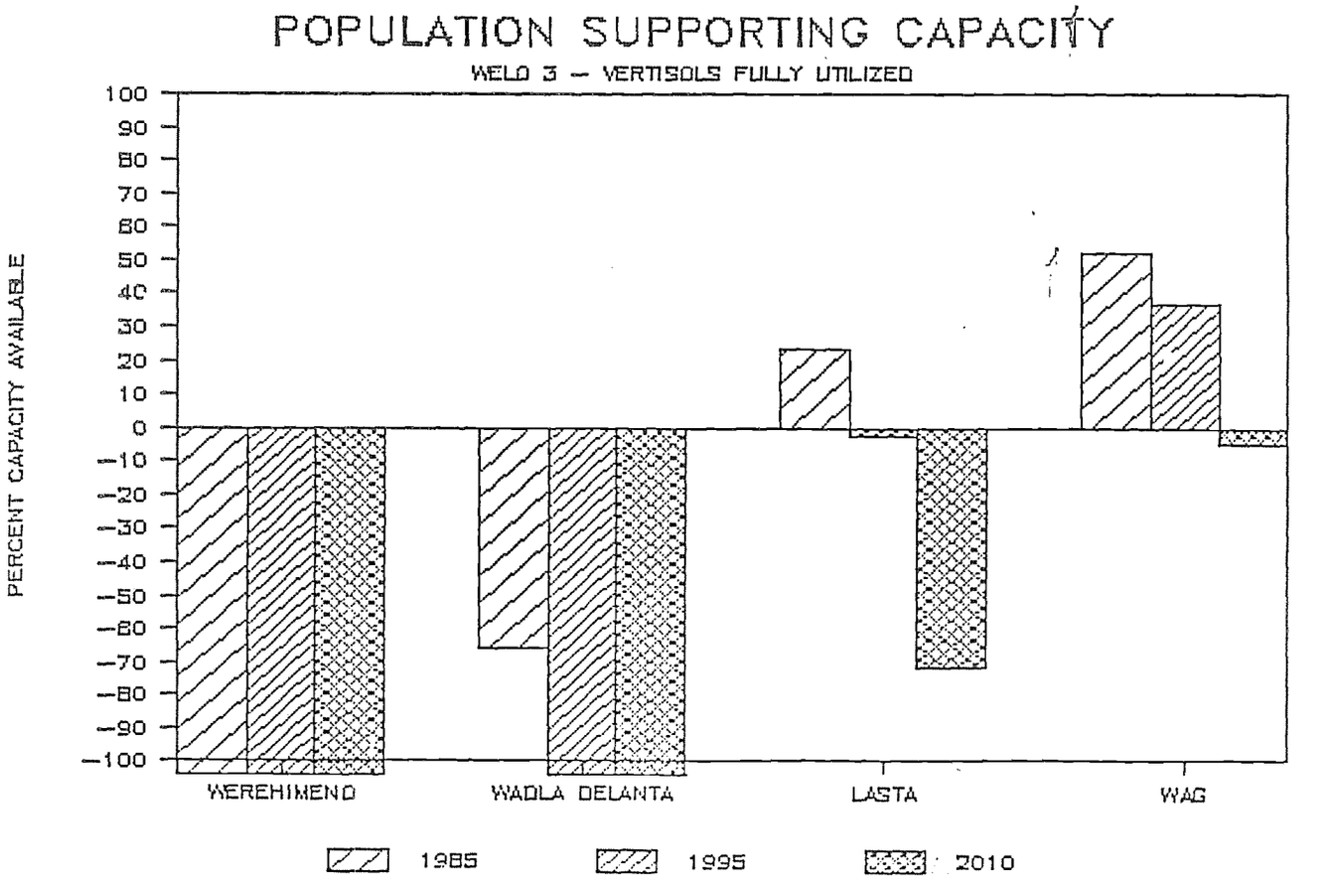
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 3 – VERTISOLS FULLY UTILIZED
PERCENT CAPACITY AVAILABLE
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WADLA DELANTA
LASTA
WAG
1985
1995
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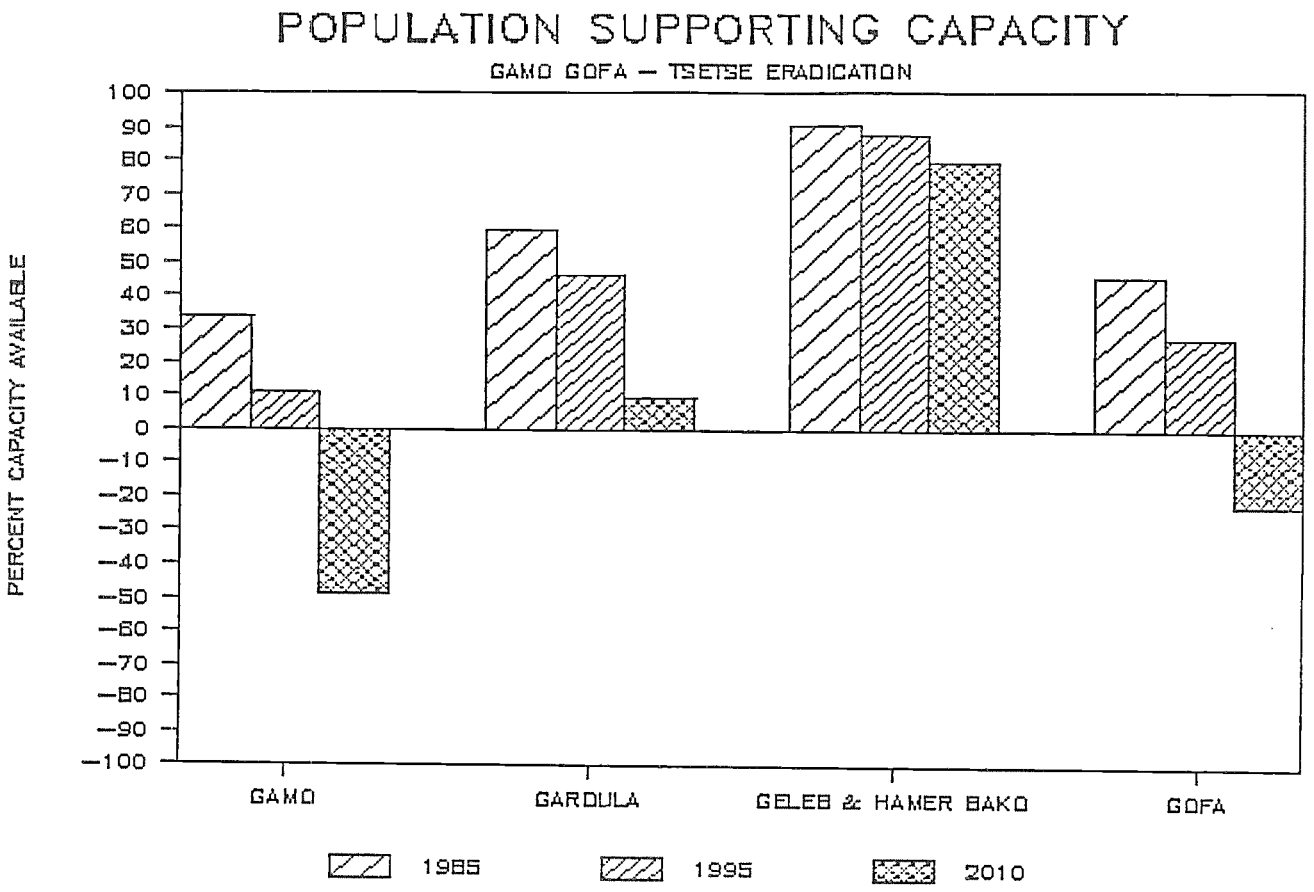
POPULATION SUPPORTING CAPACITY

TSETSE CONTROL


POPULATION SUPPORTING CAPACITY
GAMO GOFA — TSETSE ERADICATION
PERCENT CAPACITY AVAILABLE
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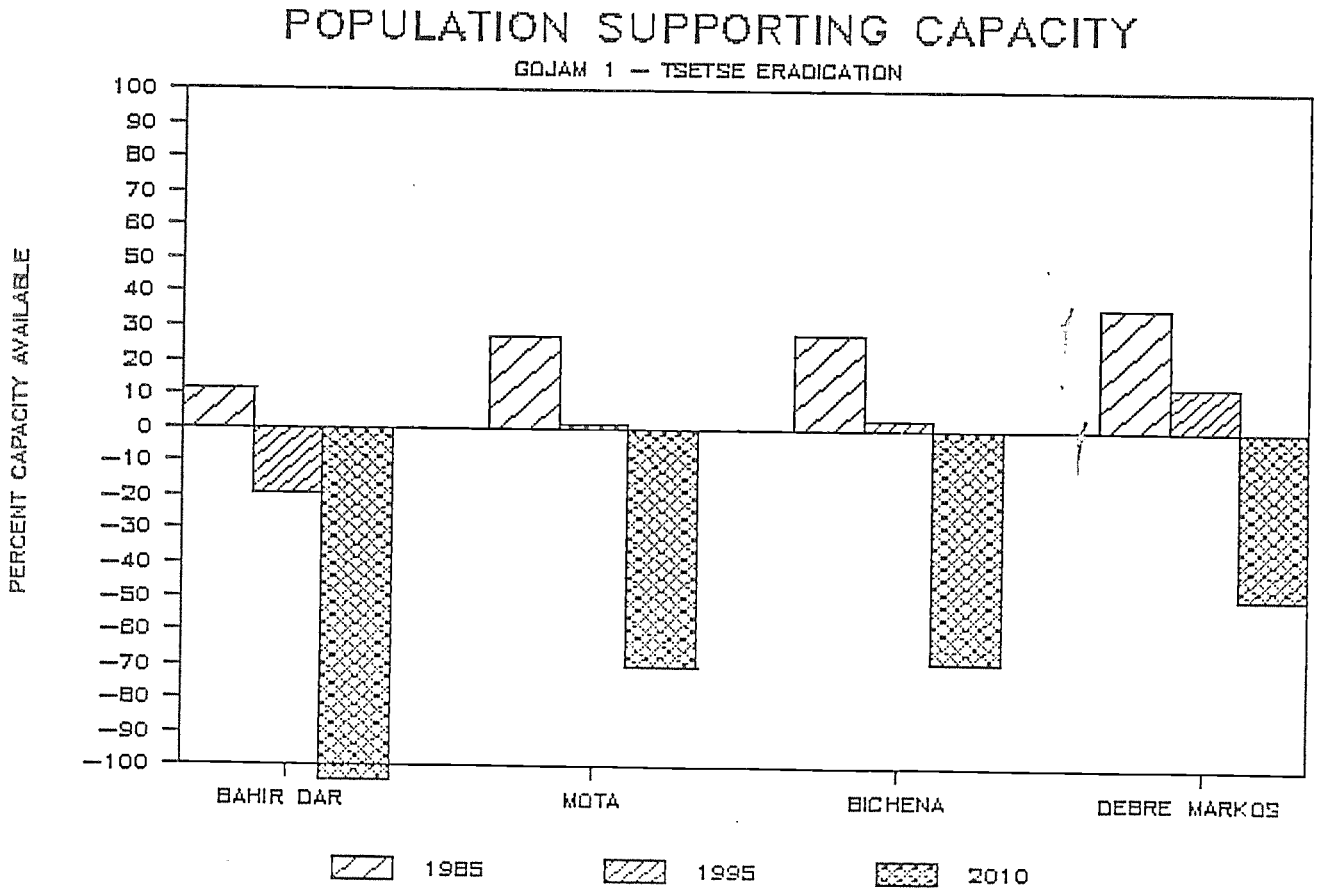
GAMO
GARDULA
GELEB & HAMER BAKO
GOFA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 1 — TSETSE ERADICATION
PERCENT CAPACITY AVAILABLE
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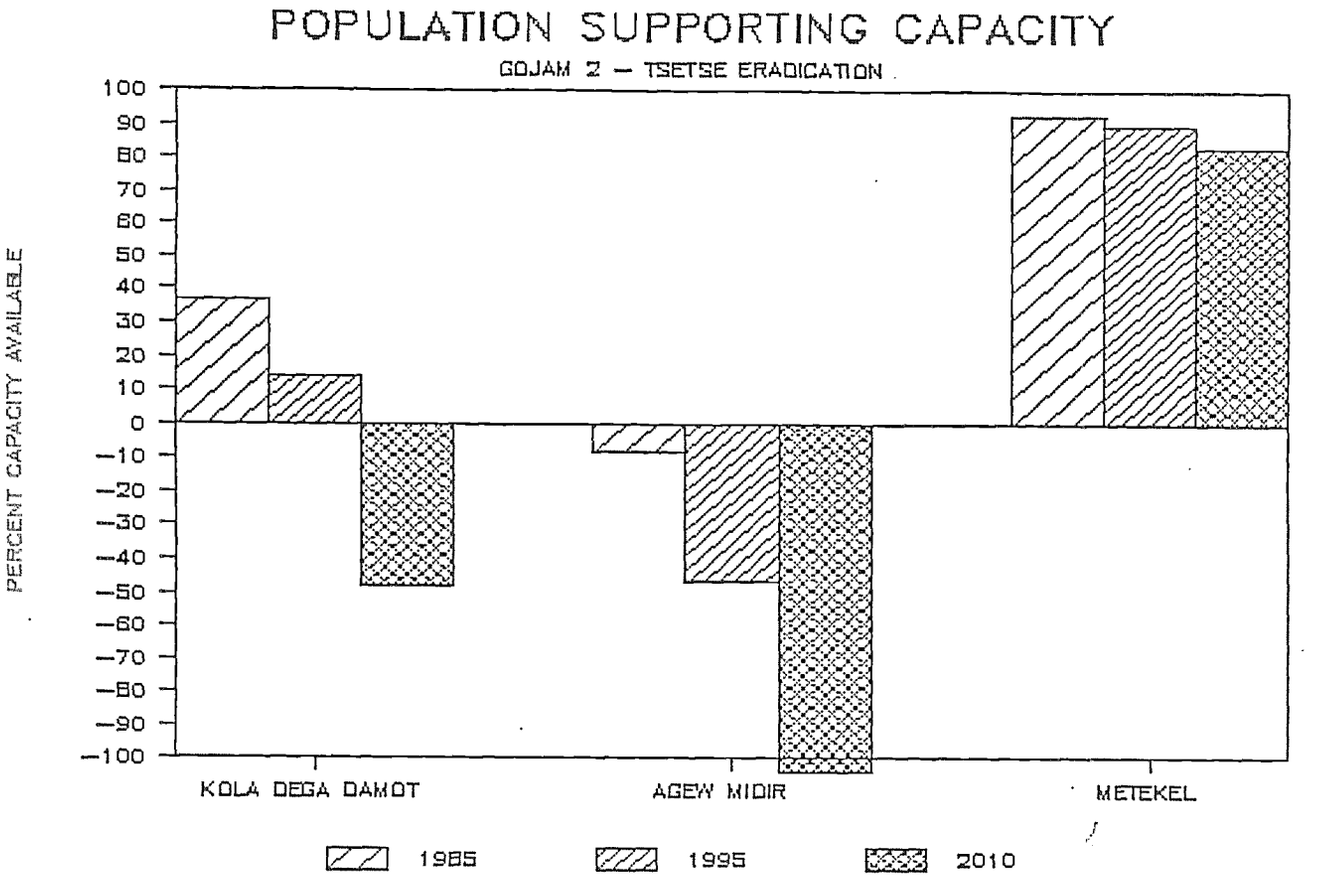
BAHIR DAR
MOTA
BICHENA
DEBRE MARKOS
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 2 — TSETSE ERADICATION
PERCENT CAPACITY AVAILABLE
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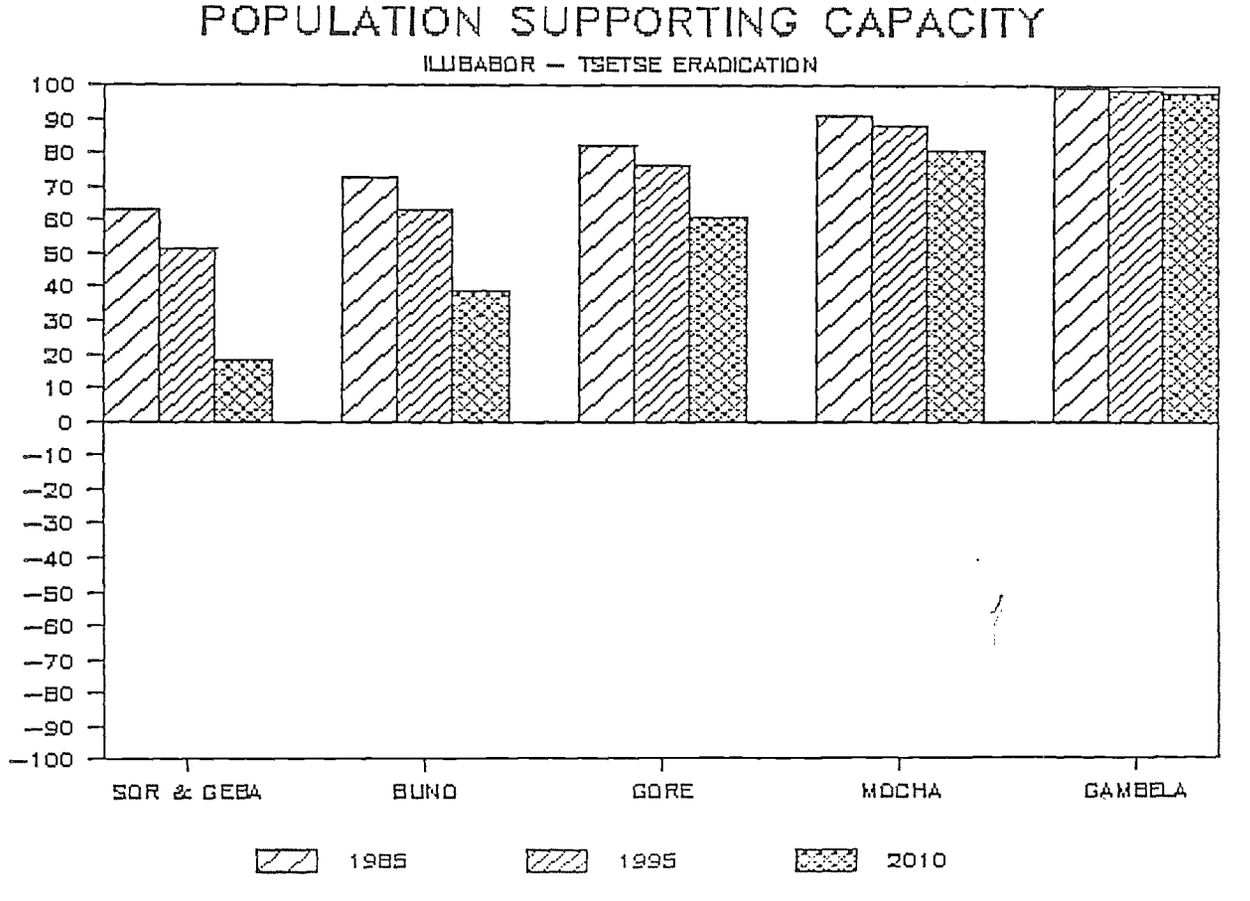
KOLA DEGA DAMOT
AGEW MIDIR
METEKEL
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ILUBABOR — TSETSE ERADICATION
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SOR & GEBA
BUNO
GORE
MOCHA
GAMBELA
1985
1995
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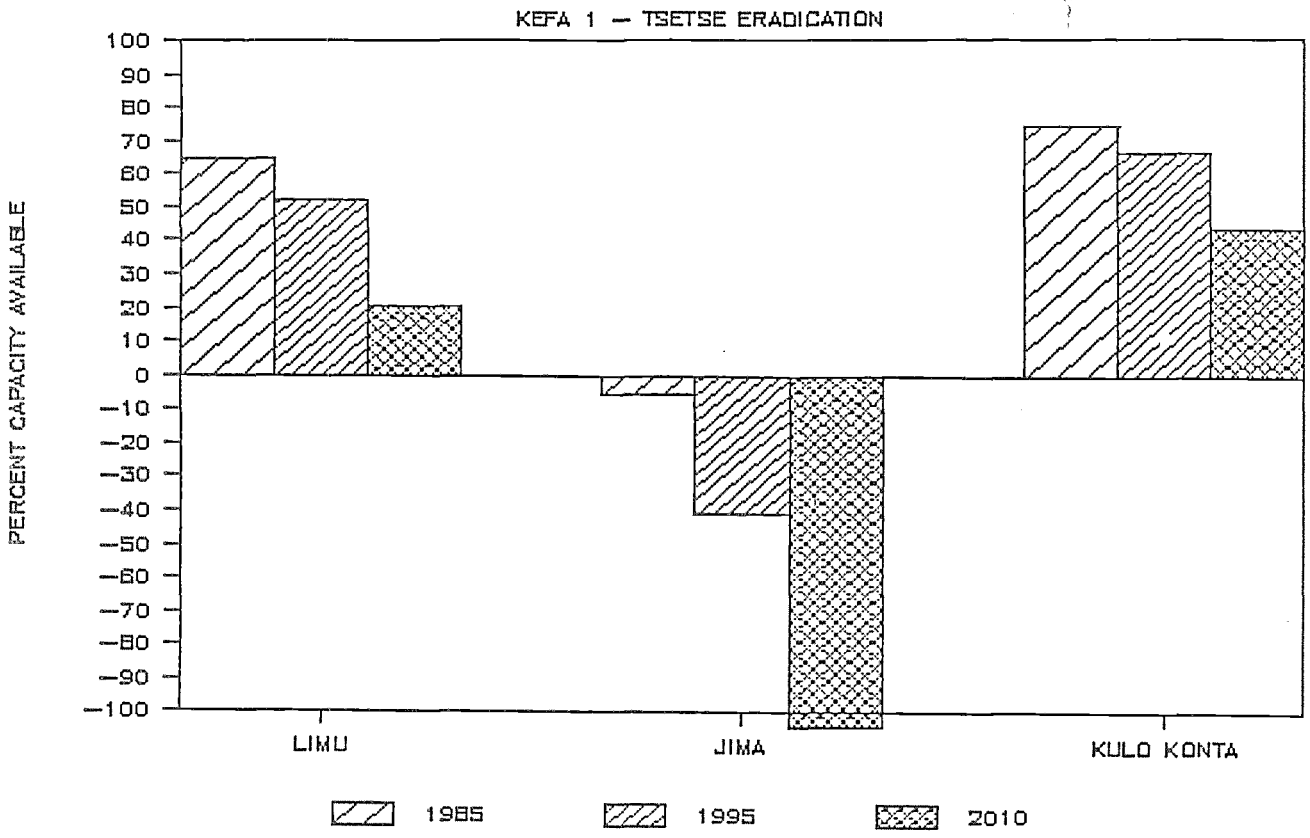
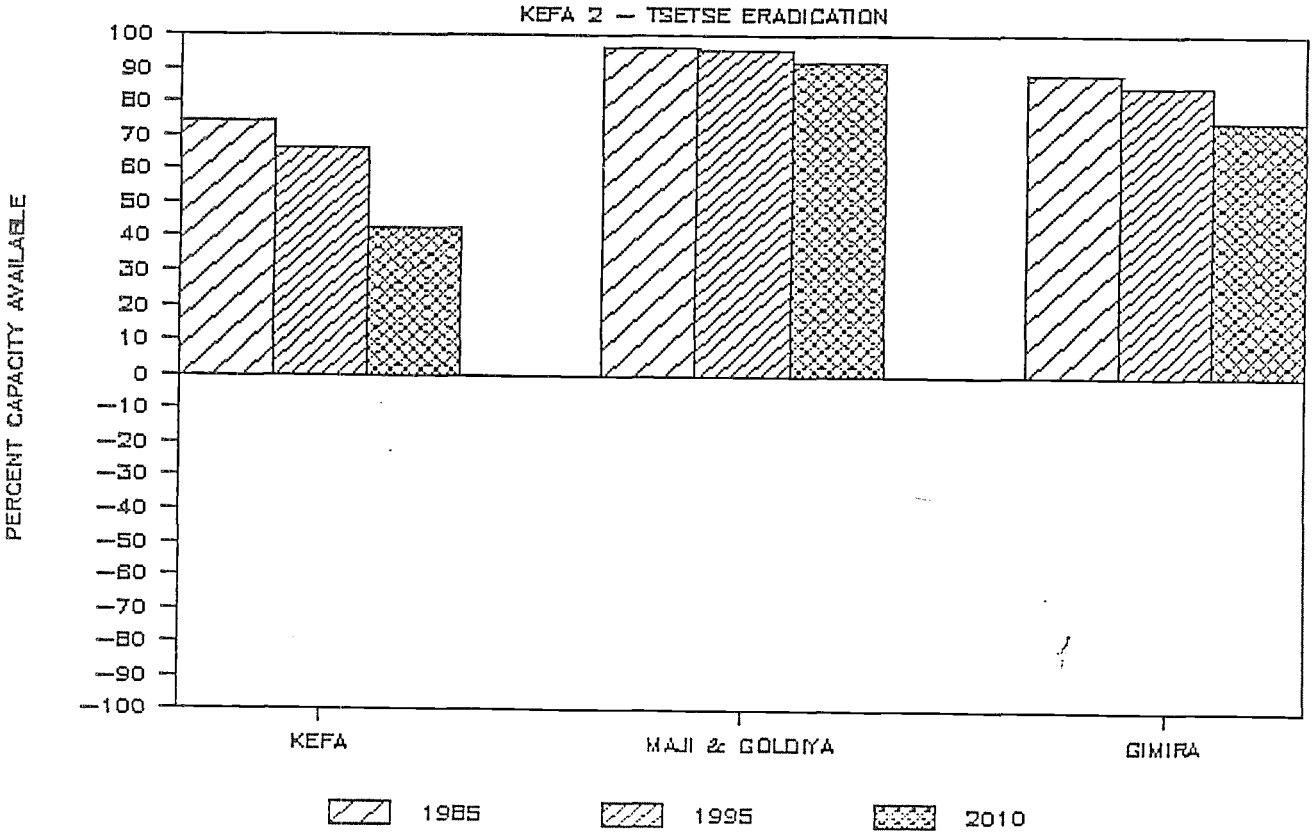
POPULATION SUPPORTING CAPACITY

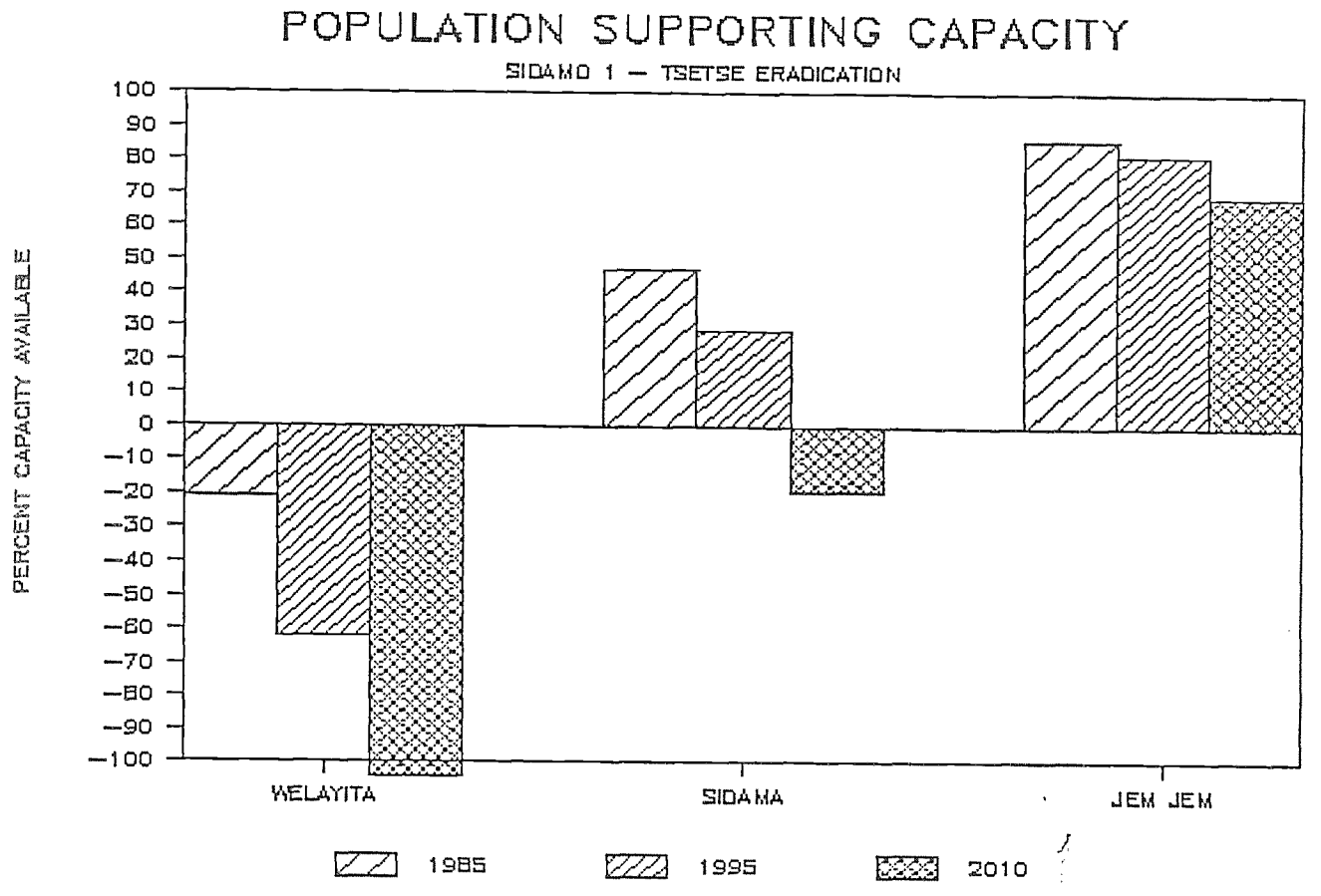
KEFA 1 — TSETSE ERADICATION



POPULATION SUPPORTING CAPACITY

KEFA 2 — TSETSE ERADICATION




POPULATION SUPPORTING CAPACITY
SIDAMO 1 — TSETSE ERADICATION
PERCENT CAPACITY AVAILABLE
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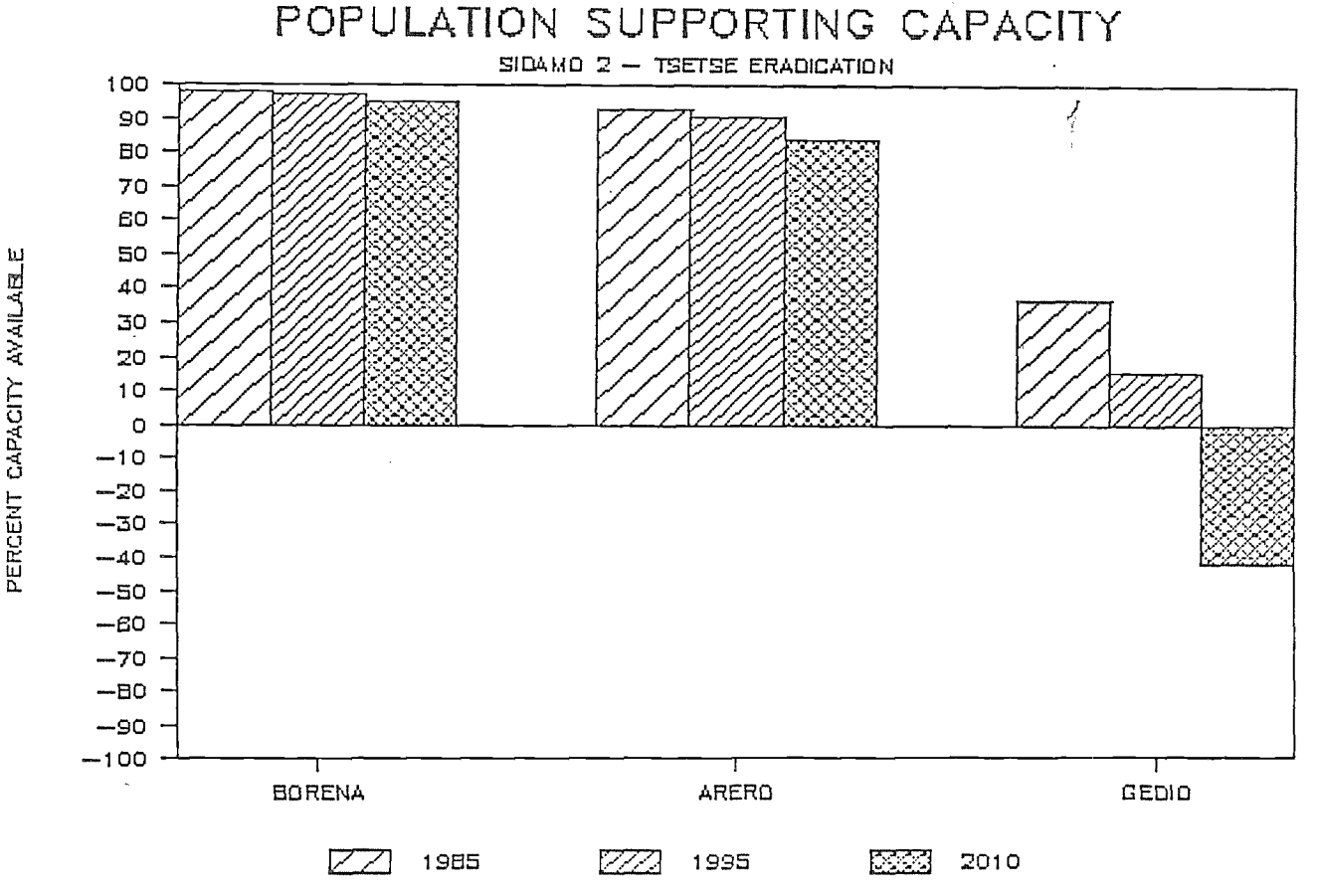
WELAYITA
SIDAMA
JEM JEM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 2 — TSETSE ERADICATION
PERCENT CAPACITY AVAILABLE
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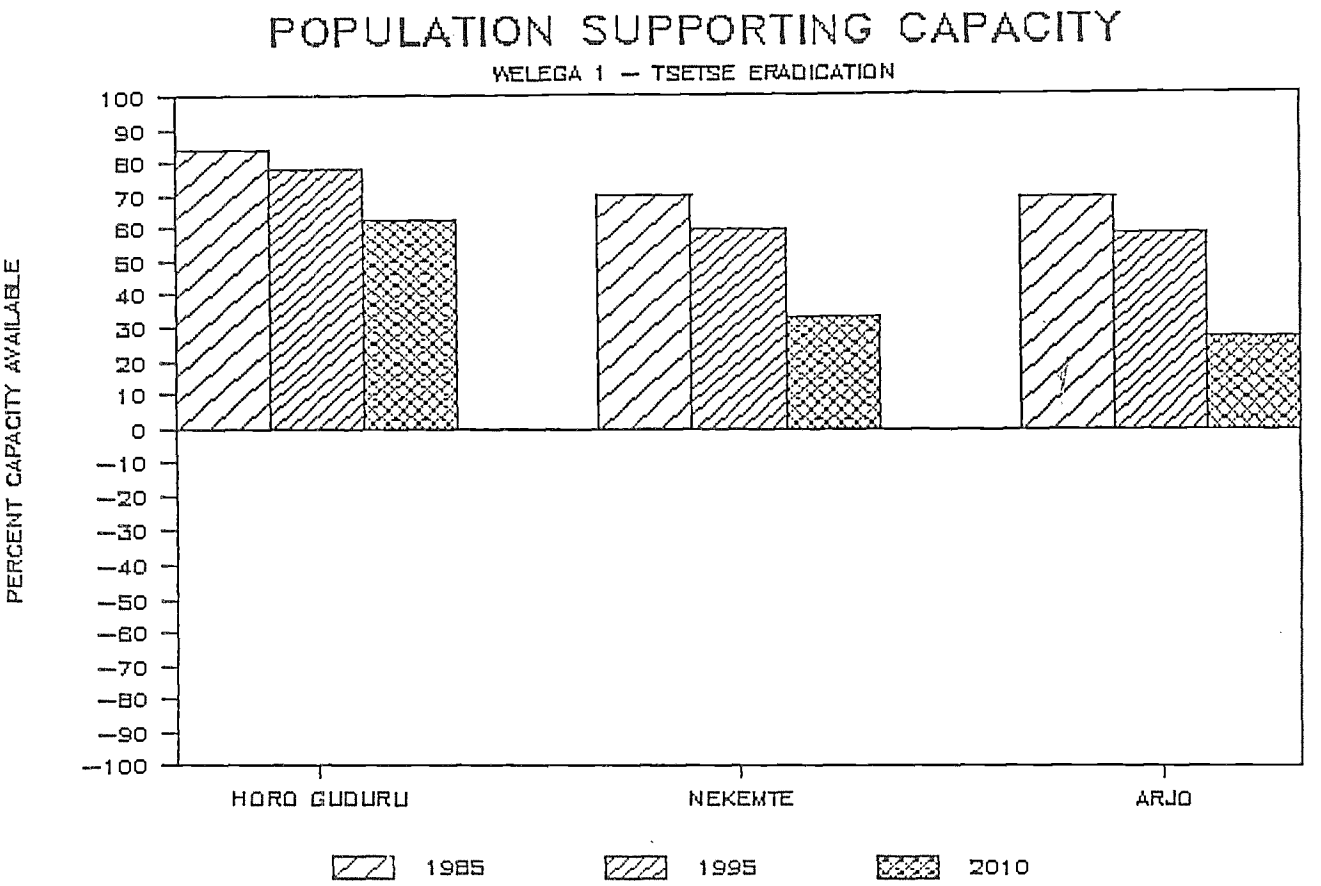
BORENA
ARERO
GEDIO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 1 — TSETSE ERADICATION
PERCENT CAPACITY AVAILABLE
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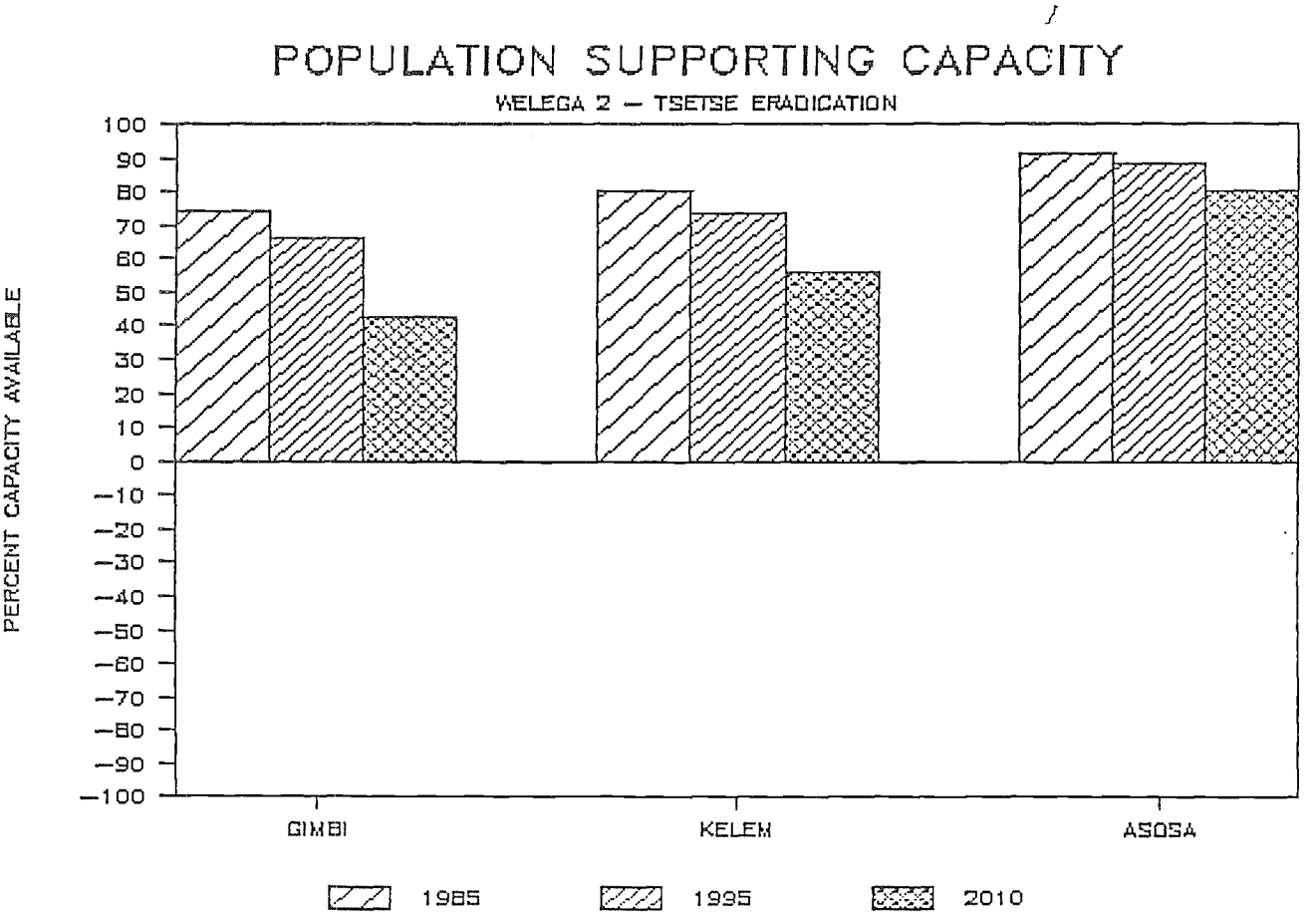
HORO GUDURU
NEKEMTE
ARJO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 2 — TSETSE ERADICATION
PERCENT CAPACITY AVAILABLE
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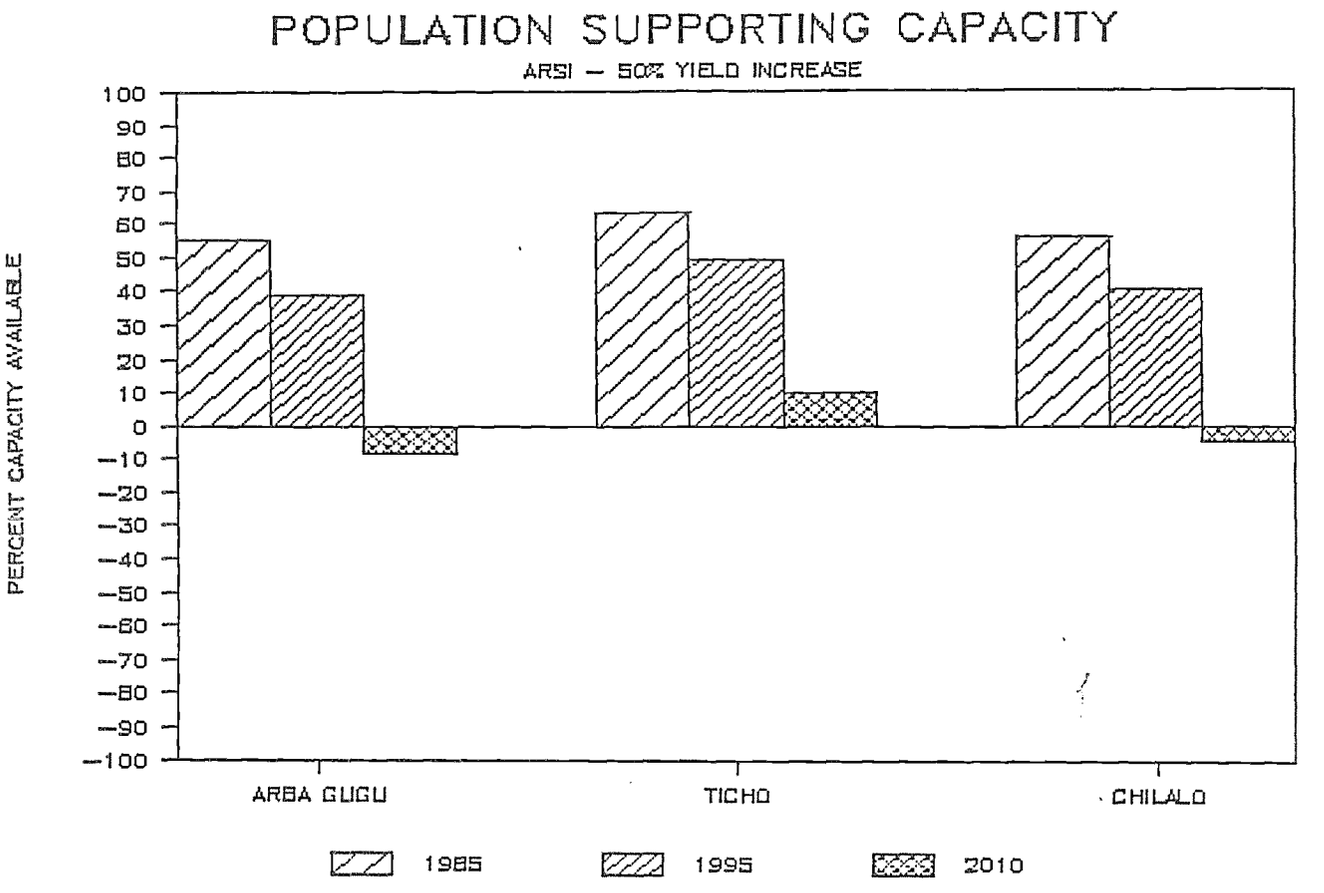
GIMBI
KELEM
ASOSA
1985
1995
2010

POPULATION SUPPORTING CAPACITY

50% INCREASE IN CROP YIELDS


POPULATION SUPPORTING CAPACITY
ARSI — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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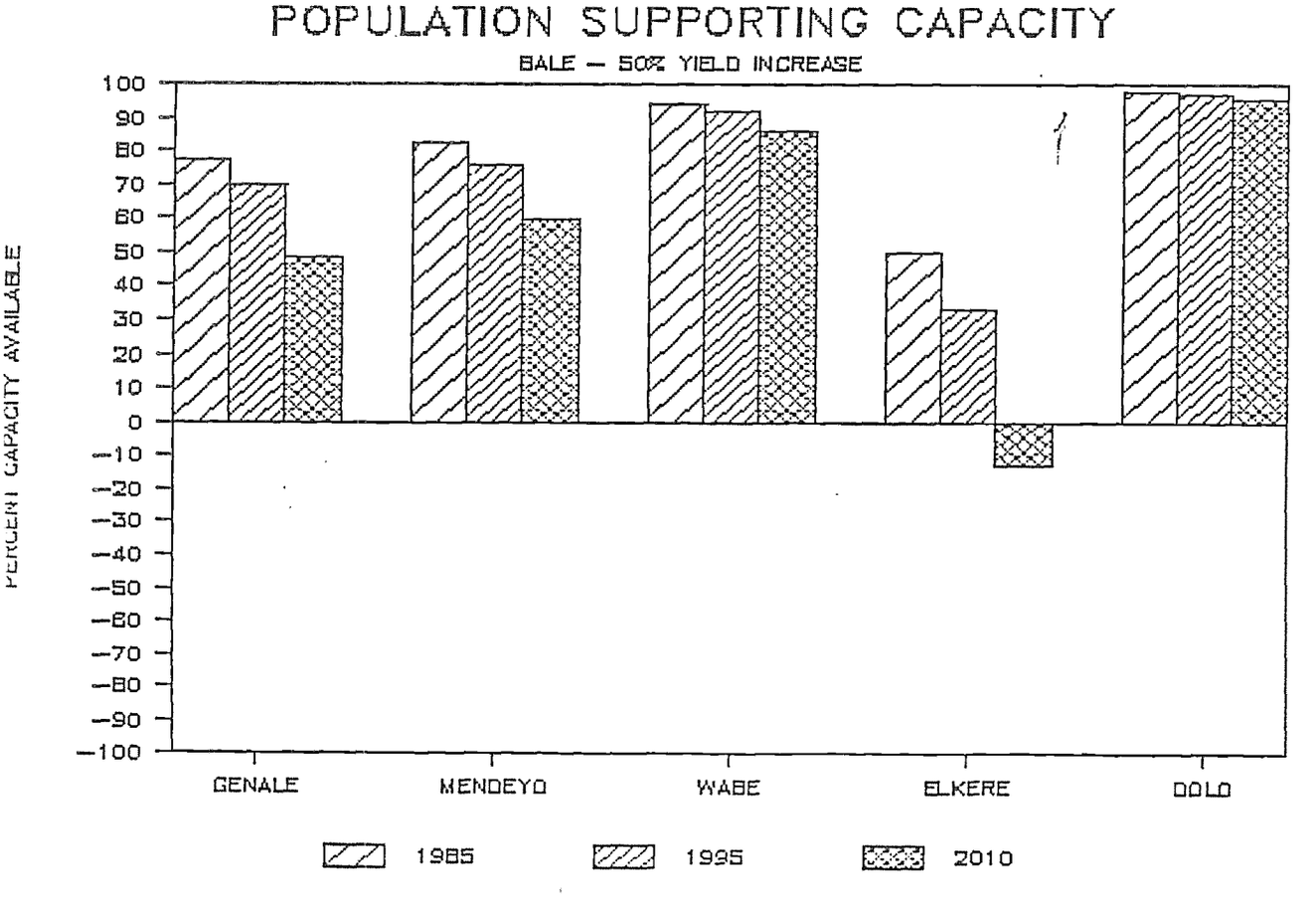
ARBA GUGU
TICHO
CHILALO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
BALE — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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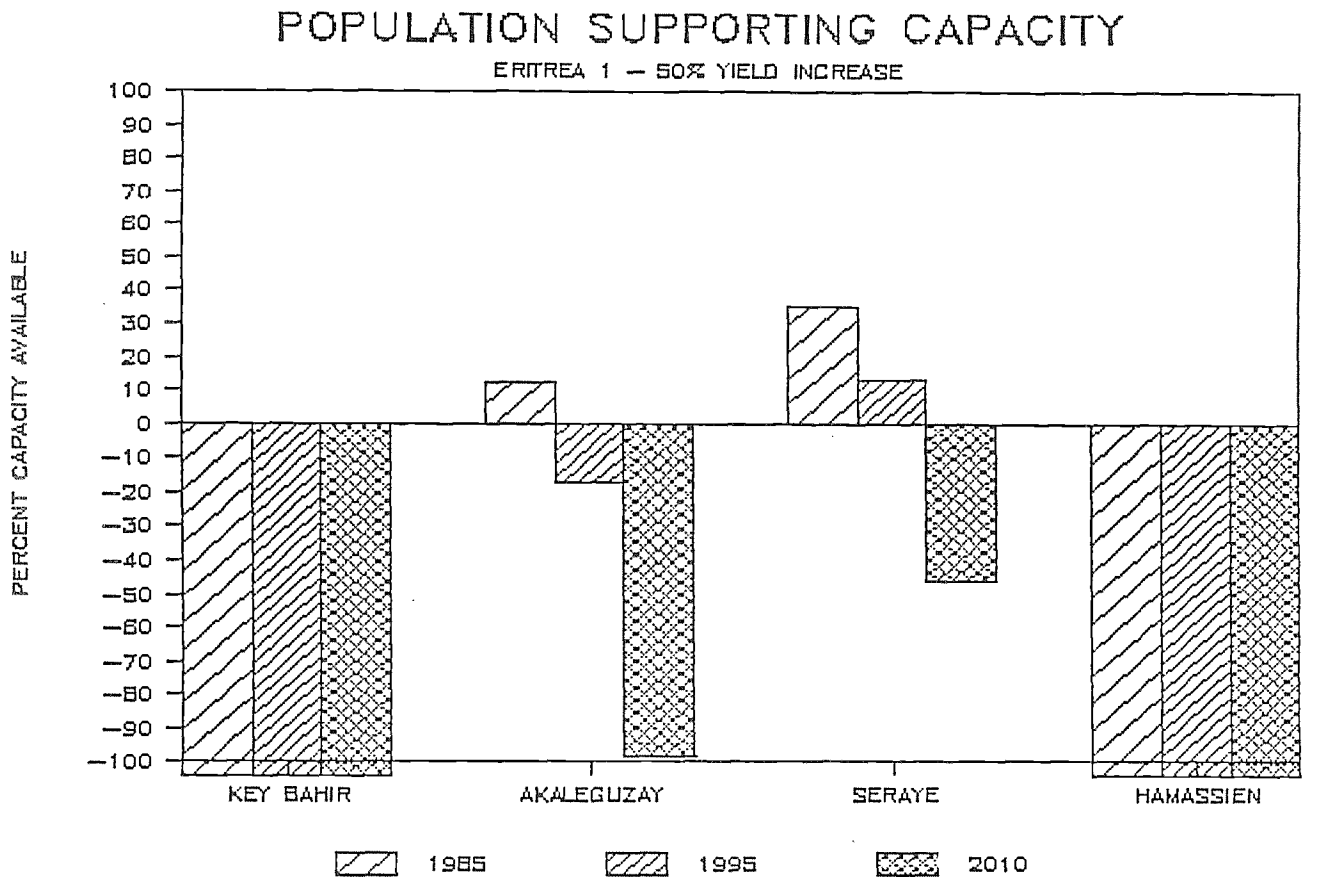
GENALE
MENDEYO
WABE
ELKERE
DOLO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 1 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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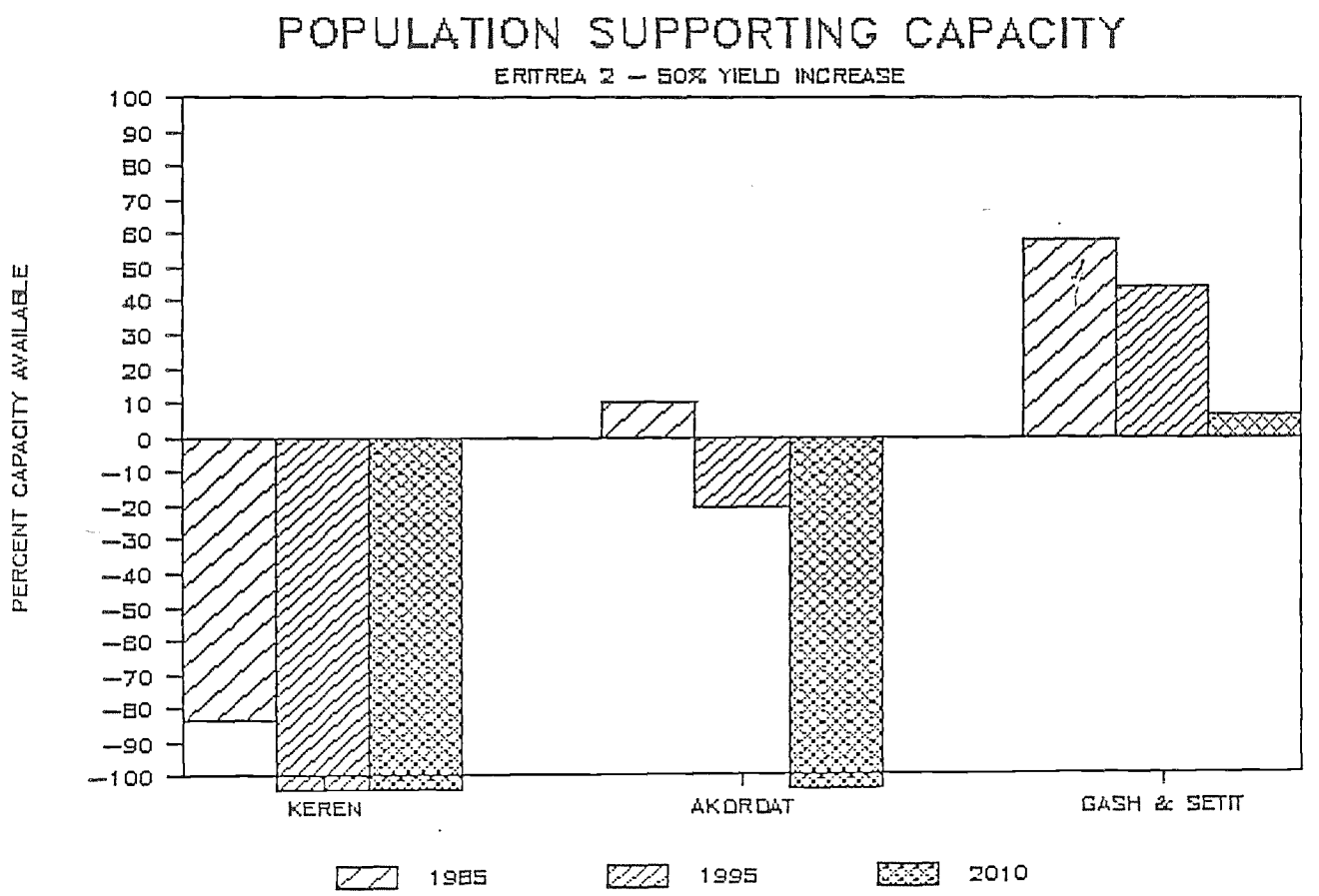
KEY BAHIR
AKALEGUZAY
SERAYE
HAMASSIEN
1985
1995
2010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ERITREA 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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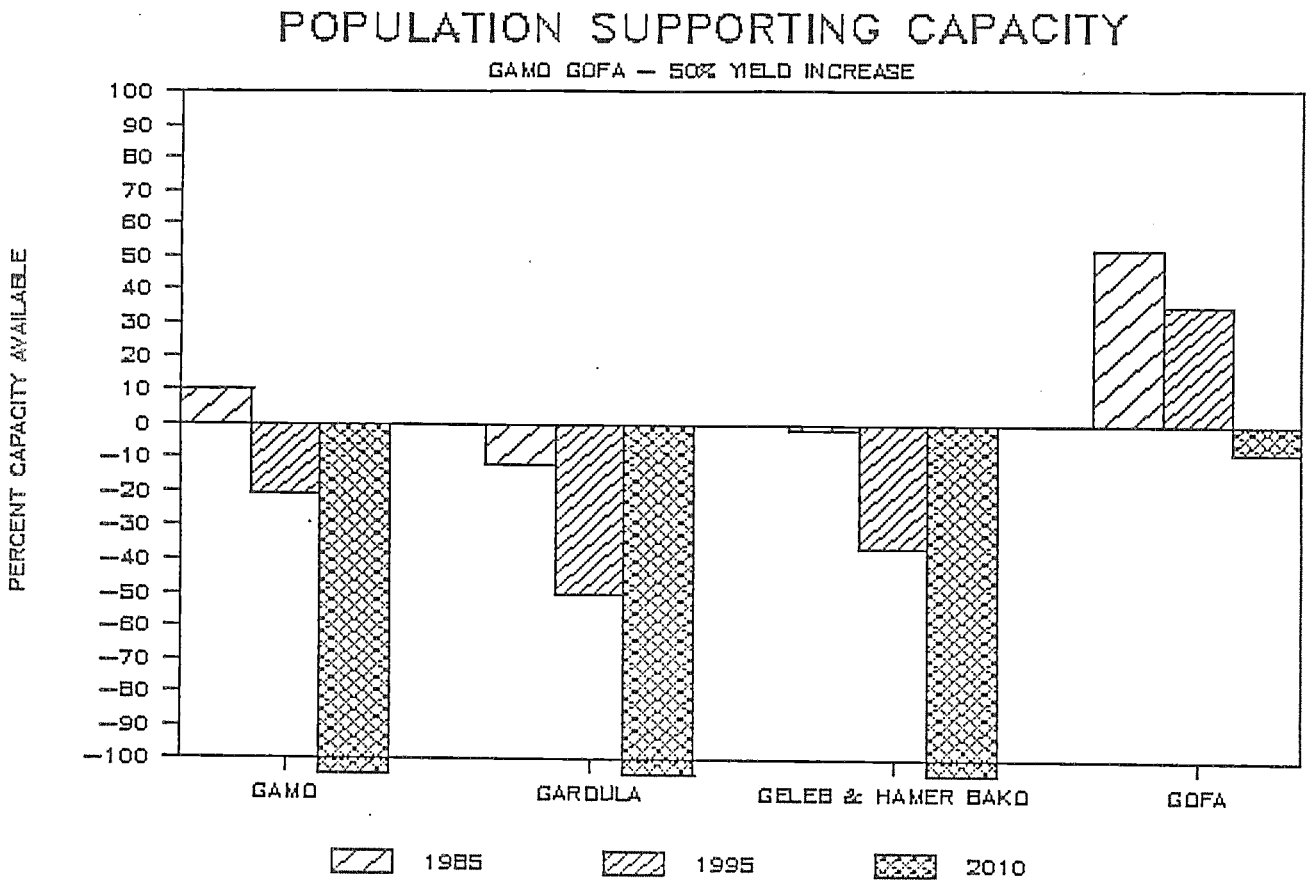
AKORDAT
GASH & SETIT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GAMO GOFA — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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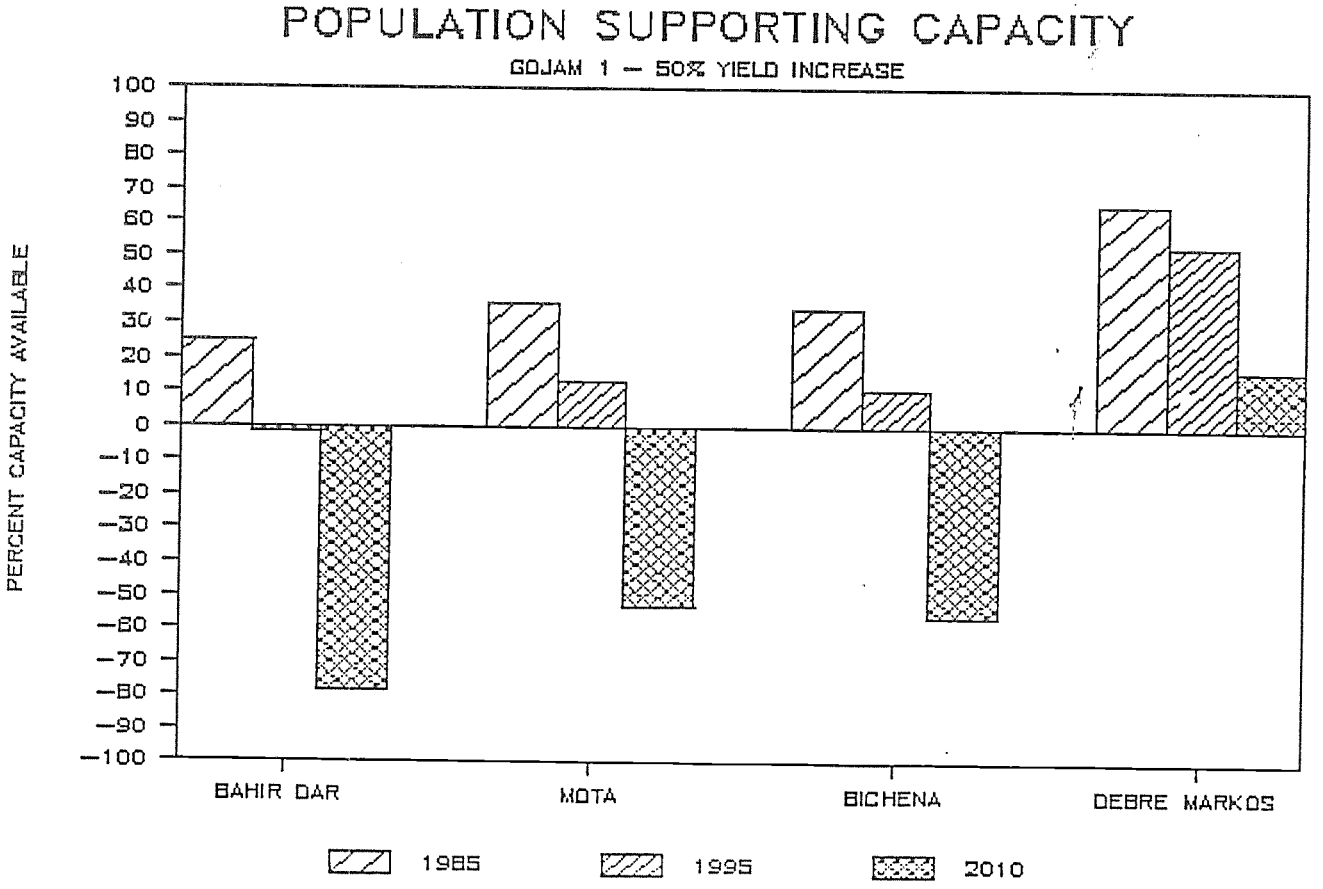
GAMO
GARDULA
GELEB & HAMER BAKO
GOFA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 1 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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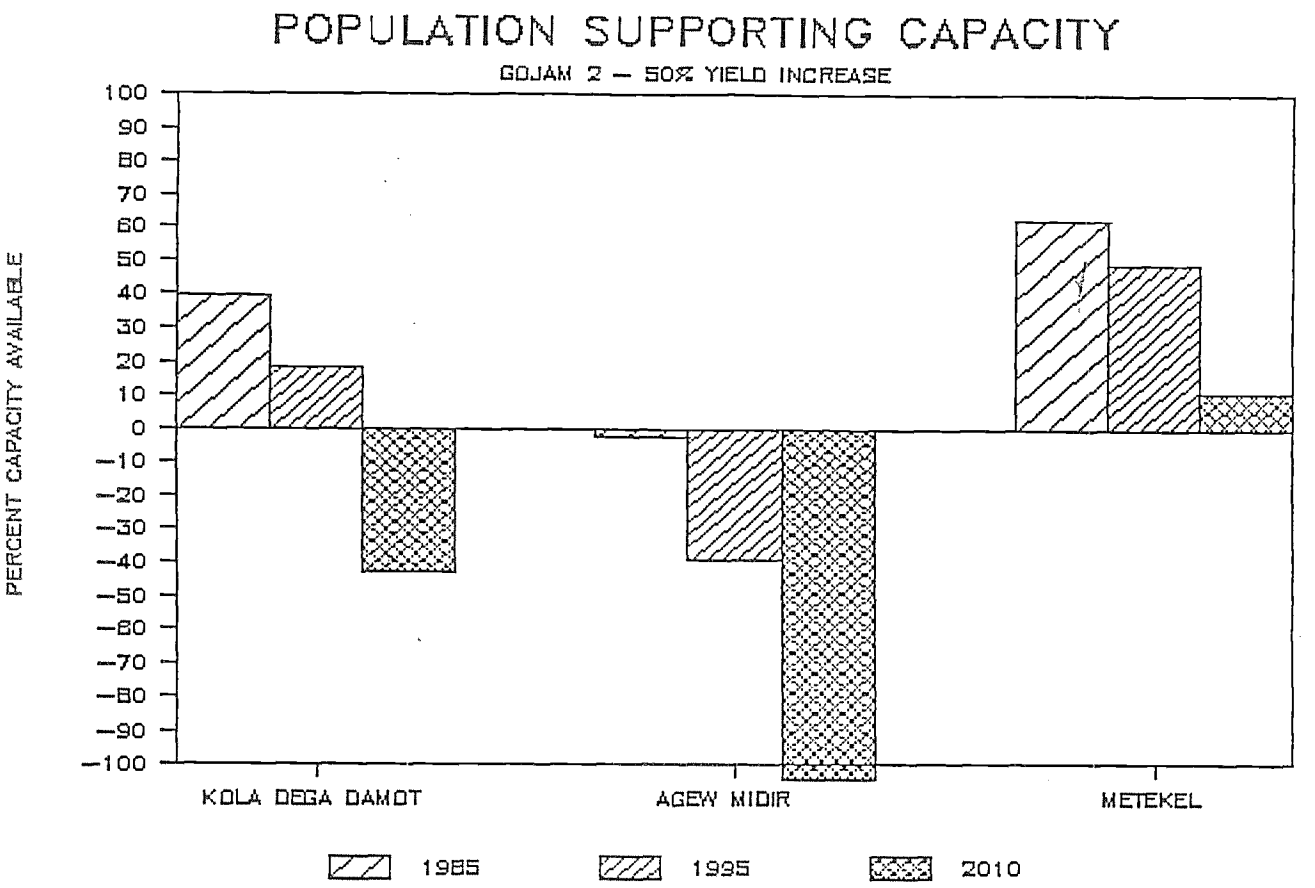
BAHIR DAR
MOTA
BICHENA
DEBRE MARKOS
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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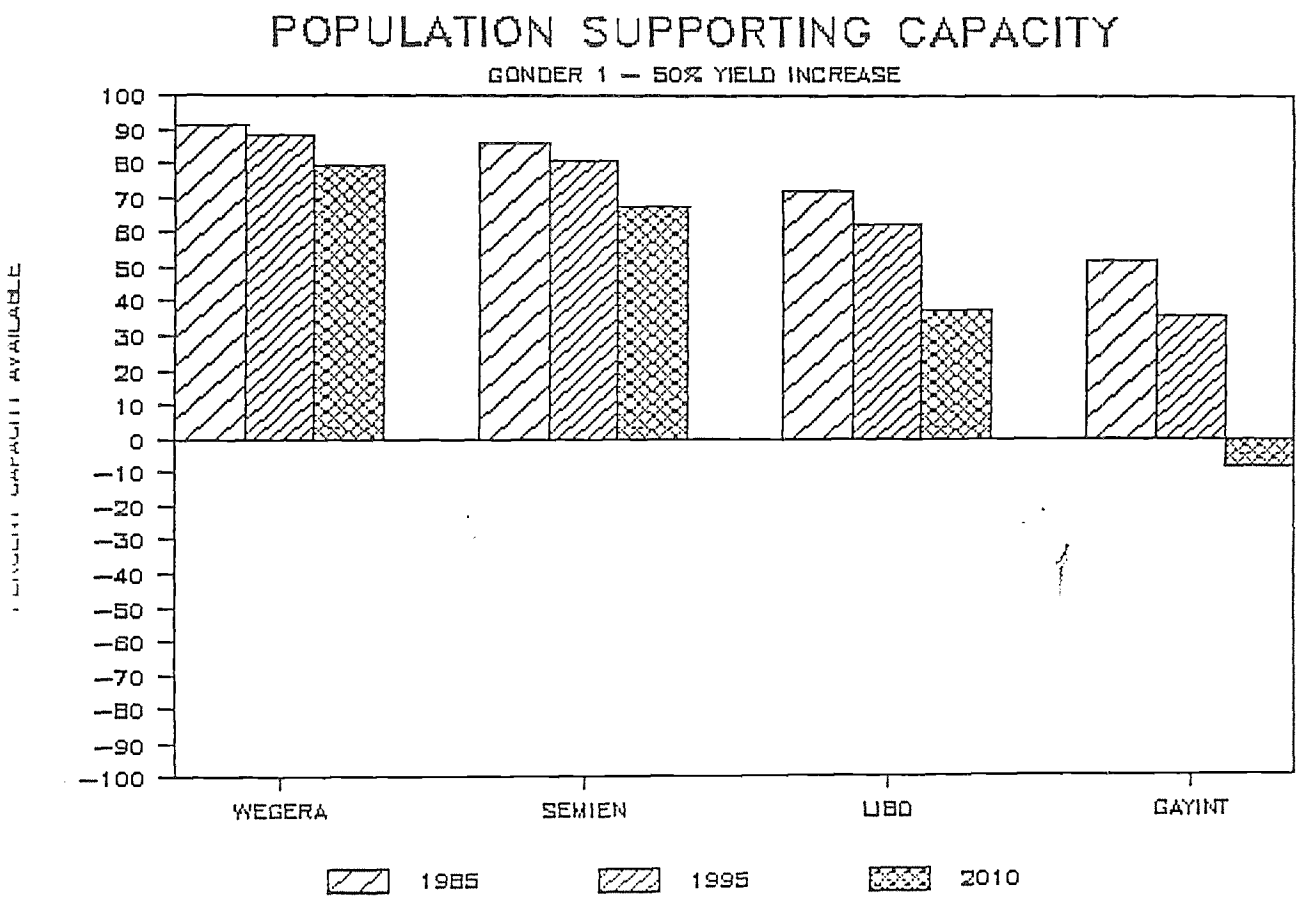
KOLA DEGA DAMOT
AGEW MIDIR
METEKEL
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 1 — 50% YIELD INCREASE
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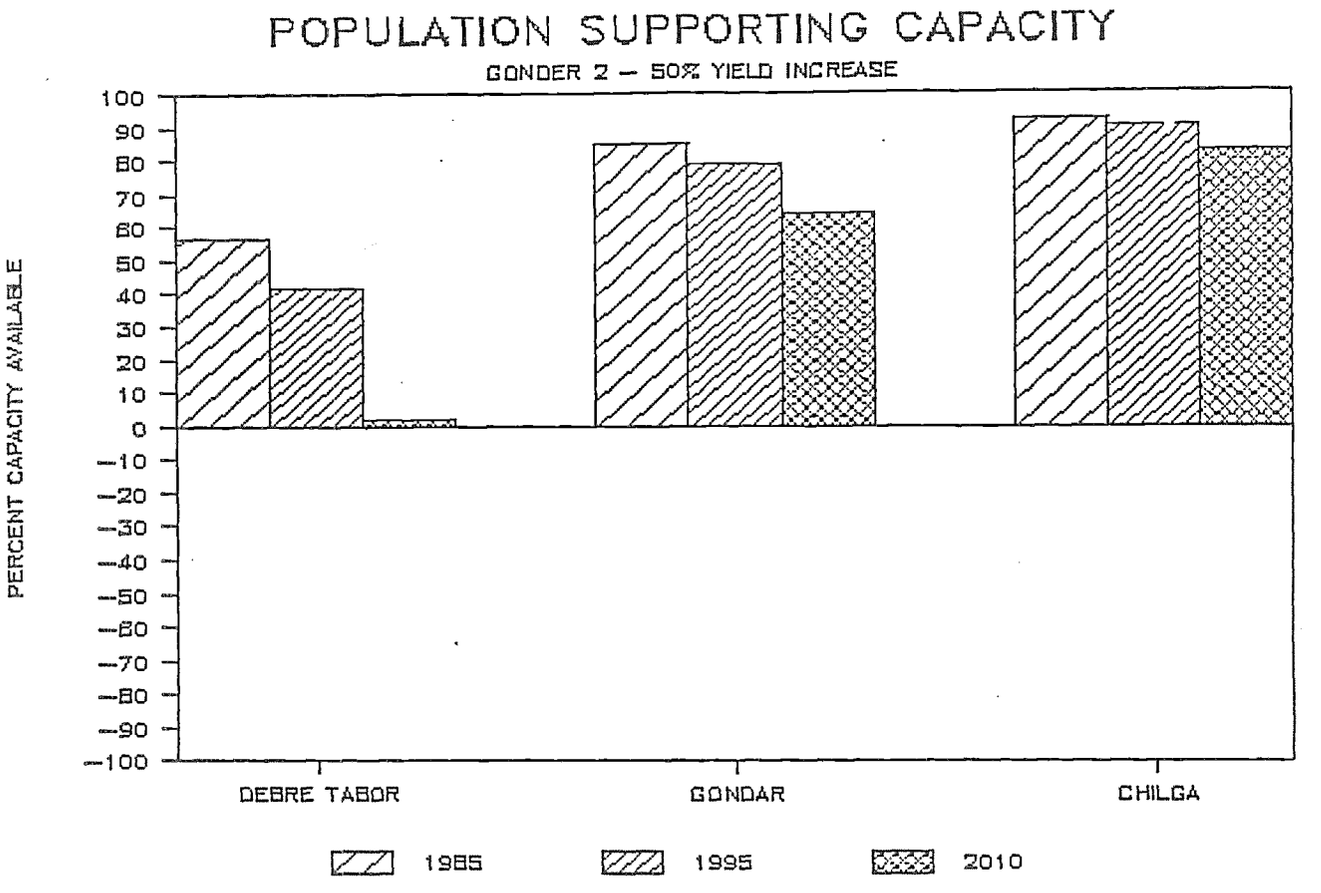
WEGERA
SEMIEN
UBO
GAYINT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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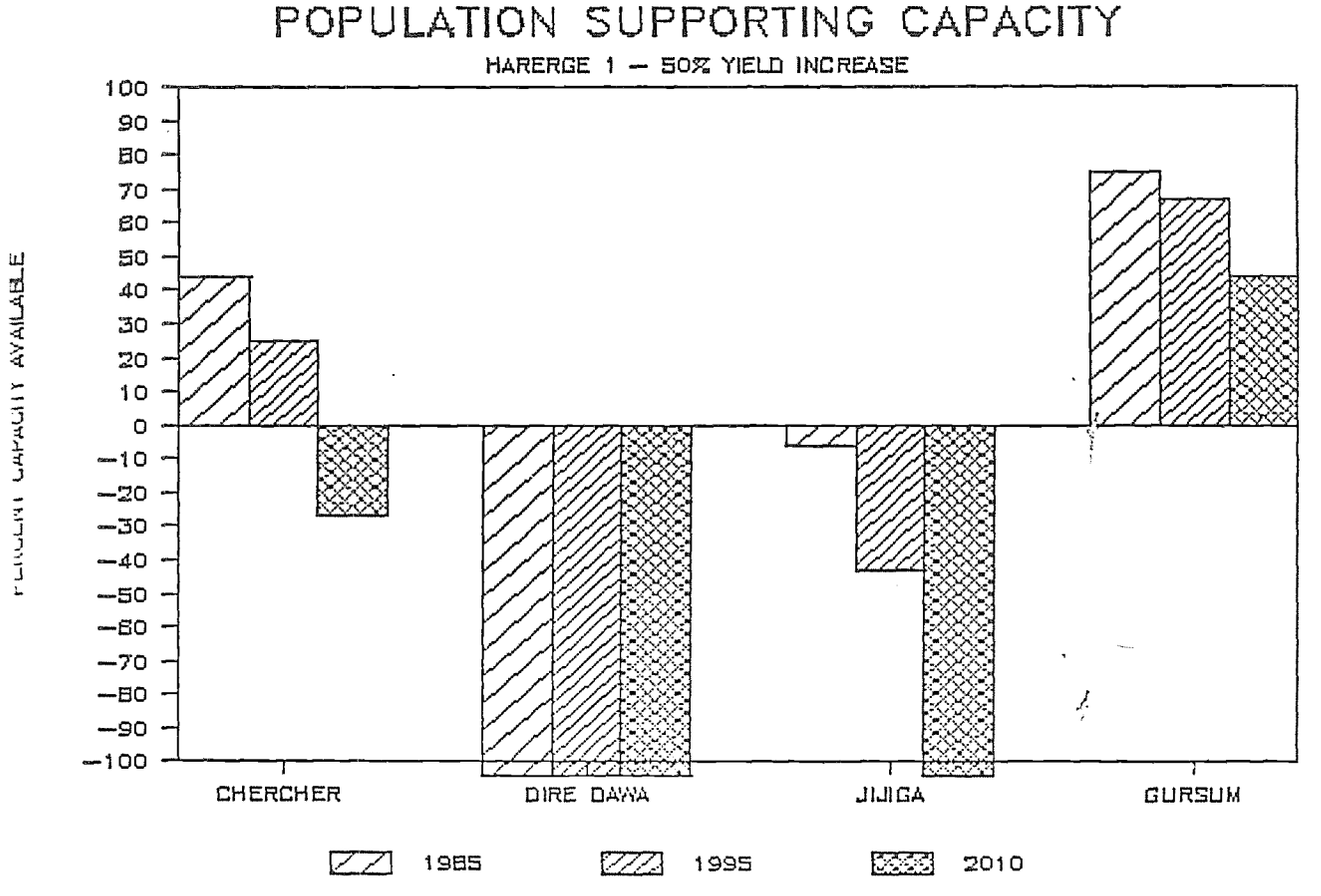
DEBRE TABOR
GONDAR
CHILGA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 1 — 50% YIELD INCREASE
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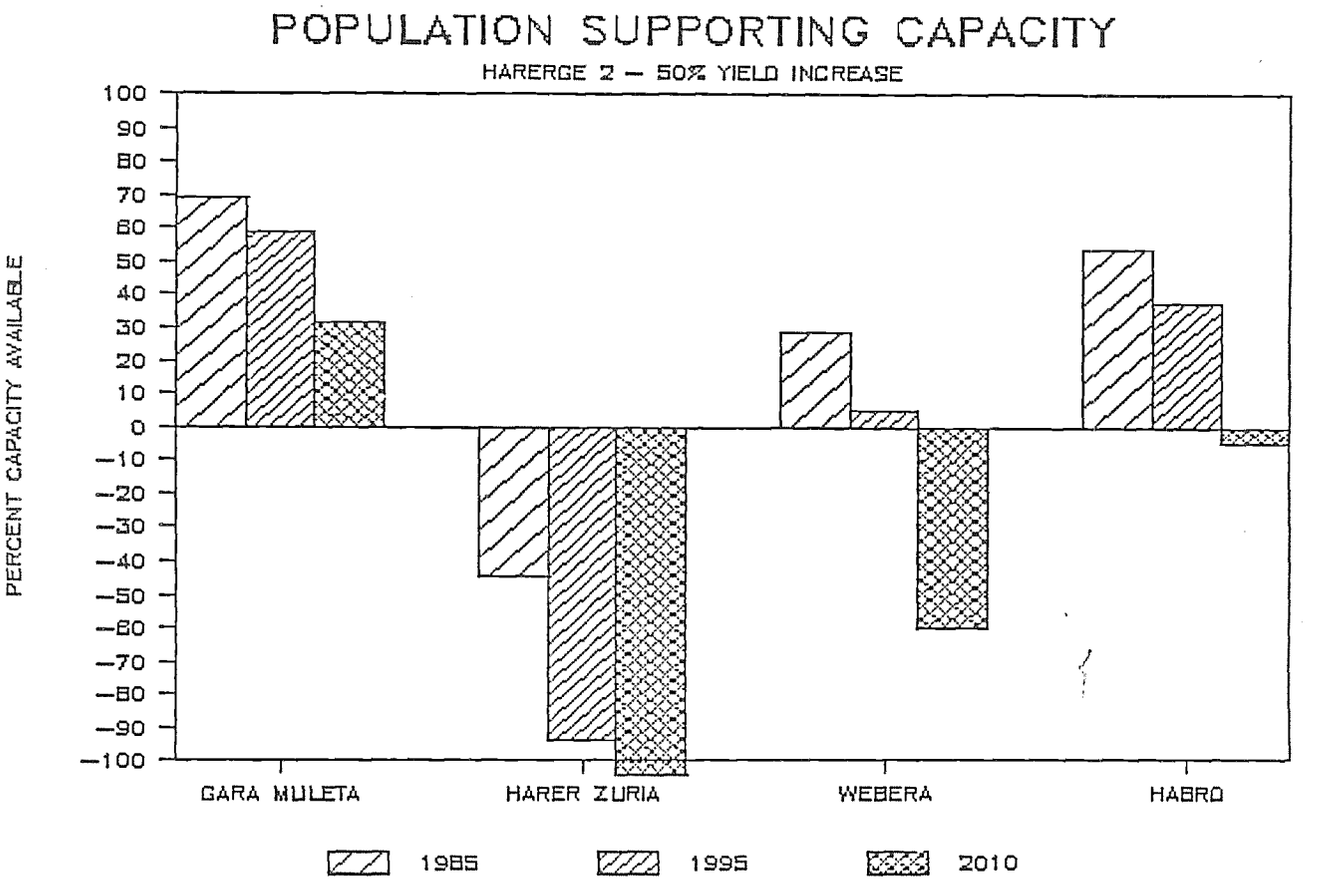
CHERCHER
DIRE DAWA
JIJIGA
GURSUM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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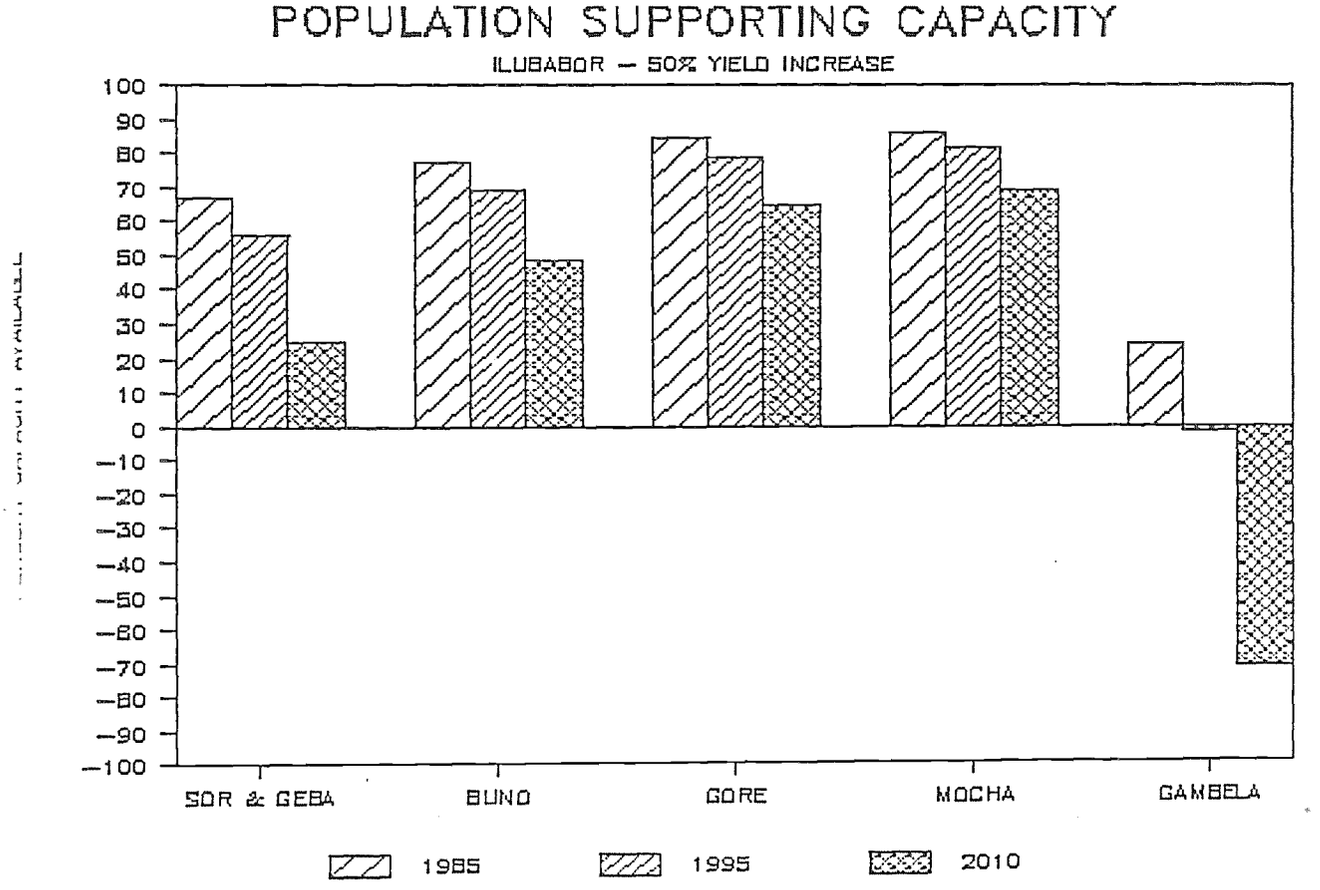
GARA MULETA
HARER ZURIA
WEBERA
HABRO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ILUBABOR — 50% YIELD INCREASE
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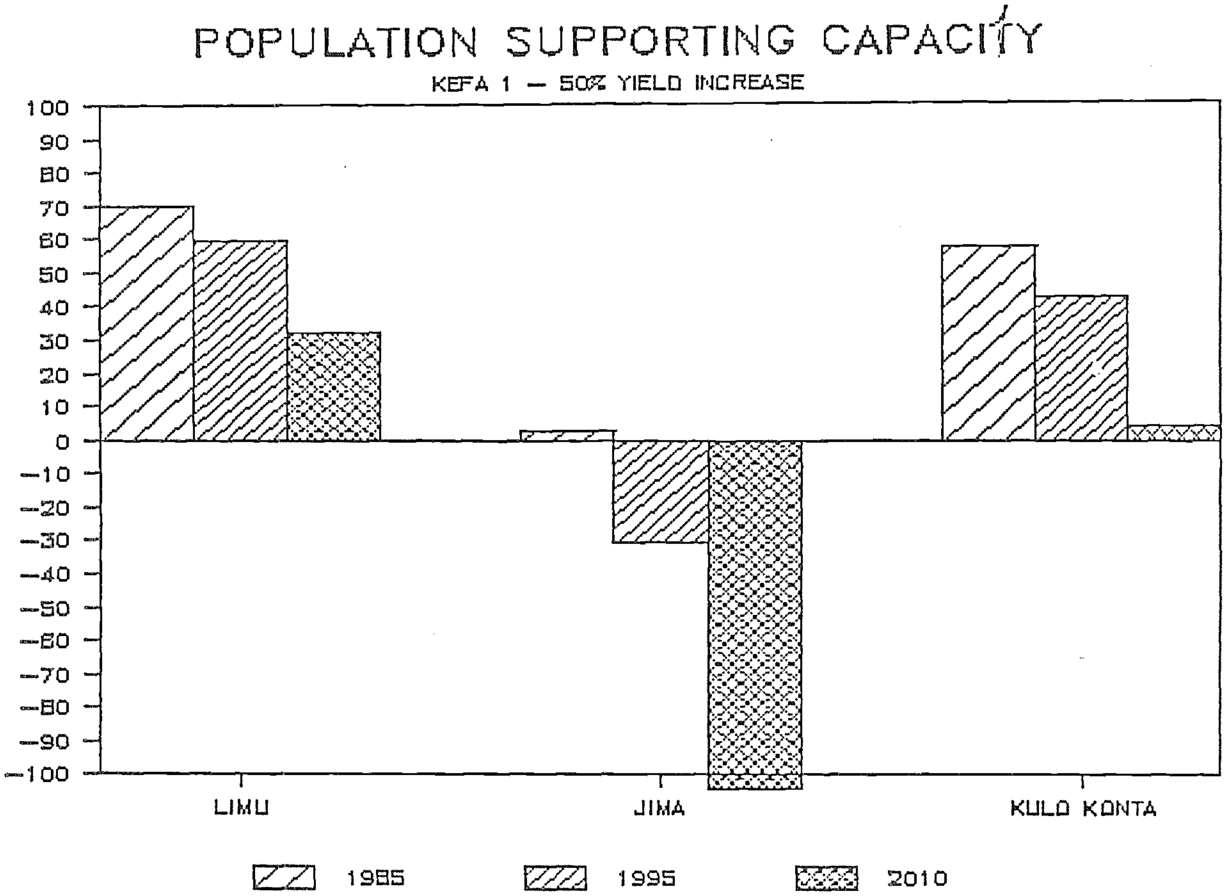
SOR & GEBA
BUNO
GORE
MOCHA
GAMBELA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 1 — 50% YIELD INCREASE
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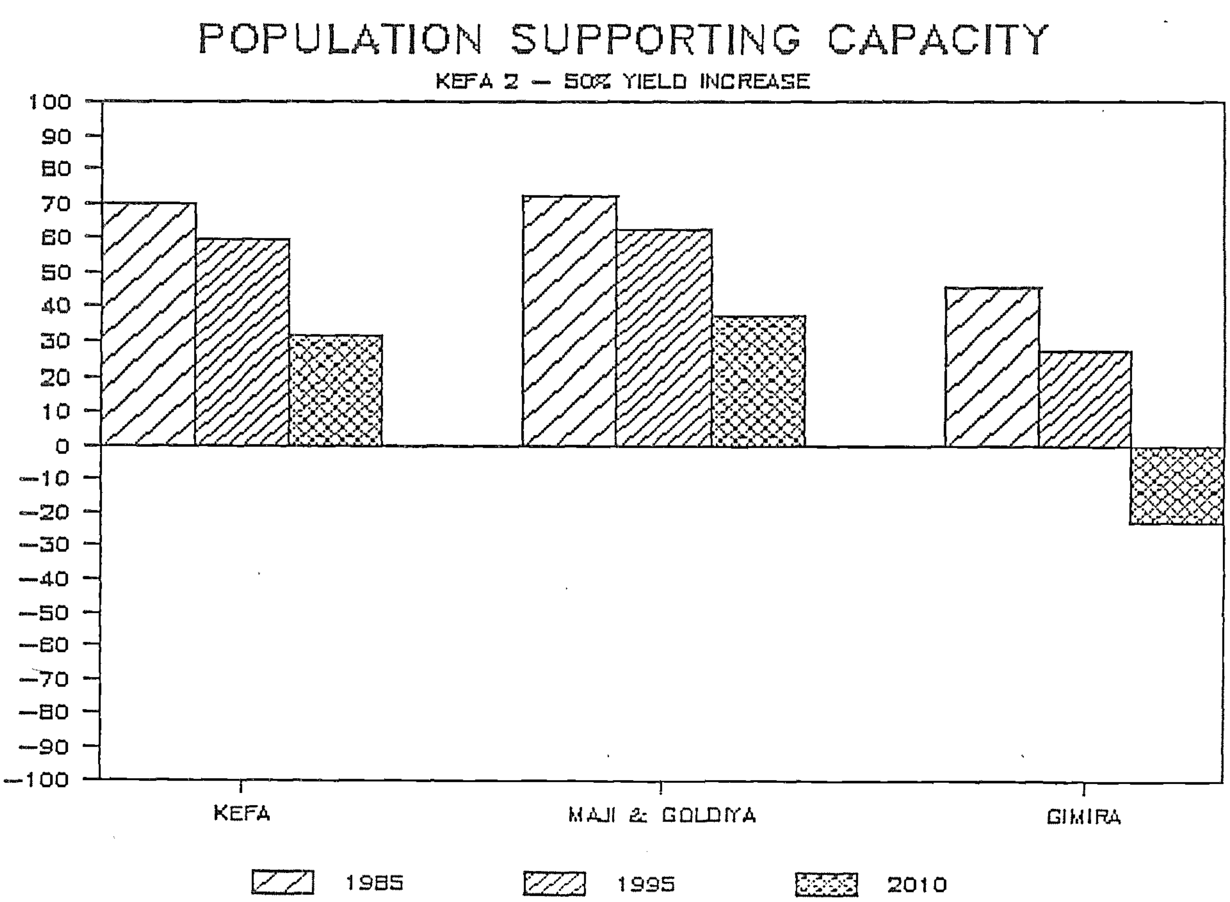
LIMU
JIMA
KULO KONTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 2 — 50% YIELD INCREASE
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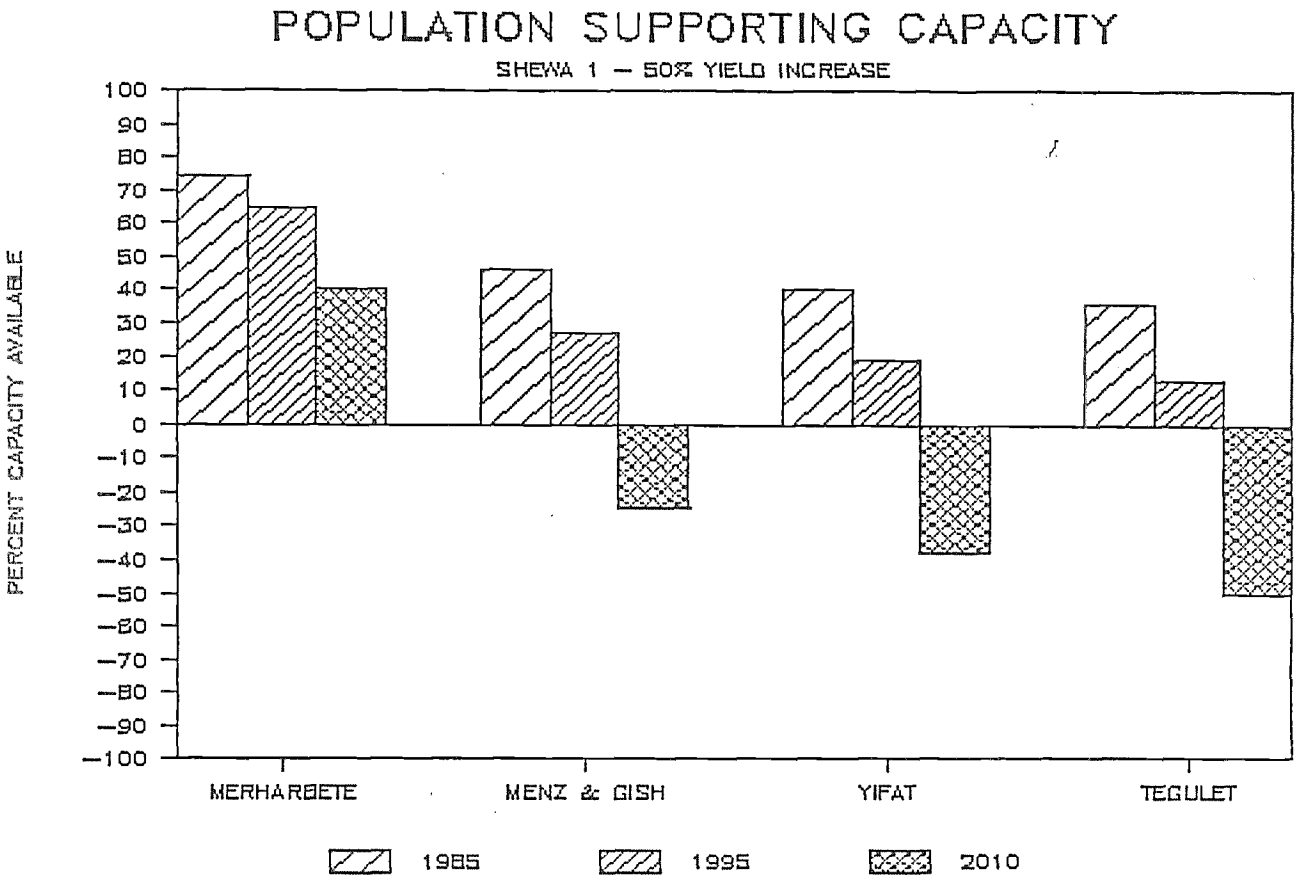
KEFA
MAJI & GOLDIYA
GIMIRA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 1 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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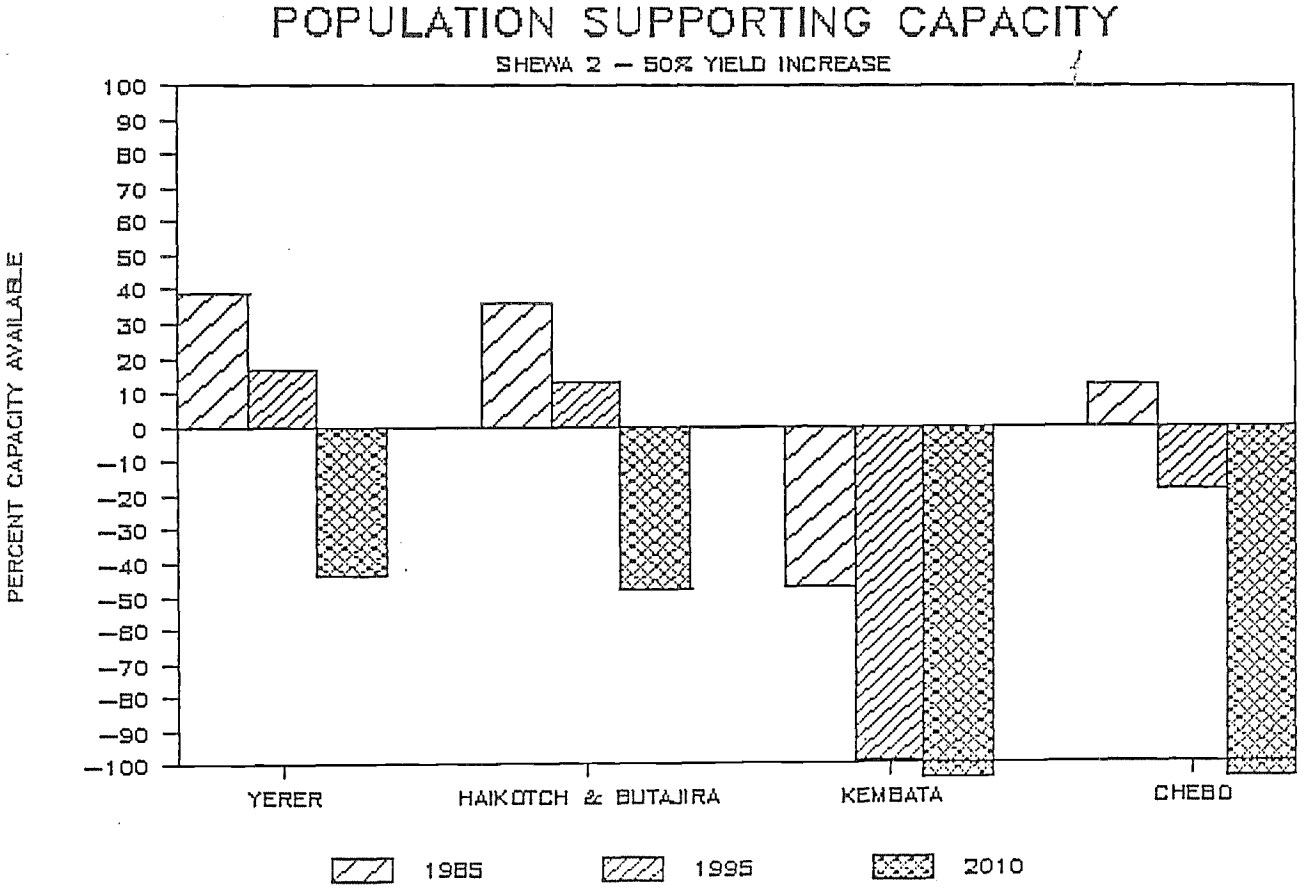
MERHABETE
MENZ & GISH
YIFAT
TEGULET
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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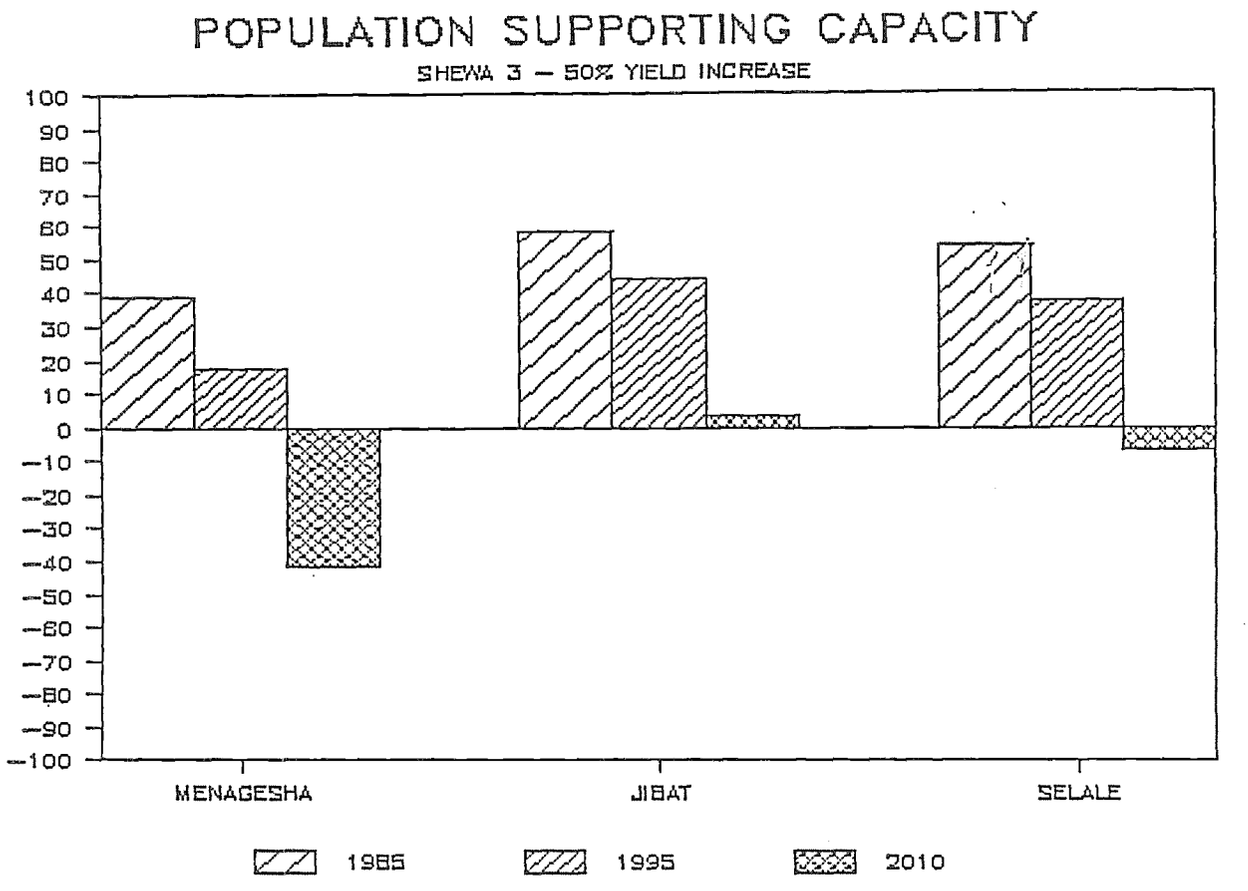
YERER
HAIKOTCH & BUTAJIRA
KEMBATA
CHEBO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 3 — 50% YIELD INCREASE
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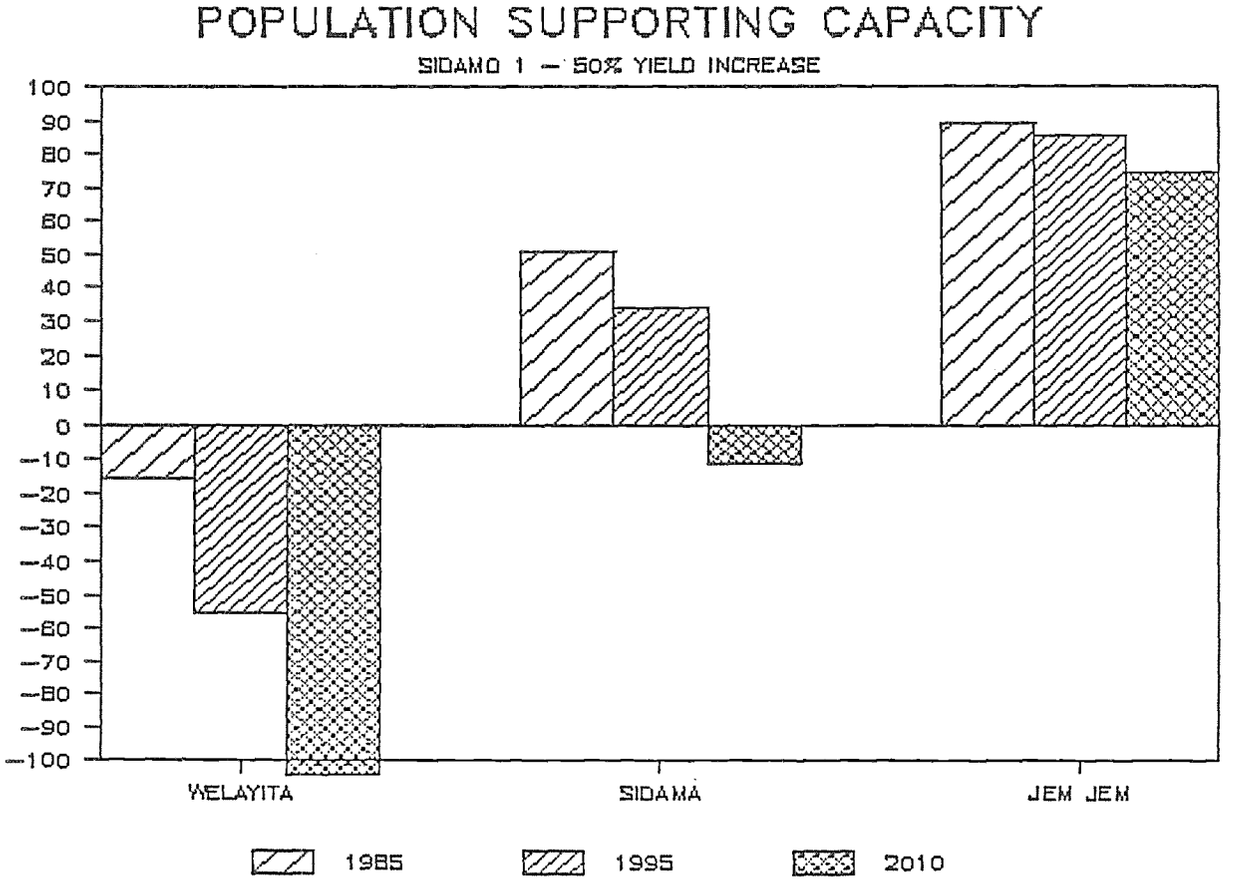
MENAGESHA
JIBAT
SELALE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 1 — 50% YIELD INCREASE
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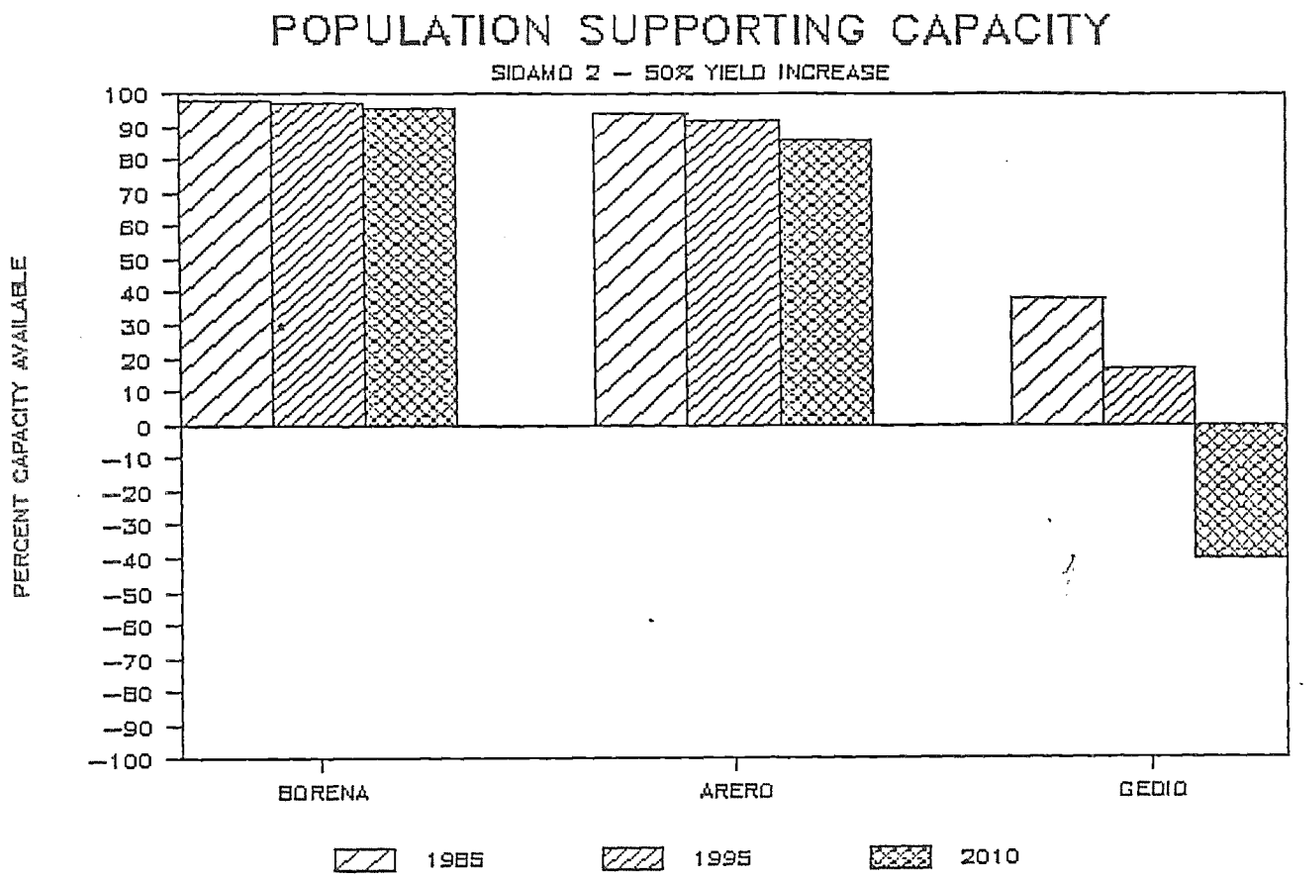
WELAYITA
SIDAMA
JEM JEM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SIDAMO 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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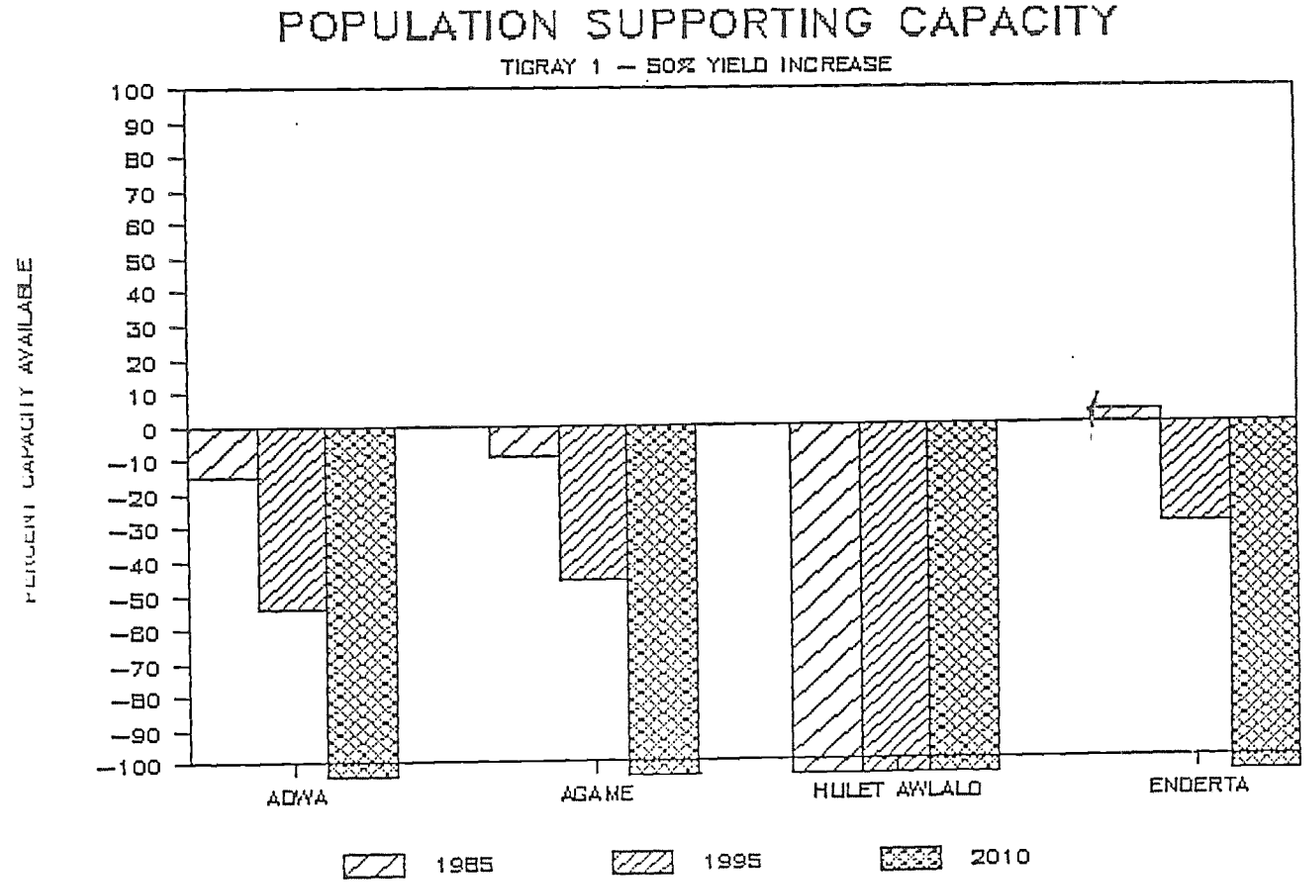
BORENA
ARERO
GEDIO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 1 — 50% YIELD INCREASE
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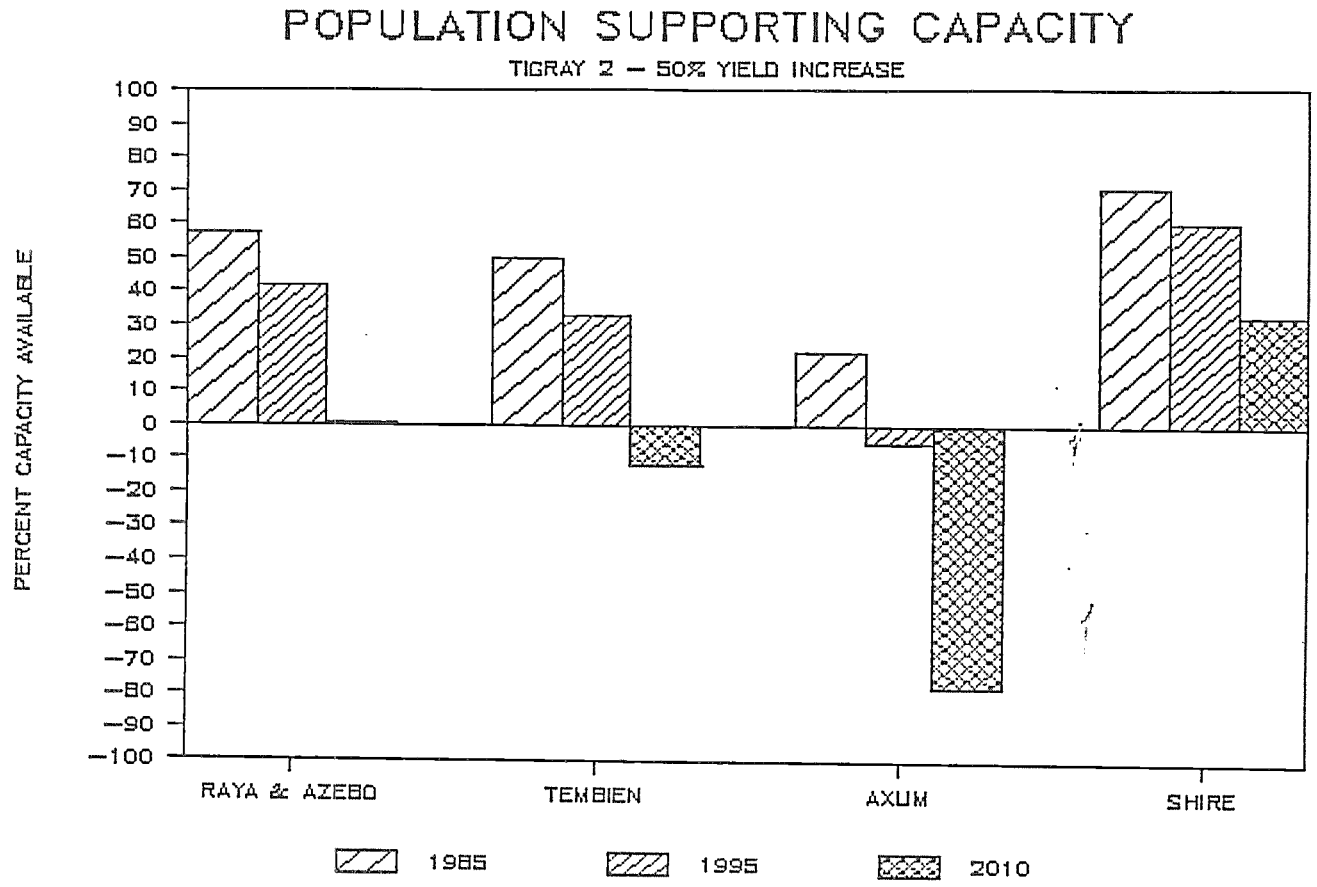
ADWA
AGAME
HULET AWLALO
ENDERTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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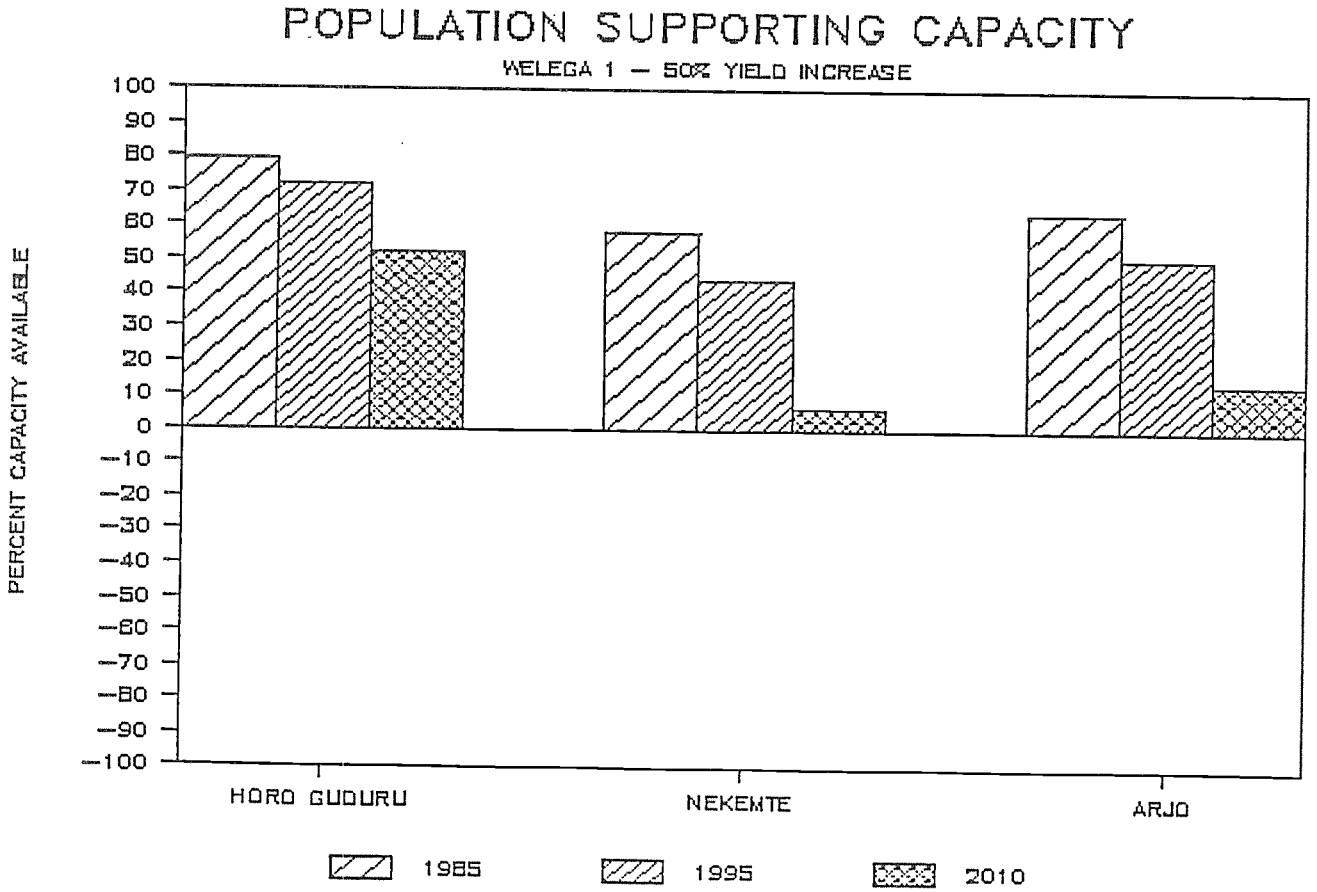
RAYA & AZEBO
TEMBIEN
AXUM
SHIRE
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 1 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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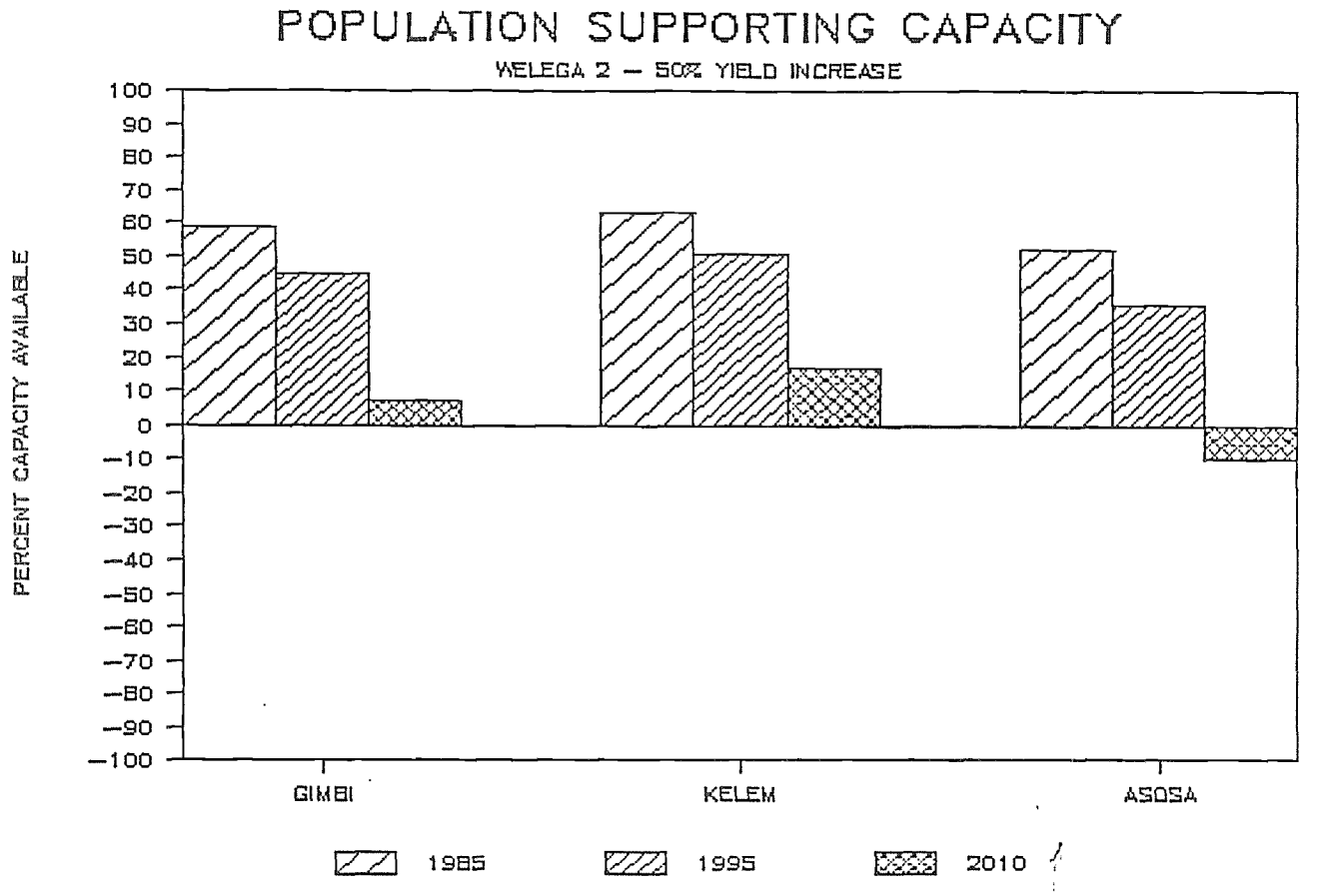
HORO GUDURU
NEKEMTE
ARJO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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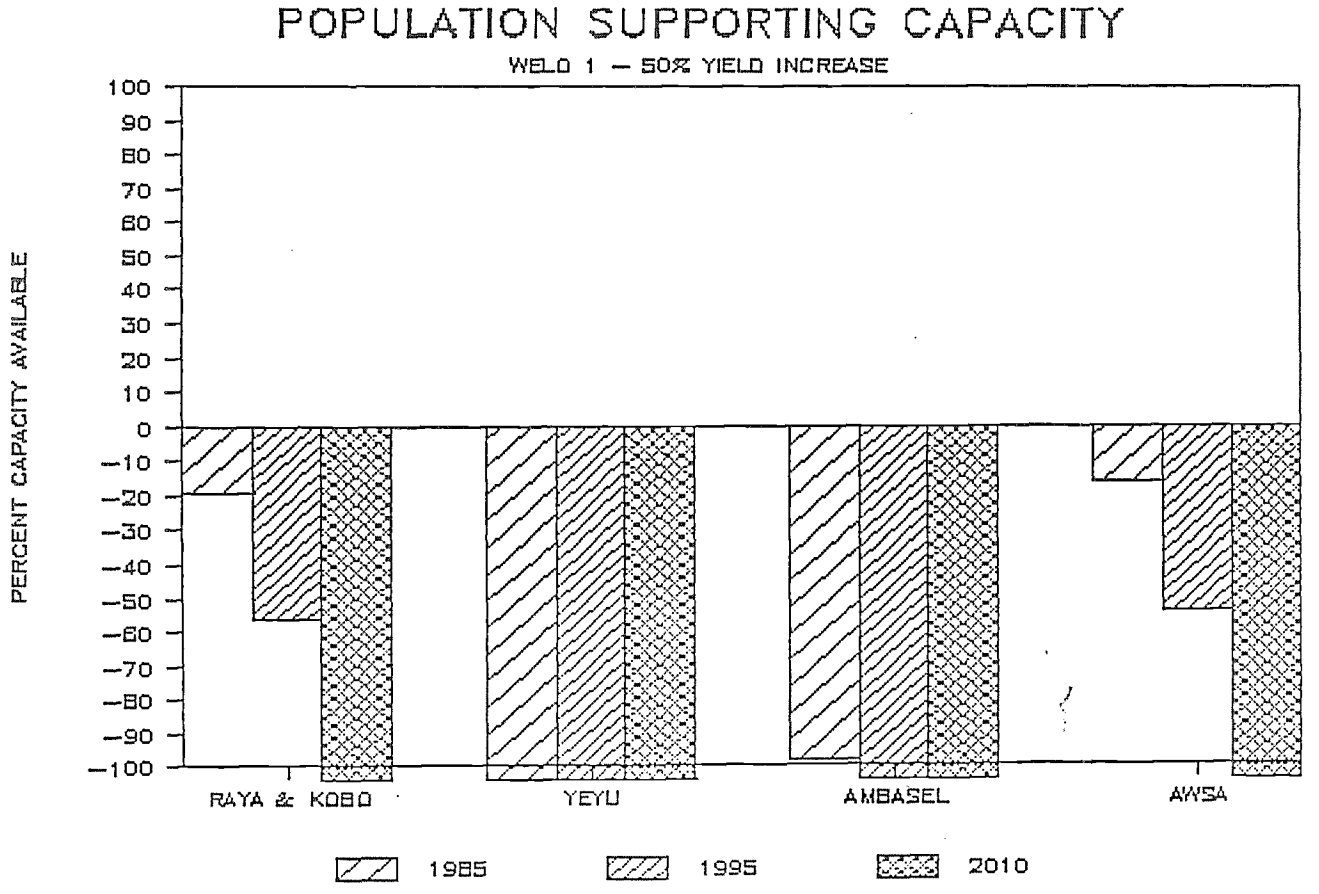
GIMBI
KELEM
ASOSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 1 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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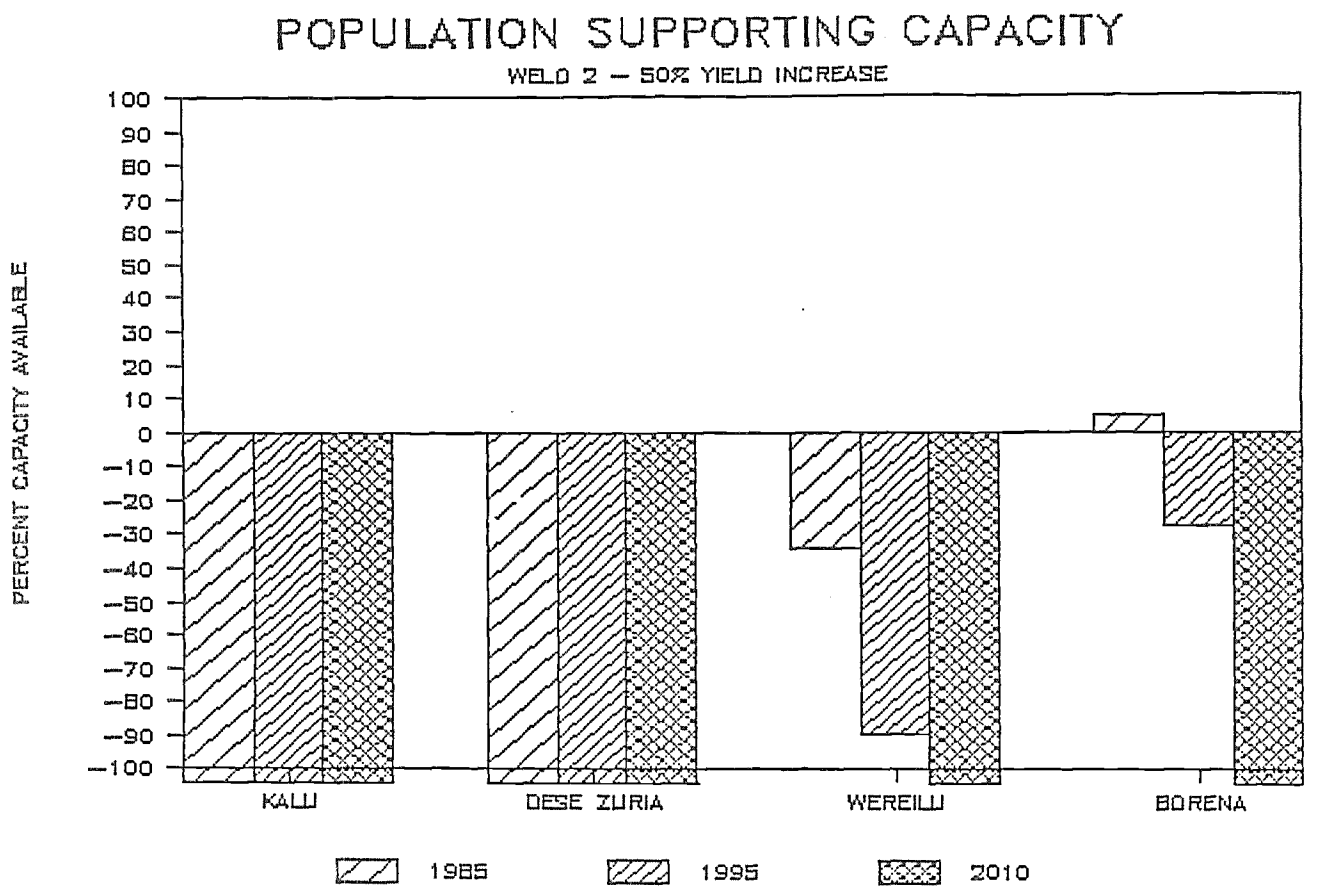
RAYA & KOBO
YEYU
AMBASEL
AWSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 2 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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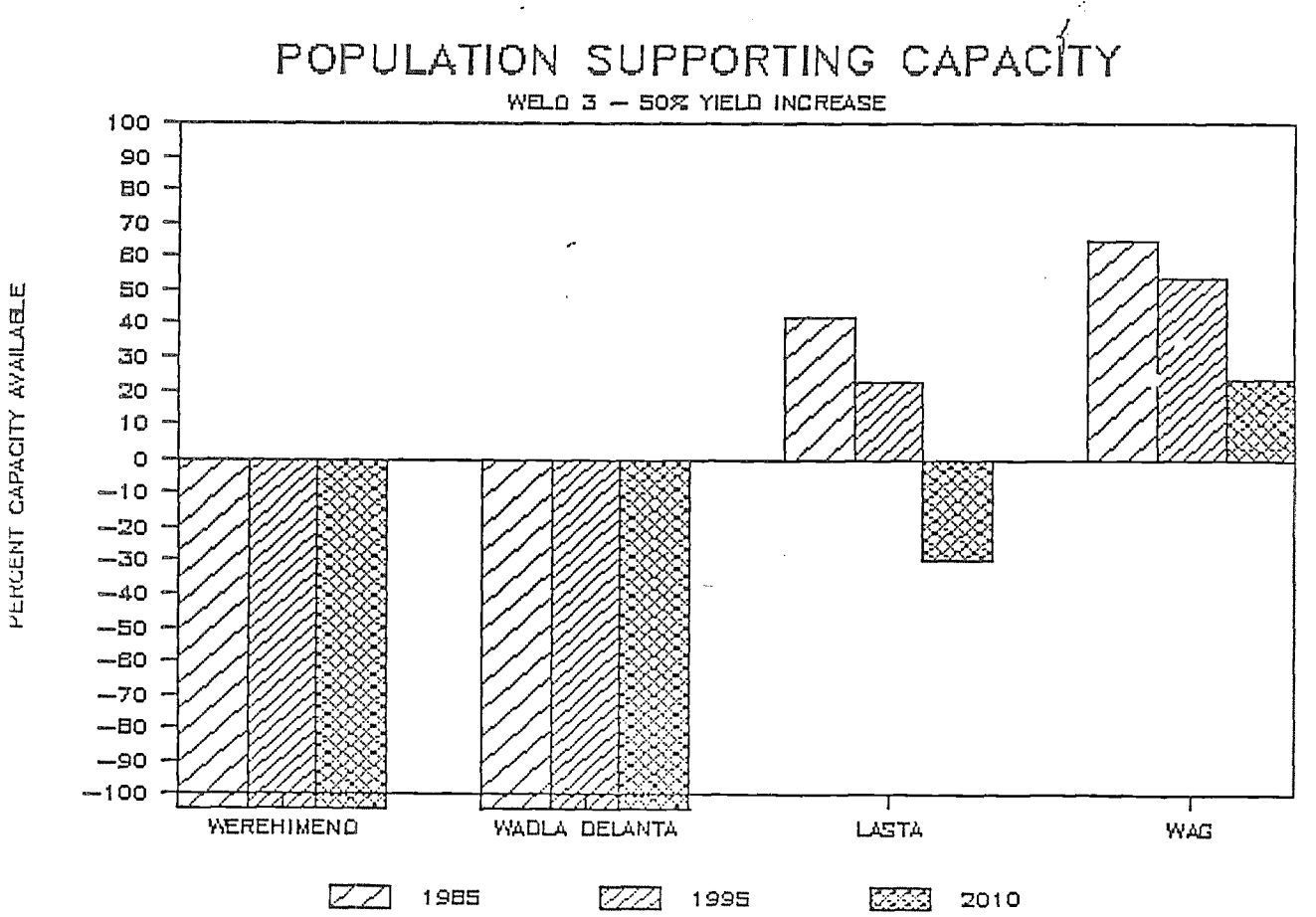
KALU
DESE ZURIA
WEREILU
BORENA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 3 — 50% YIELD INCREASE
PERCENT CAPACITY AVAILABLE
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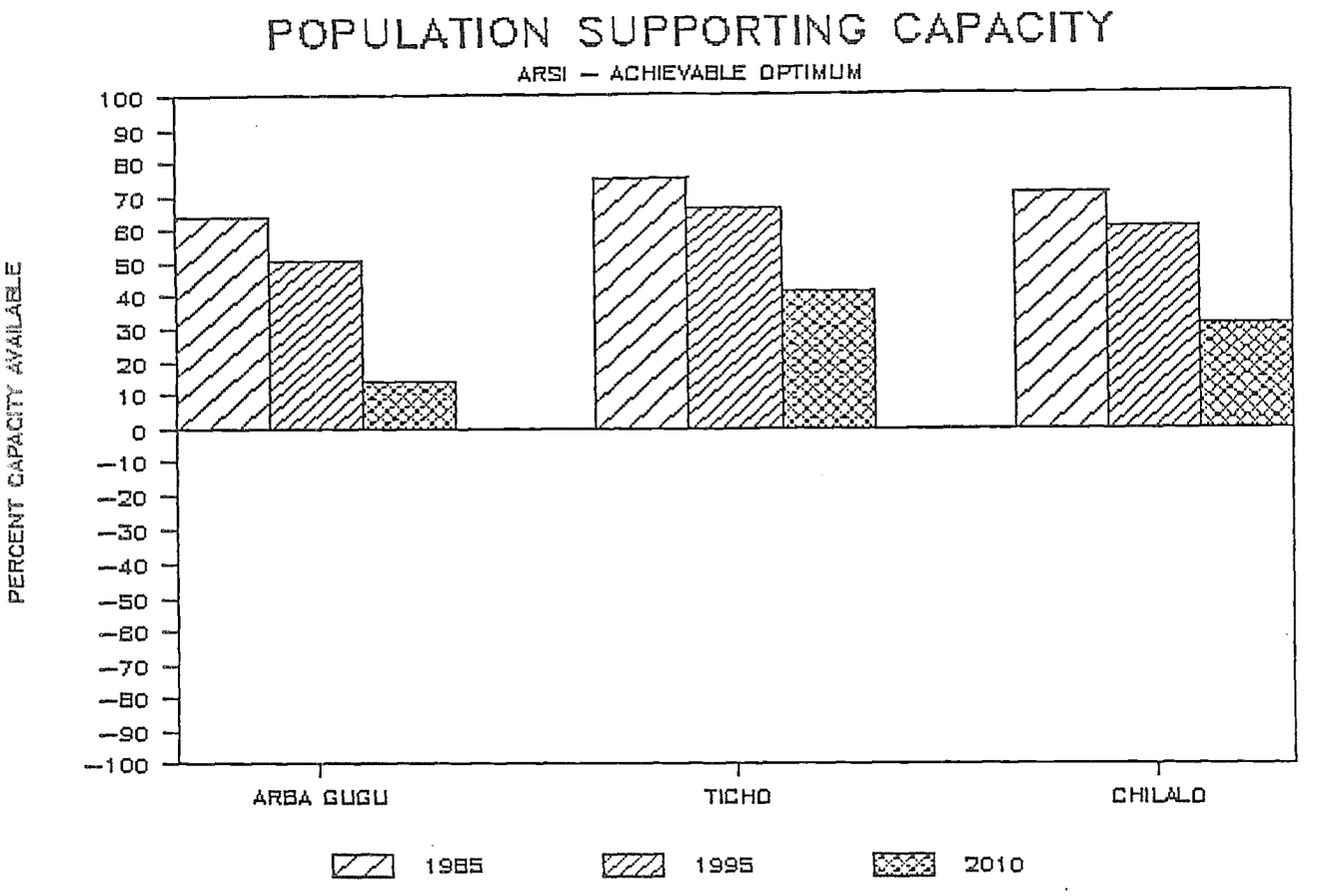
WEREHIMENO
WADLA DELANTA
LASTA
WAG
1985
1995
2010

POPULATION SUPPORTING CAPACITY

ACHIEVABLE OPTIMUM


POPULATION SUPPORTING CAPACITY
ARSI — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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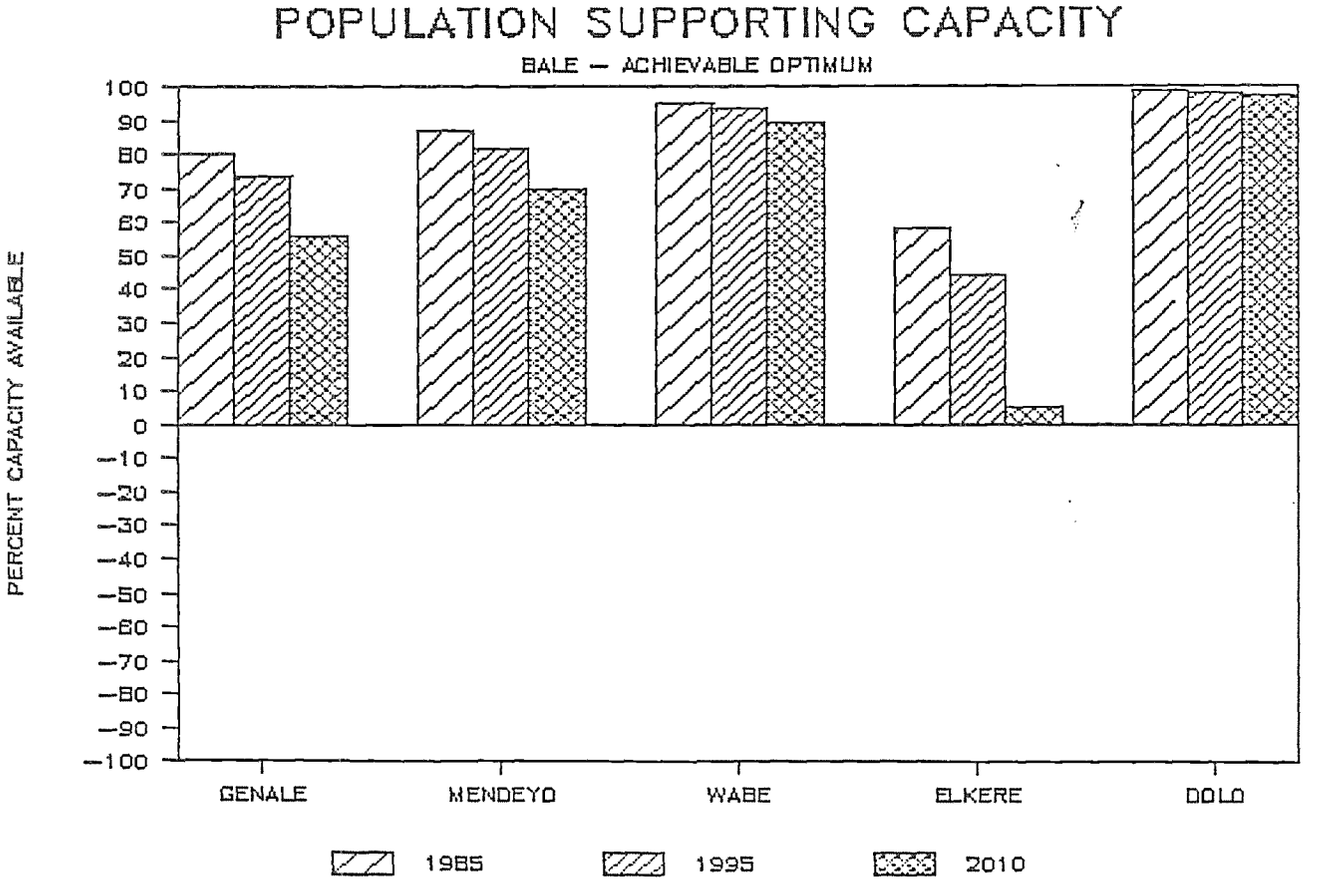
ARBA GUGU
TICHO
CHILALO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
BALE — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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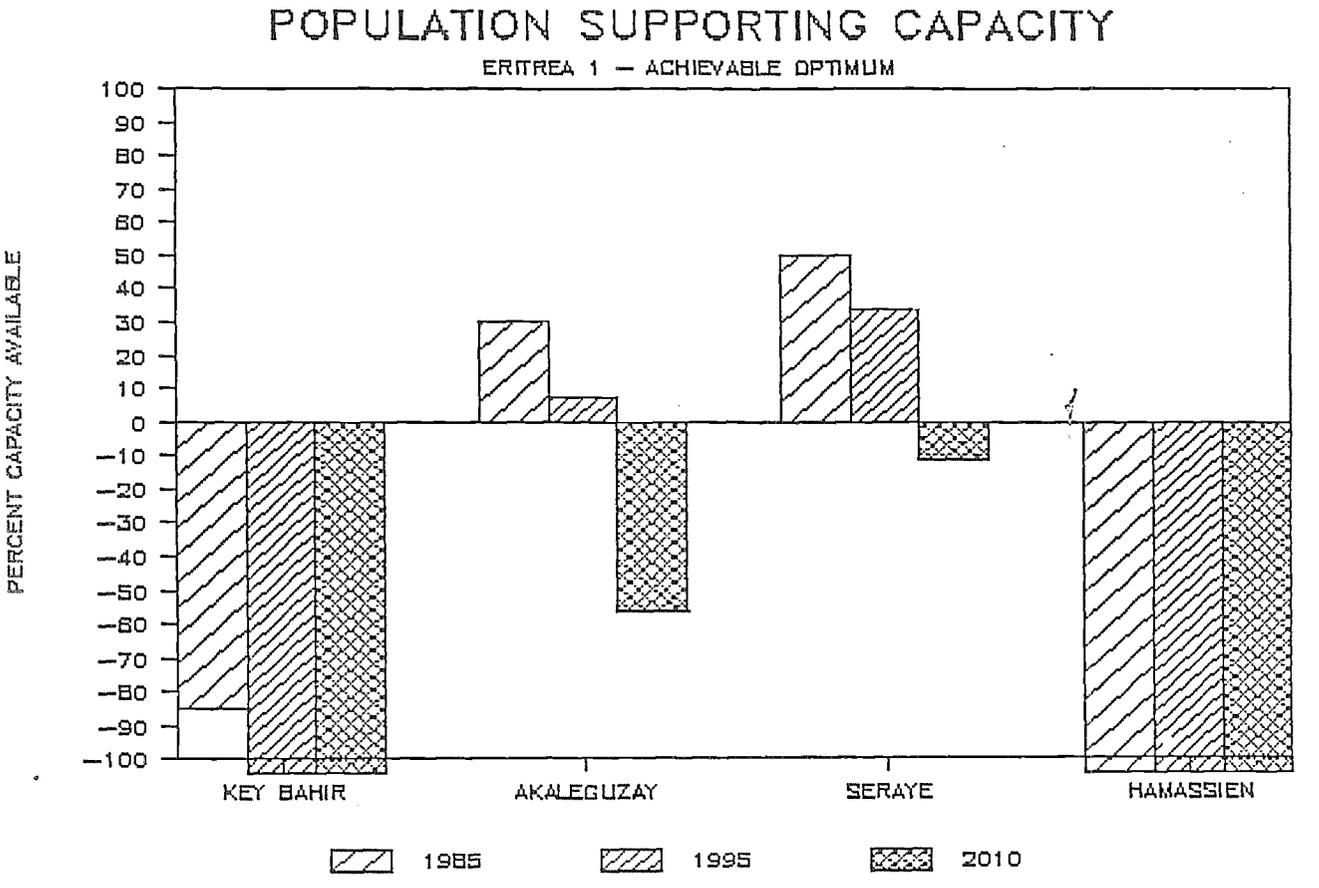
GENALE
MENDEYO
WABE
ELKERE
DOLO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 1 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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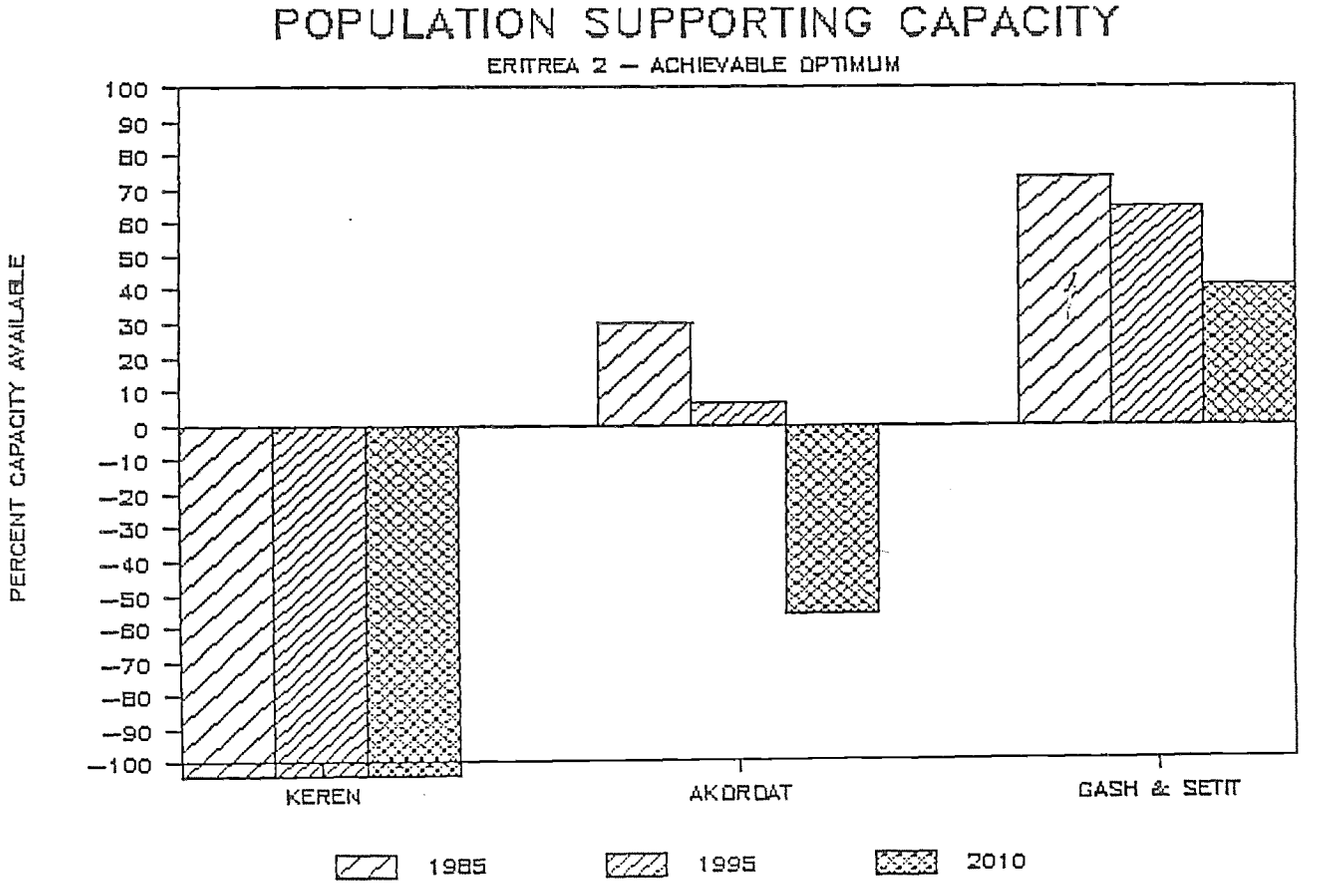
KEY BAHIR
AKALEGUZAY
SERAYE
HAMASSIEN
1985
1995
2010


POPULATION SUPPORTING CAPACITY
ERITREA 2 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
100
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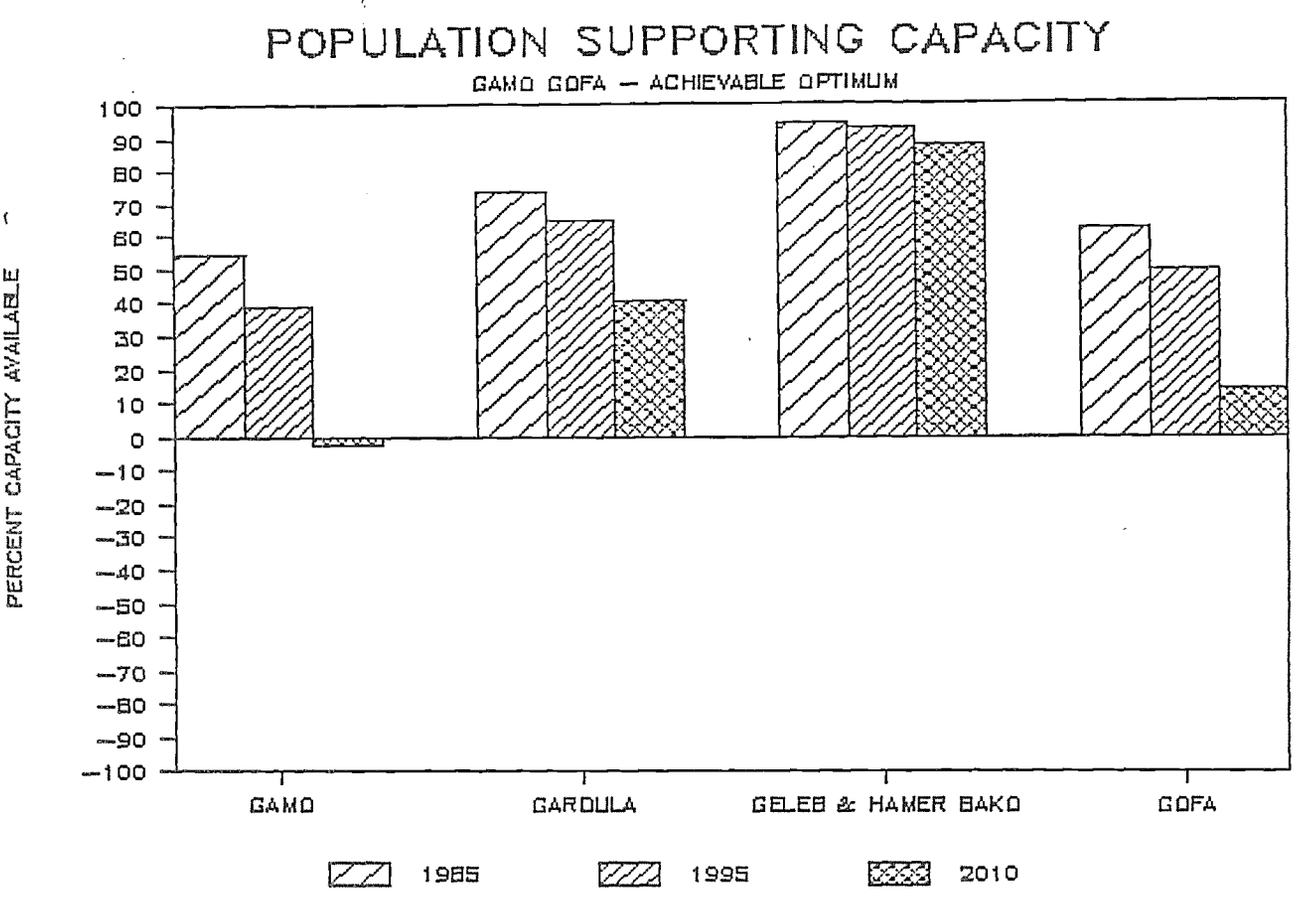
KEREN
AKORDAT
GASH & SETIT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GAMO GOFA — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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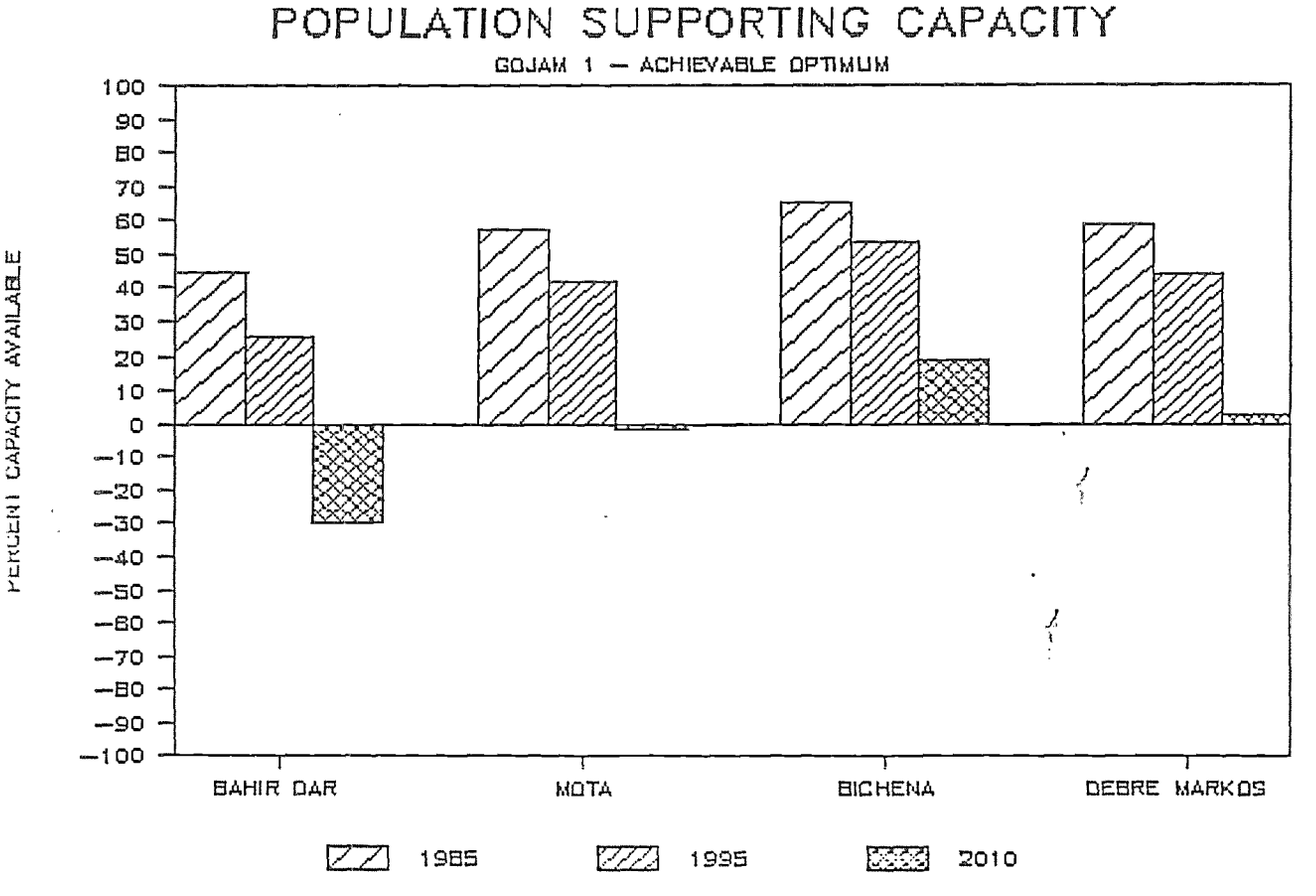
GAMO
GARDULA
GELEB & HAMER BAKO
GOFA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GOJAM 1 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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BAHIR DAR
MOTA
BICHENA
DEBRE MARKOS
1985
1995
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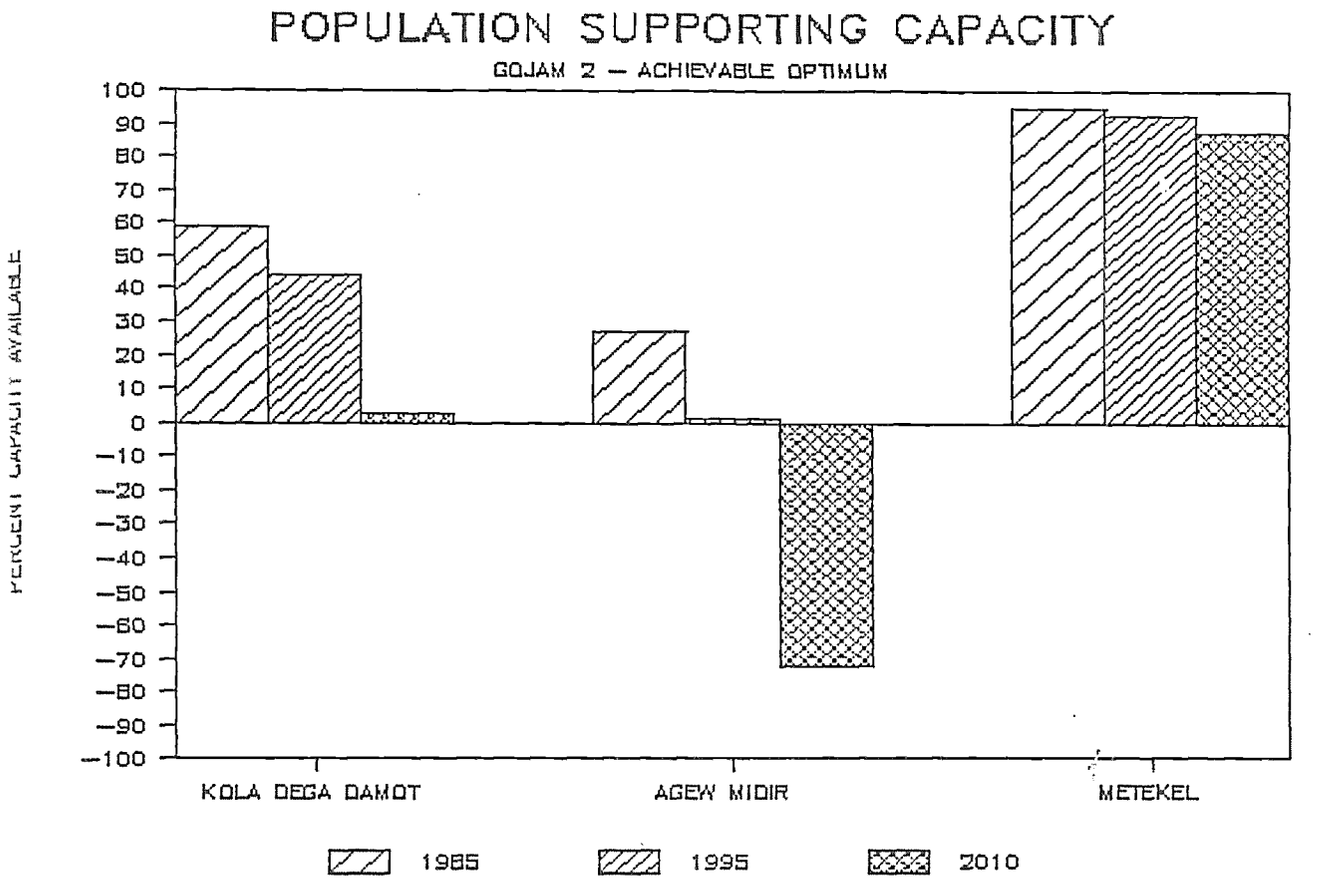
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GOJAM 2 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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KOLA DEGA DAMOT
AGEW MIDIR
METEKEL
1985
1995
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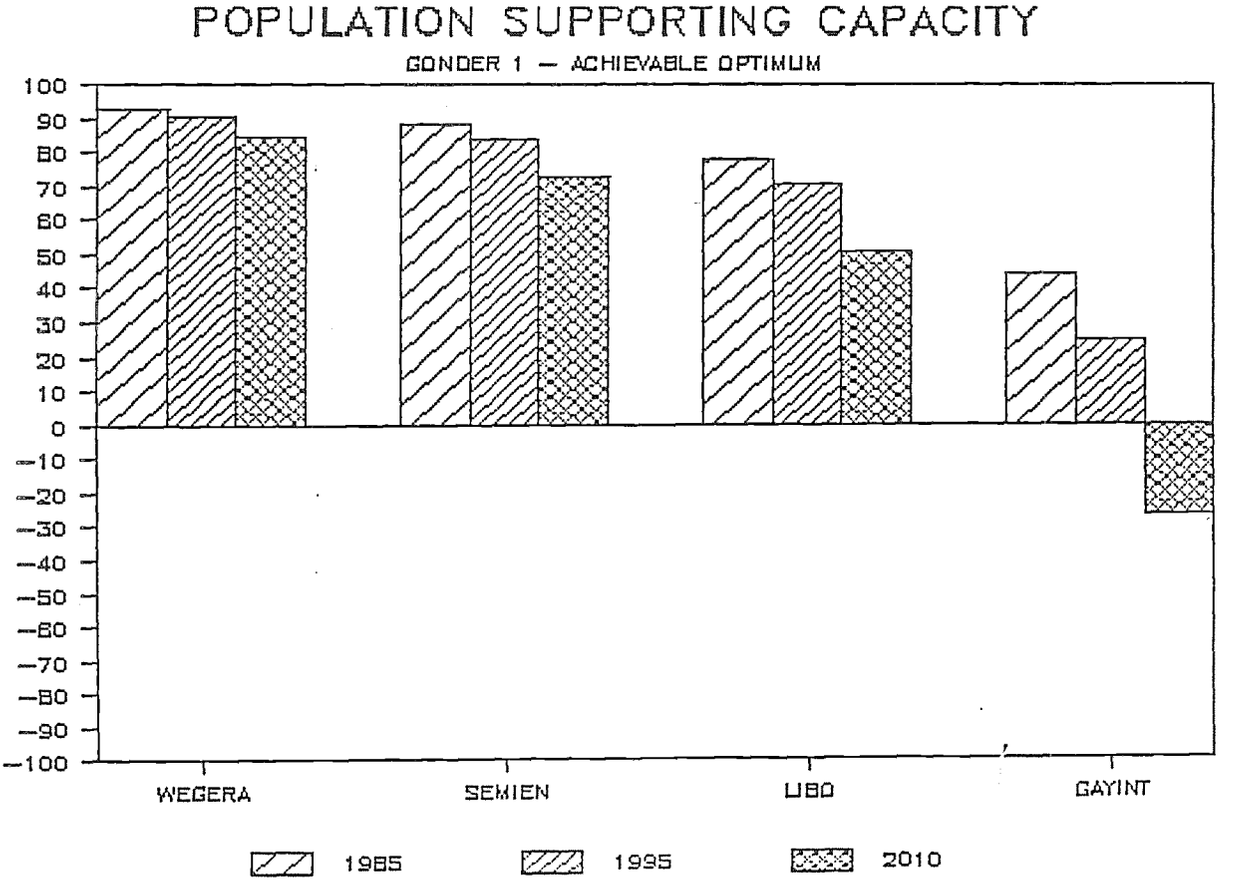
POPULATION SUPPORTING CAPACITY
GONDER 1 — ACHIEVABLE OPTIMUM
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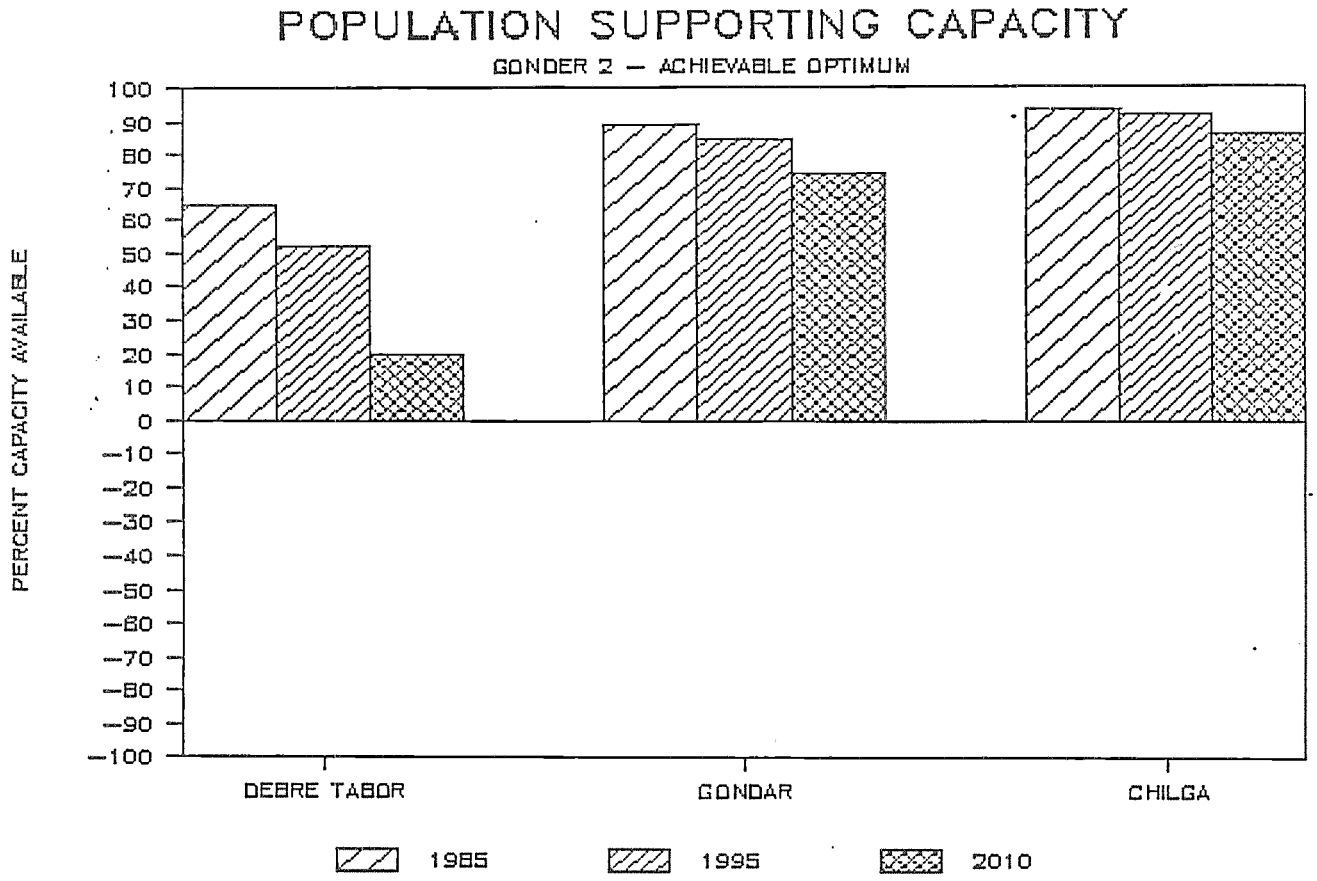
WEGERA
SEMIEN
LIBO
GAYINT
1985
1995
2010


POPULATION SUPPORTING CAPACITY
GONDER 2 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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DEBRE TABOR
GONDAR
CHILGA
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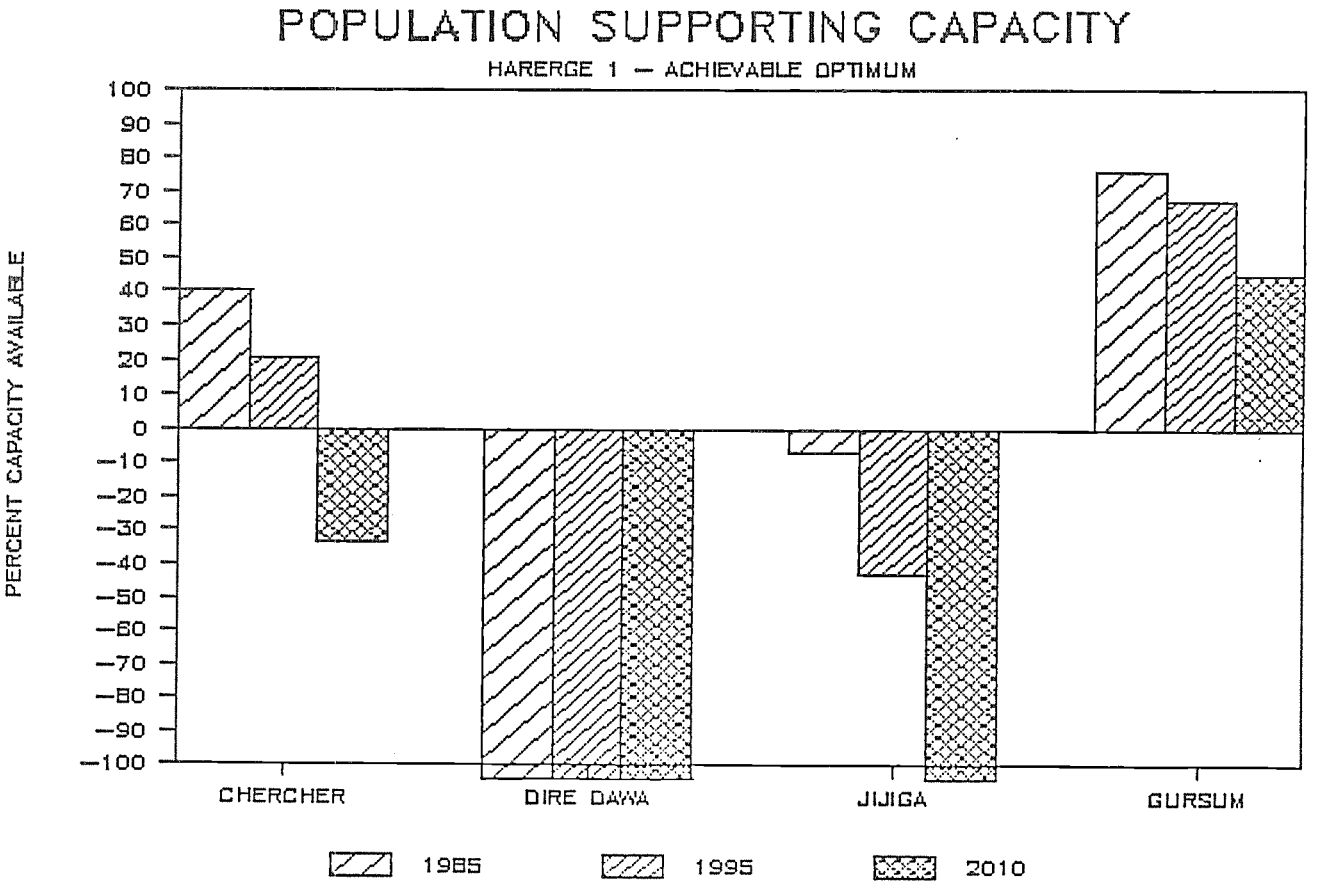
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 1 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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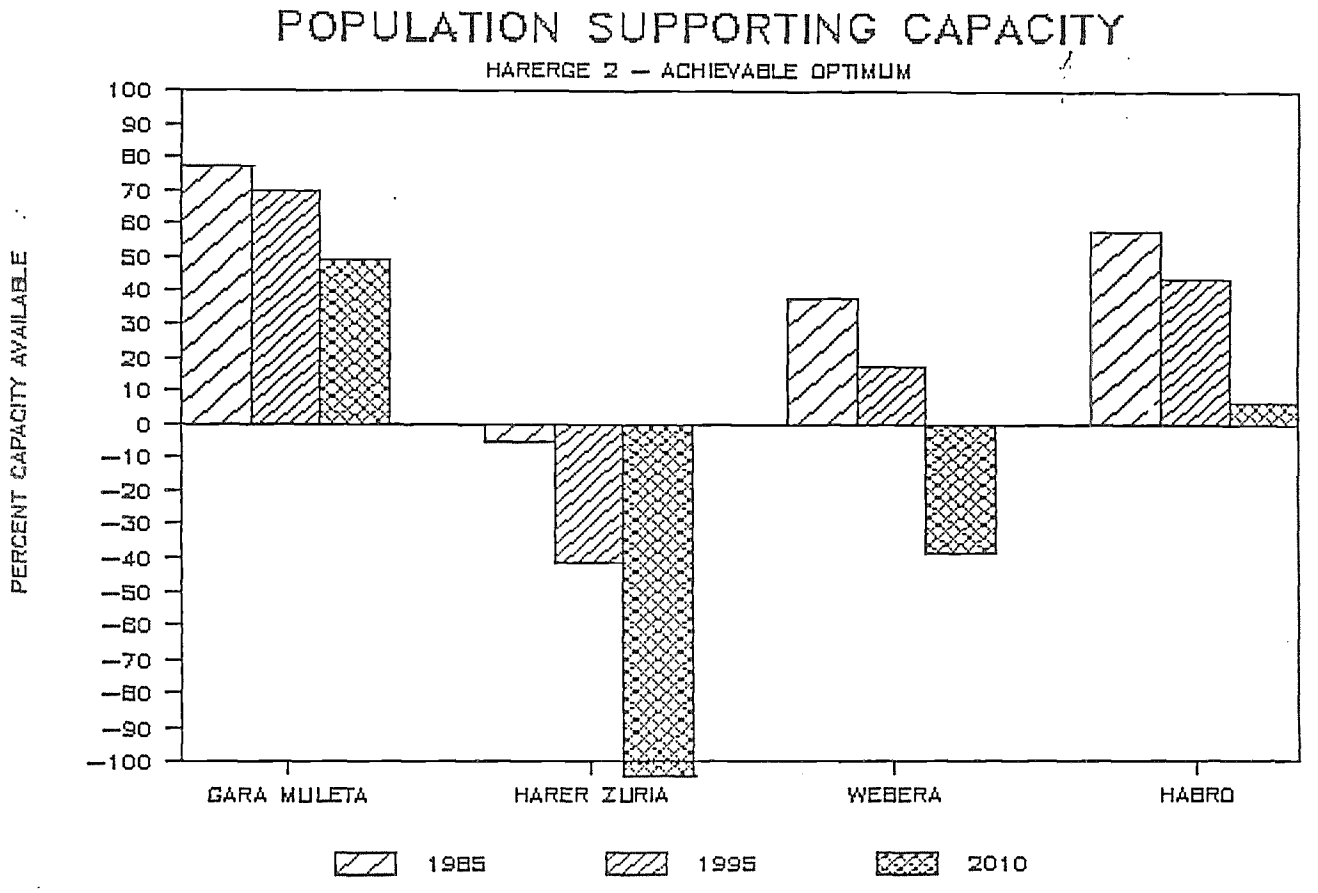
-100
CHERCHER
DIRE DAWA
JIJIGA
GURSUM
1985
1995
2010


POPULATION SUPPORTING CAPACITY
HARERGE 2 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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GARA MULETA
HARER ZURIA
WEBERA
HABRO
1985
1995
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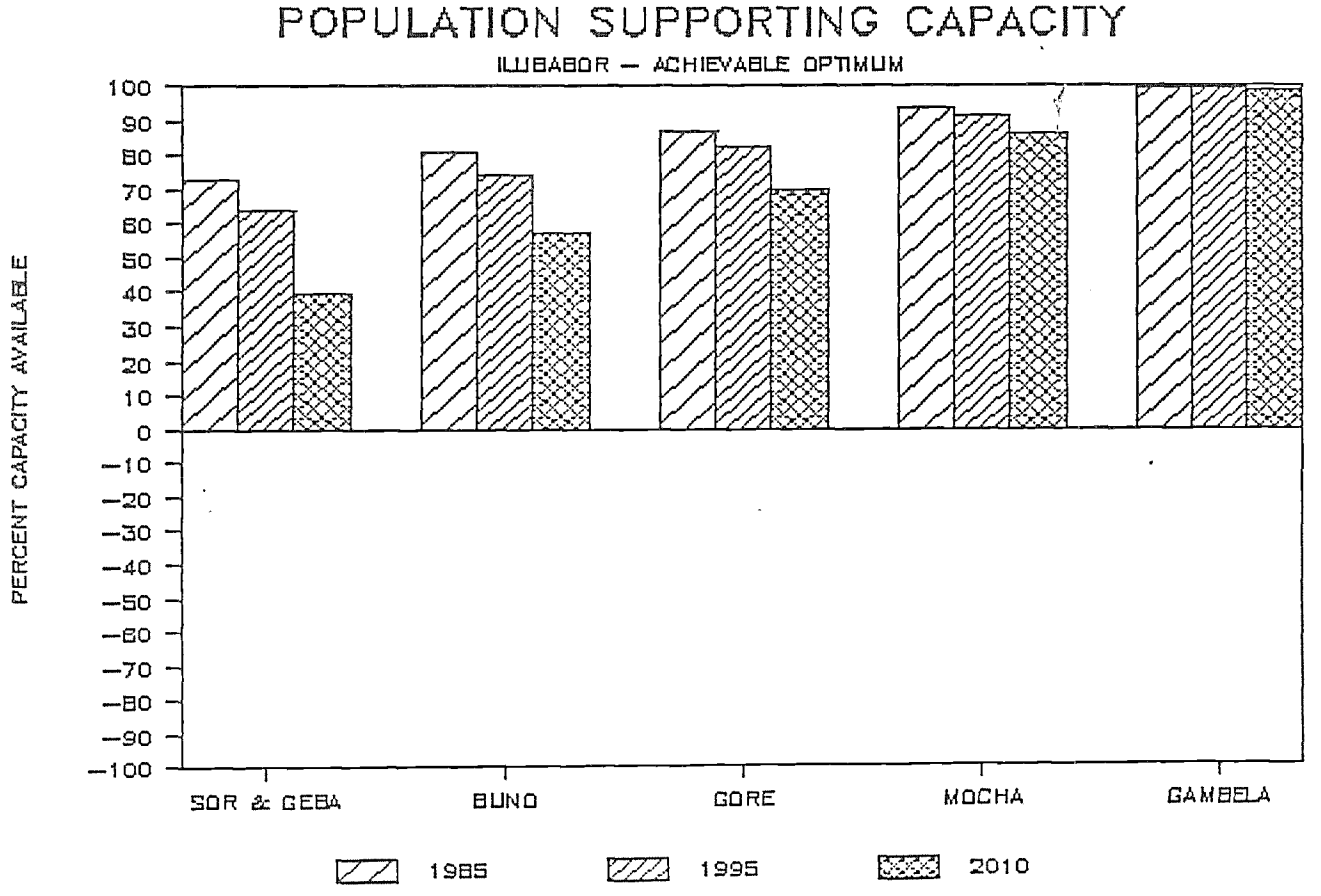
POPULATION SUPPORTING CAPACITY
ILUBABOR — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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SOR & GEBA
BUNO
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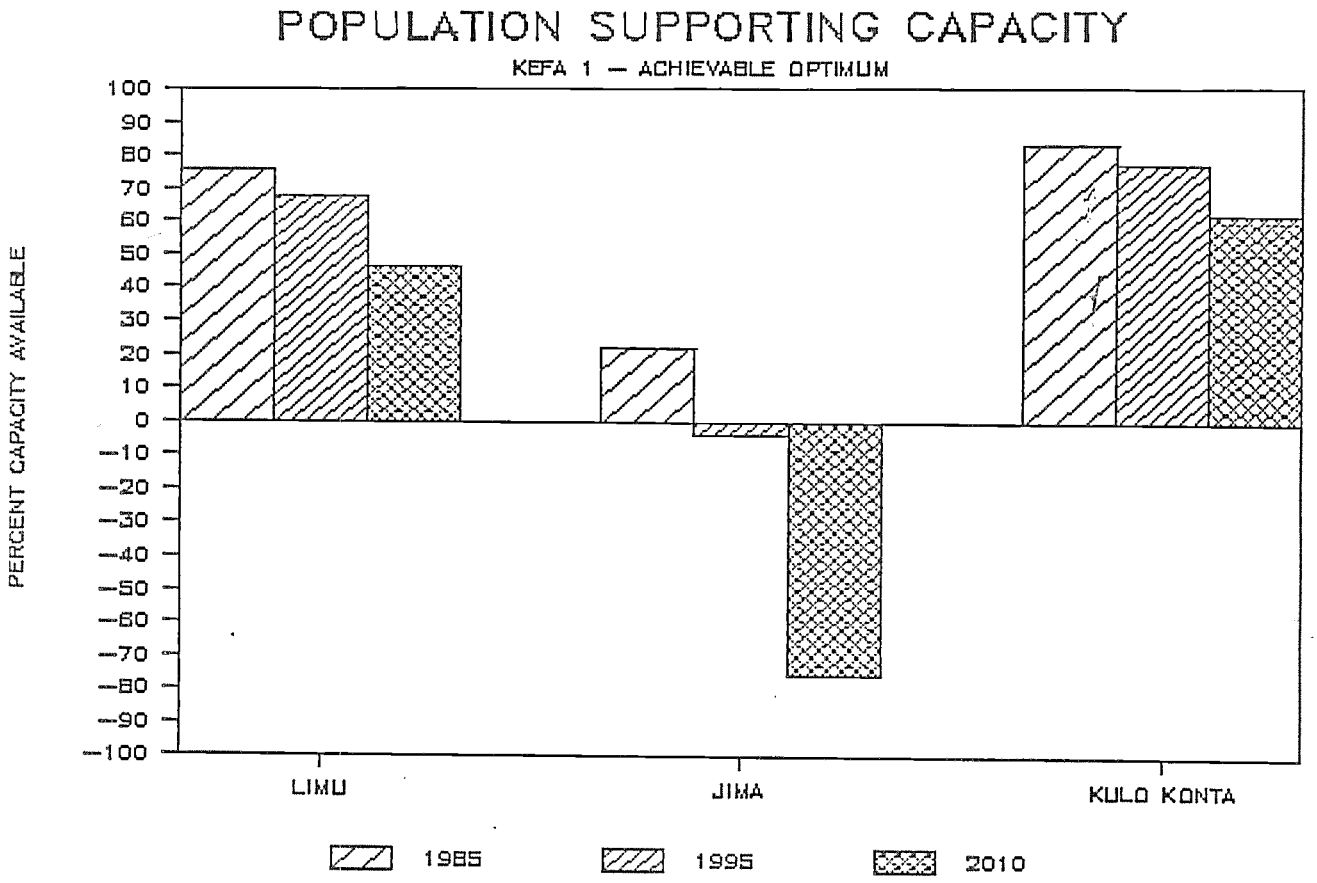
MOCHA
GAMBELA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 1 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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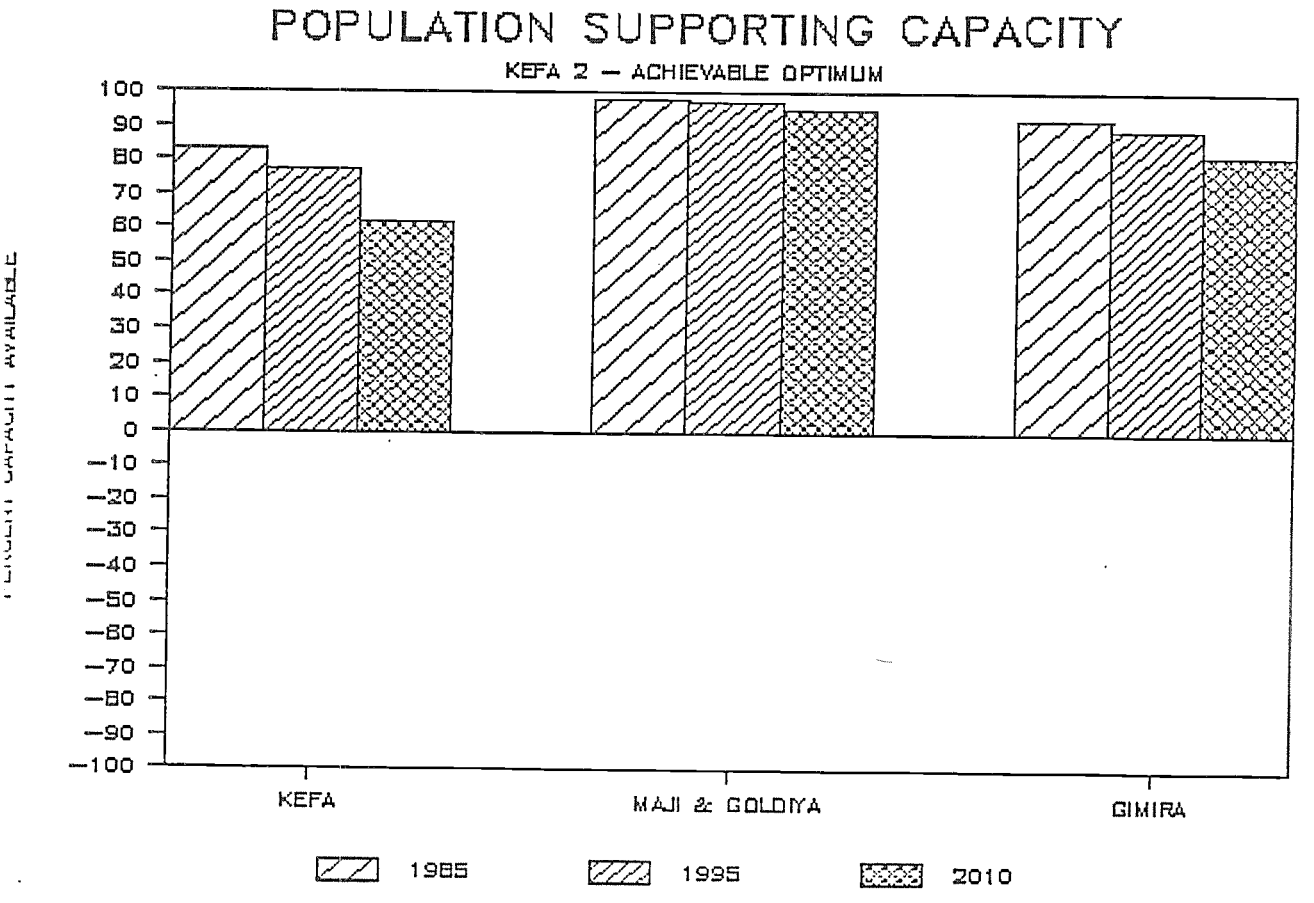
LIMU
JIMA
KULO KONTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
KEFA 2 — ACHIEVABLE OPTIMUM
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KEFA
MAJI & GOLDIYA
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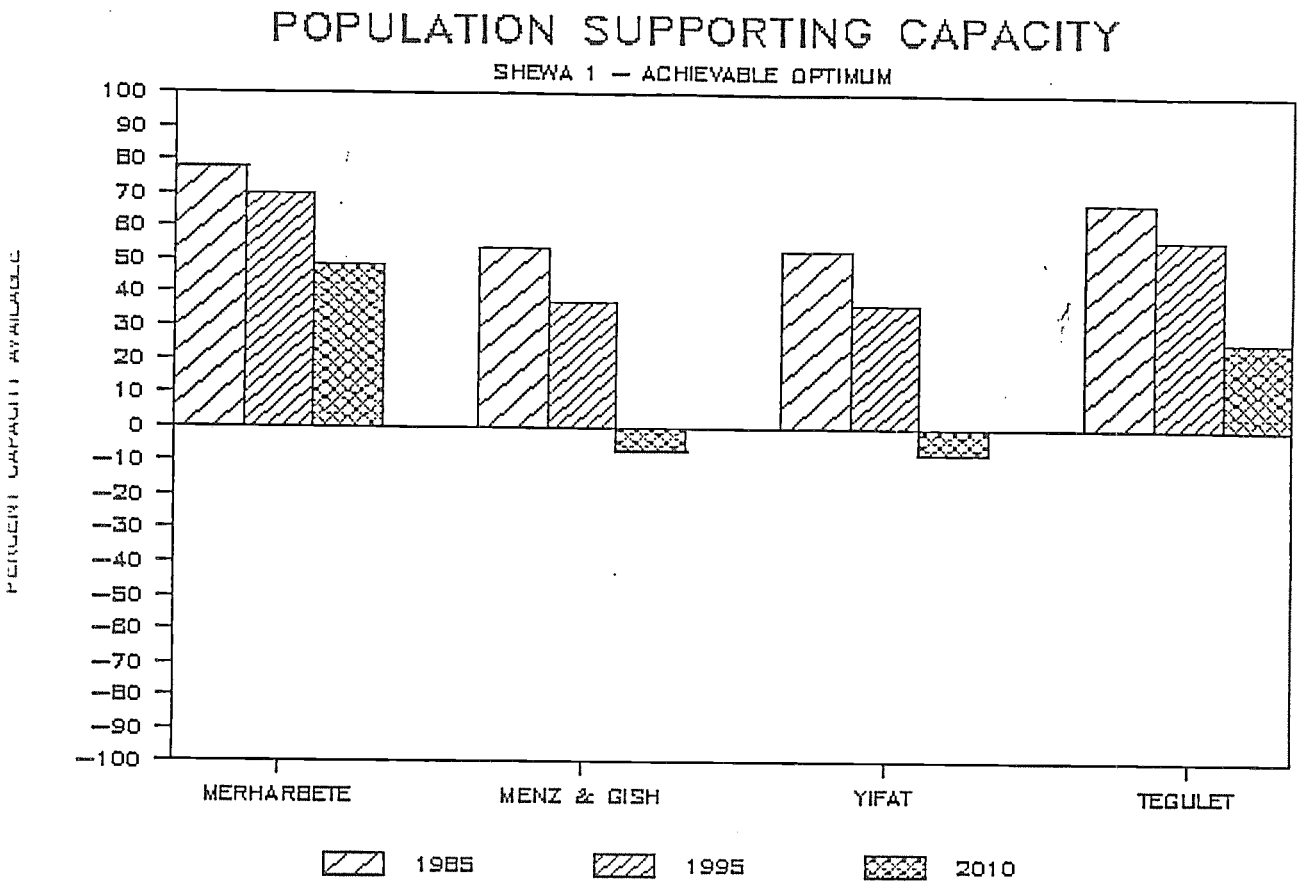
POPULATION SUPPORTING CAPACITY
SHEWA 1 — ACHIEVABLE OPTIMUM
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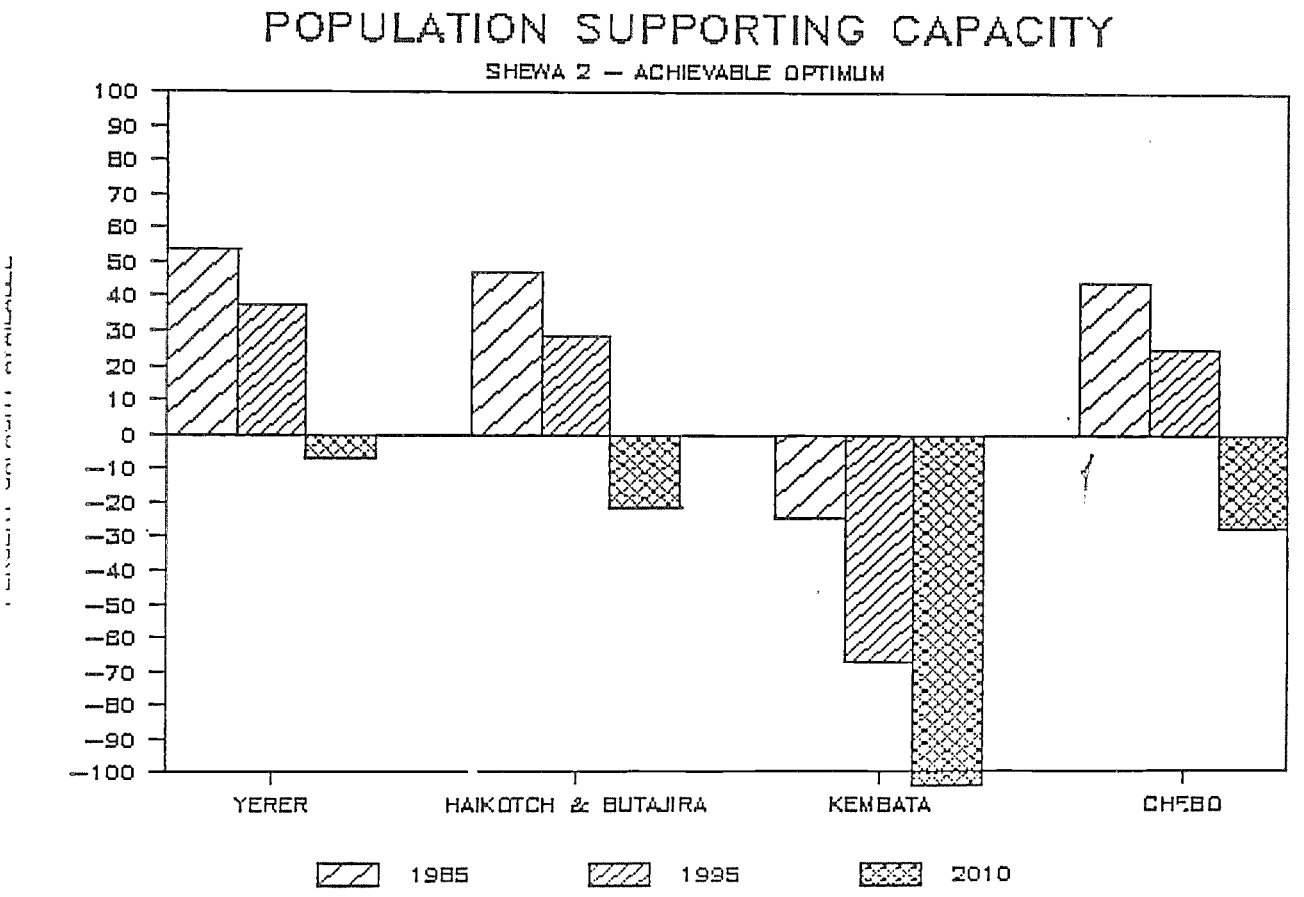
MERHARBETE
MENZ & GISH
YIFAT
TEGULET
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 2 — ACHIEVABLE OPTIMUM
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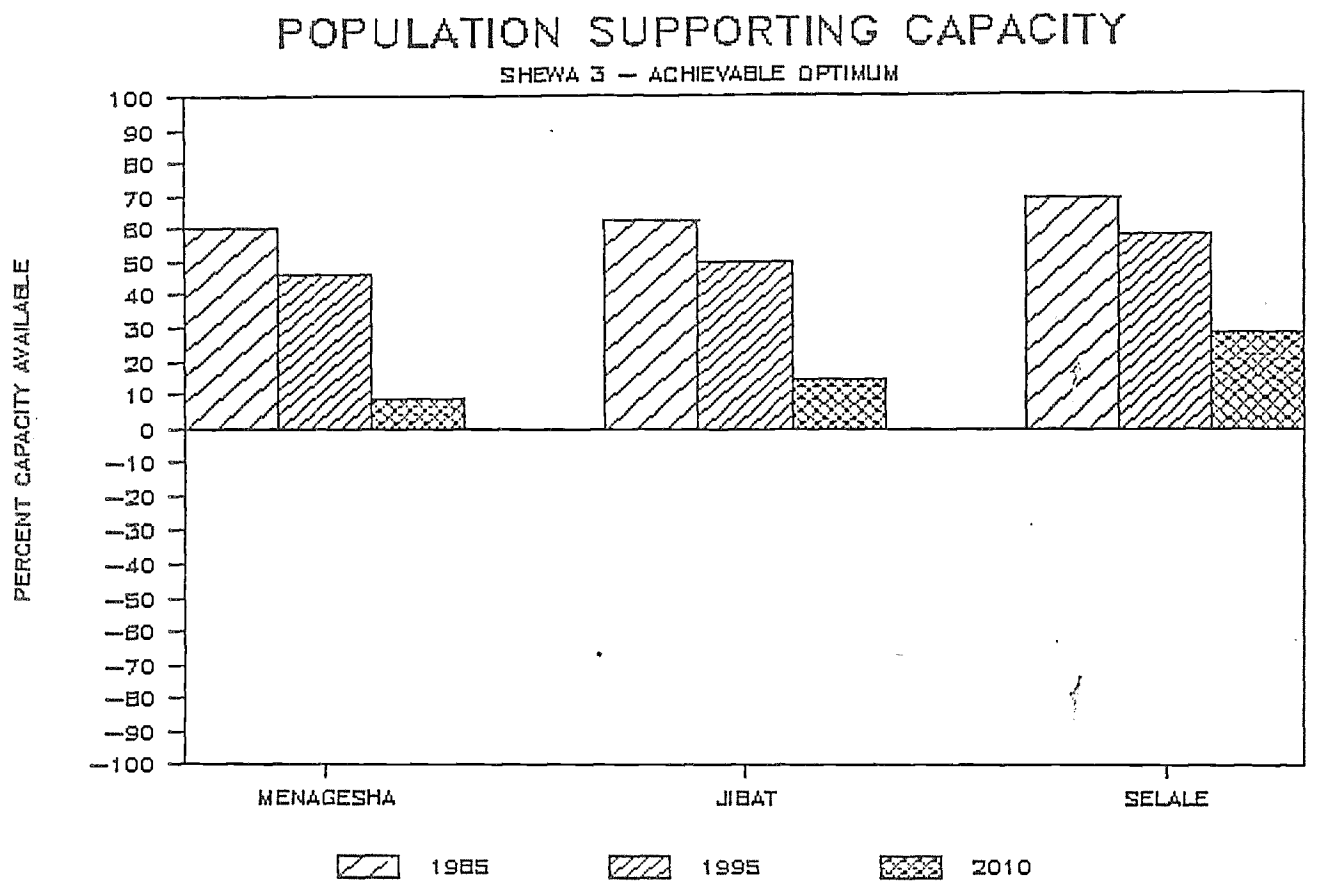
YERER
HAIKOTCH & BUTAJIRA
KEMBATA
CHEBO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
SHEWA 3 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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MENAGESHA
JIBAT
SELALE
1985
1995
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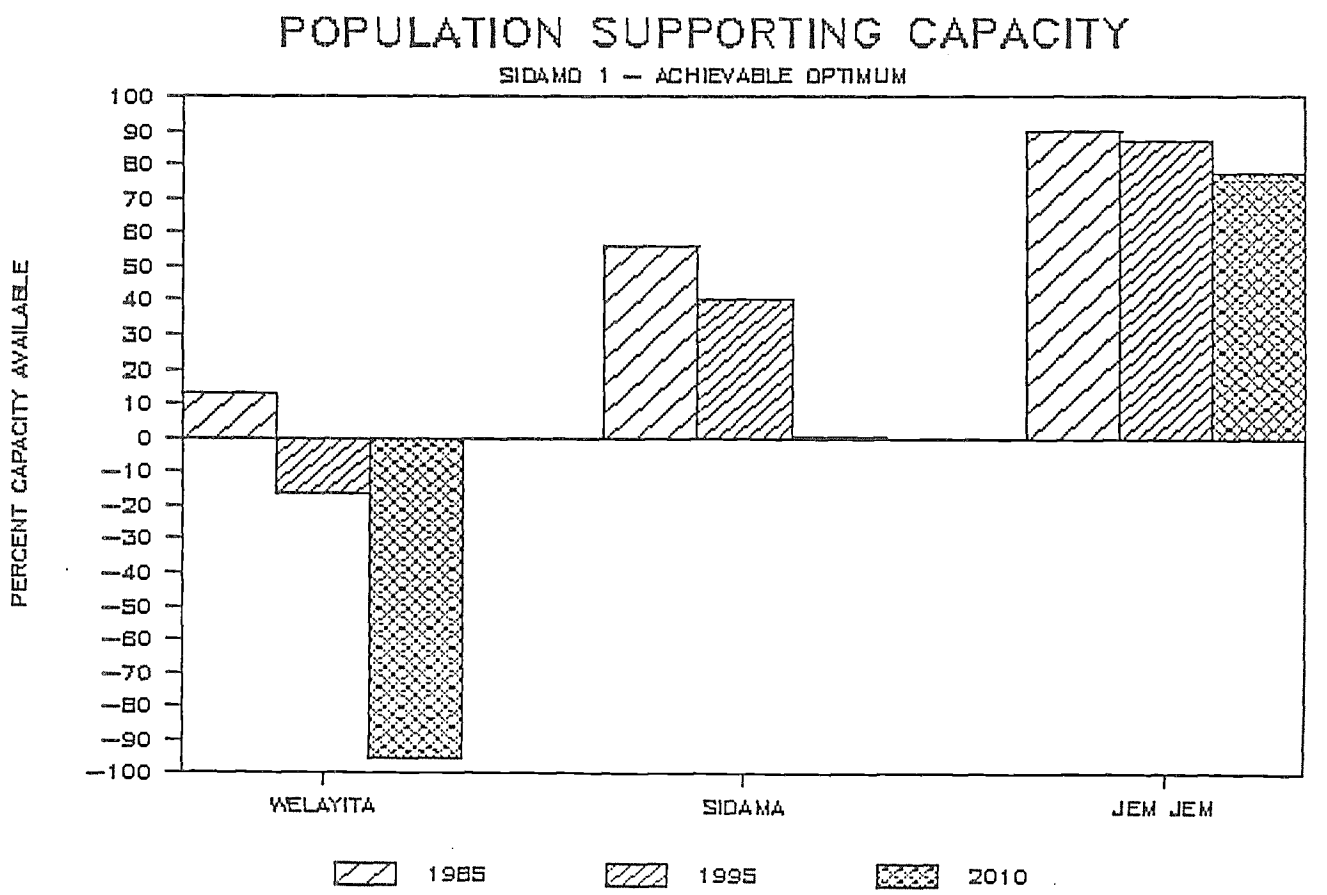
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SIDAMO 1 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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SIDAMA
JEM JEM
1985
1995
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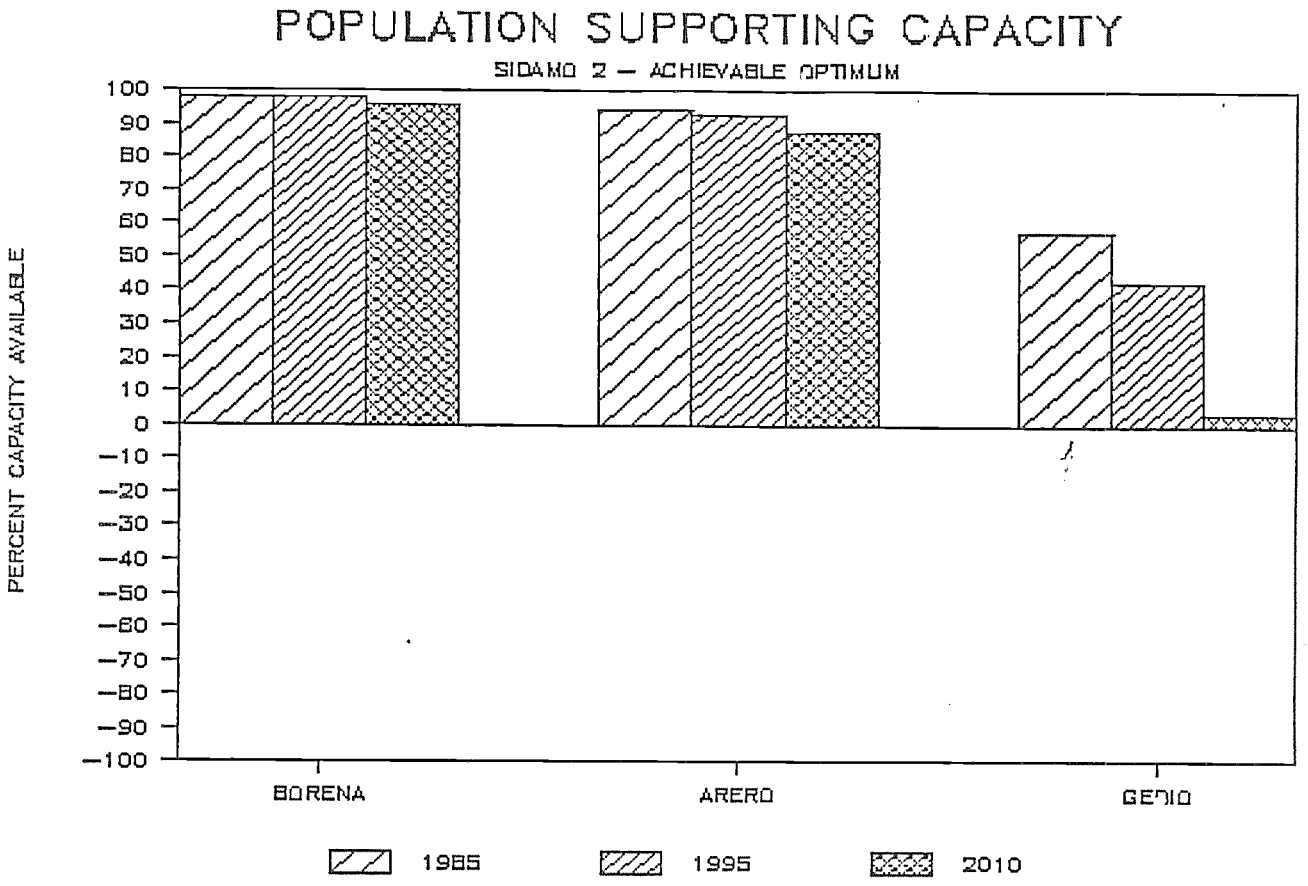
POPULATION SUPPORTING CAPACITY
SIDAMO 2 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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BORENA
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GEDIO
1985
1995
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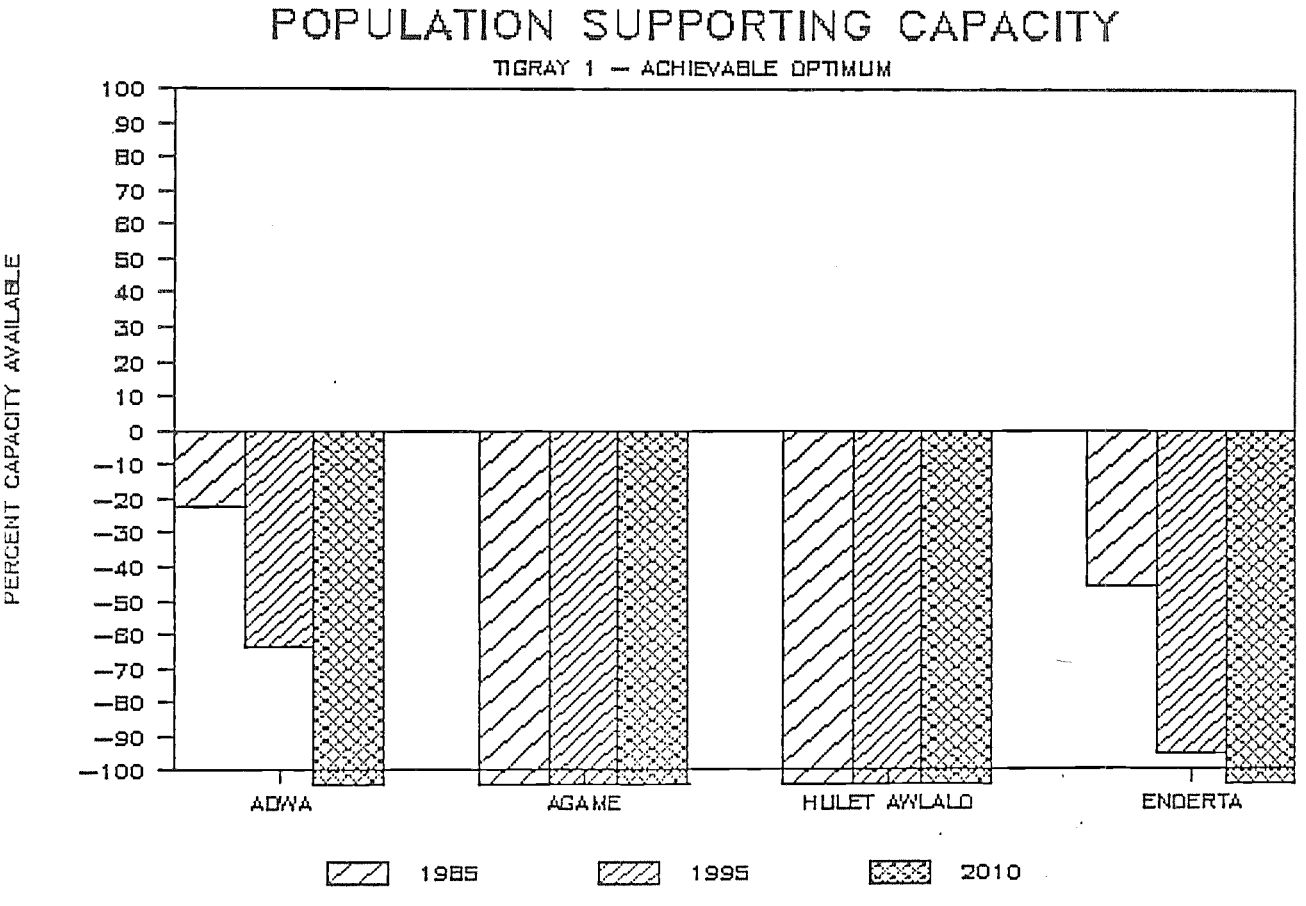
POPULATION SUPPORTING CAPACITY
TIGRAY 1 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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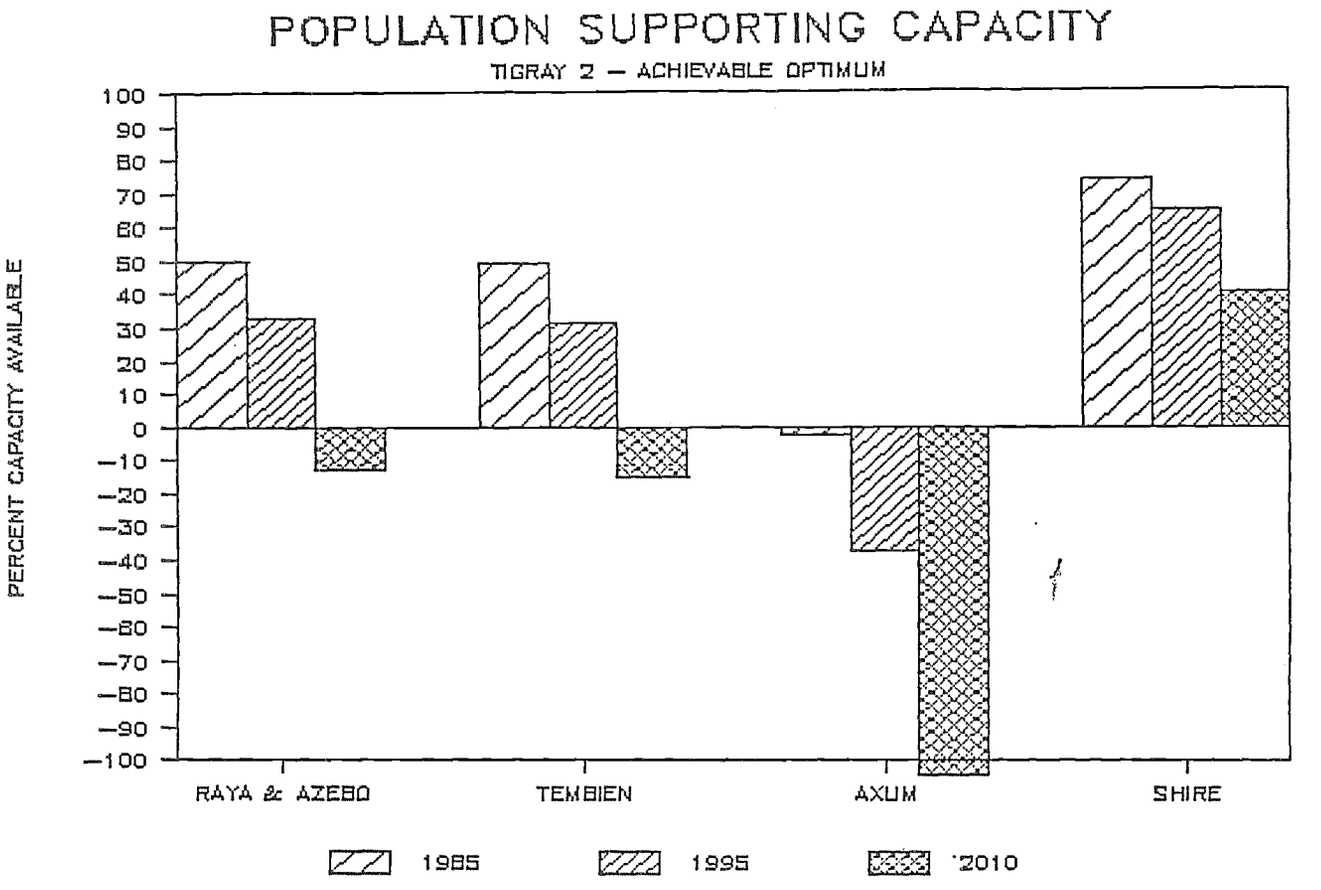
HULET AWLALO
ENDERTA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
TIGRAY 2 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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RAYA & AZEBO
TEMBIEN
AXUM
SHIRE
1985
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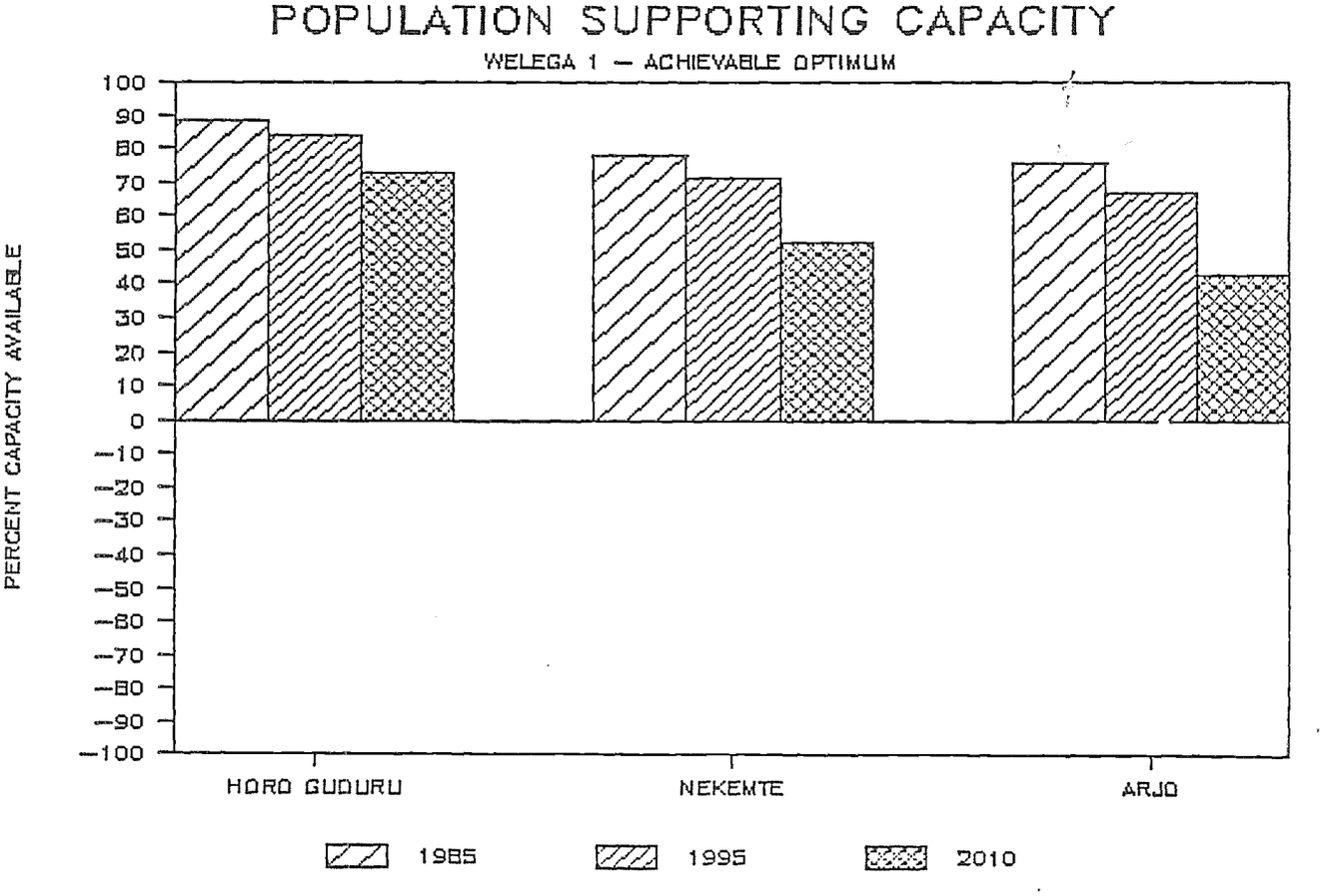
2010


POPULATION SUPPORTING CAPACITY
WELEGA 1 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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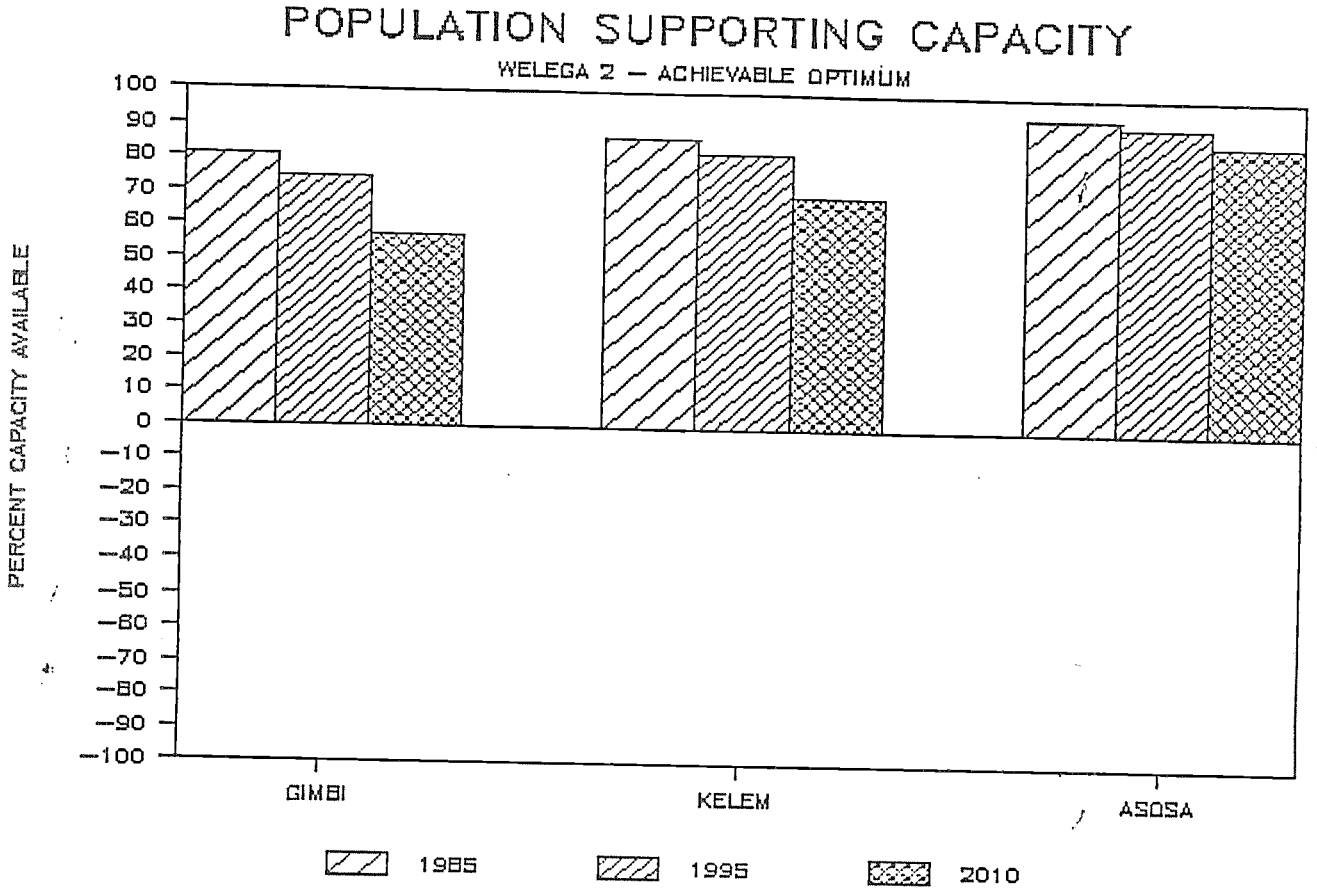
NEKEMTE
ARJO
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELEGA 2 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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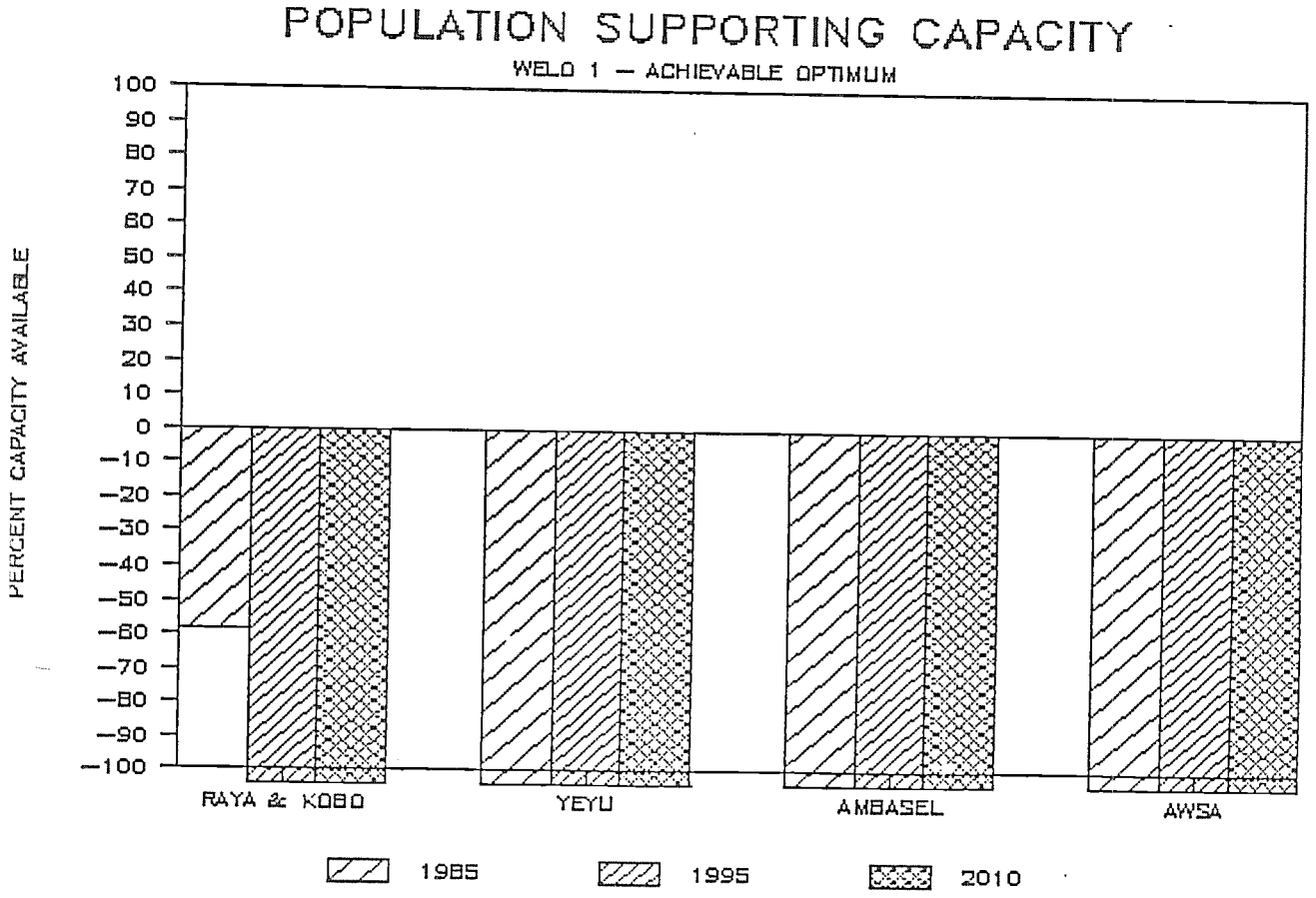
KELEM
ASOSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 1 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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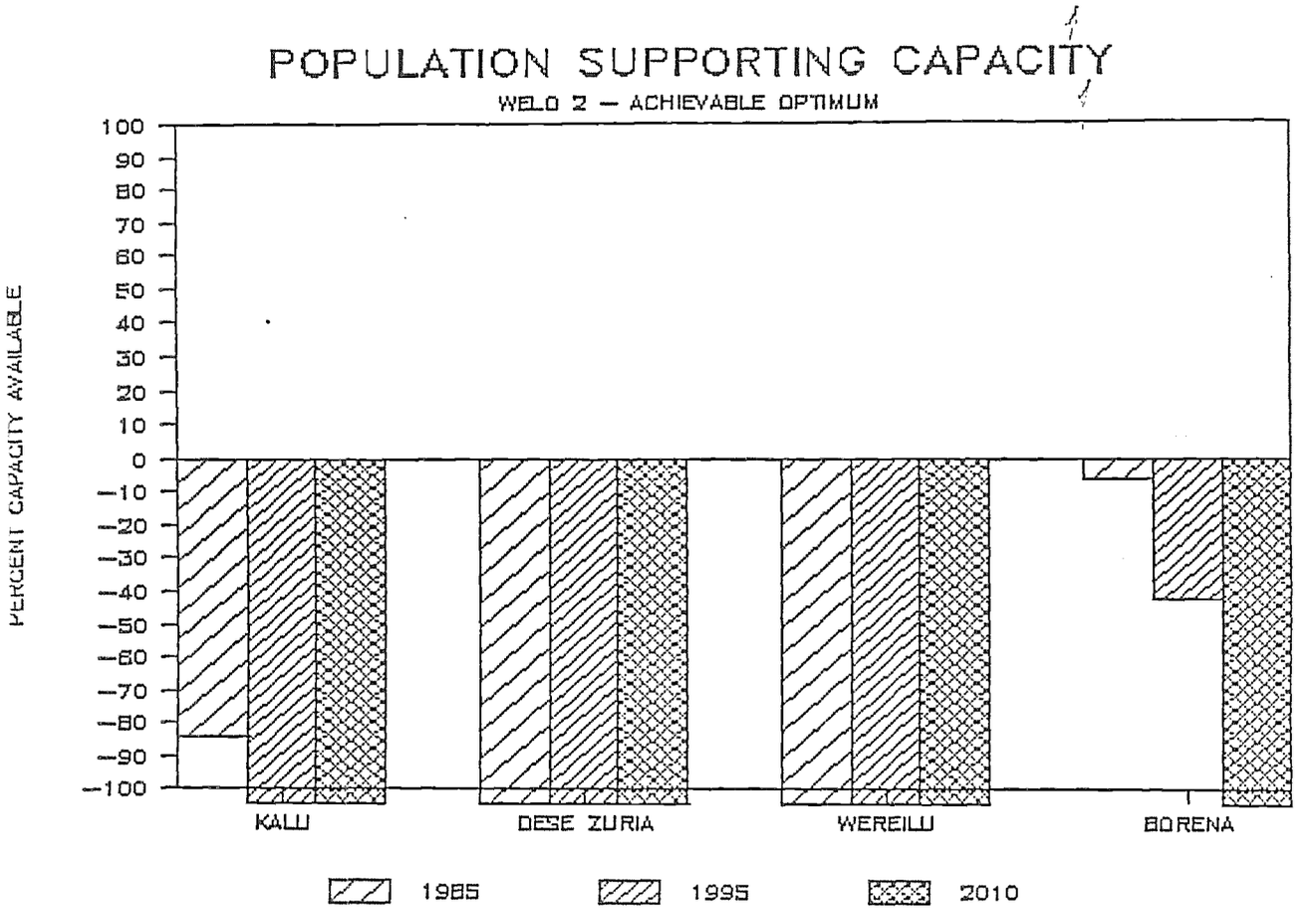
RAYA & KOBO
YEYU
AMBASEL
AWSA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 2 — ACHIEVABLE OPTIMUM
PERCENT CAPACITY AVAILABLE
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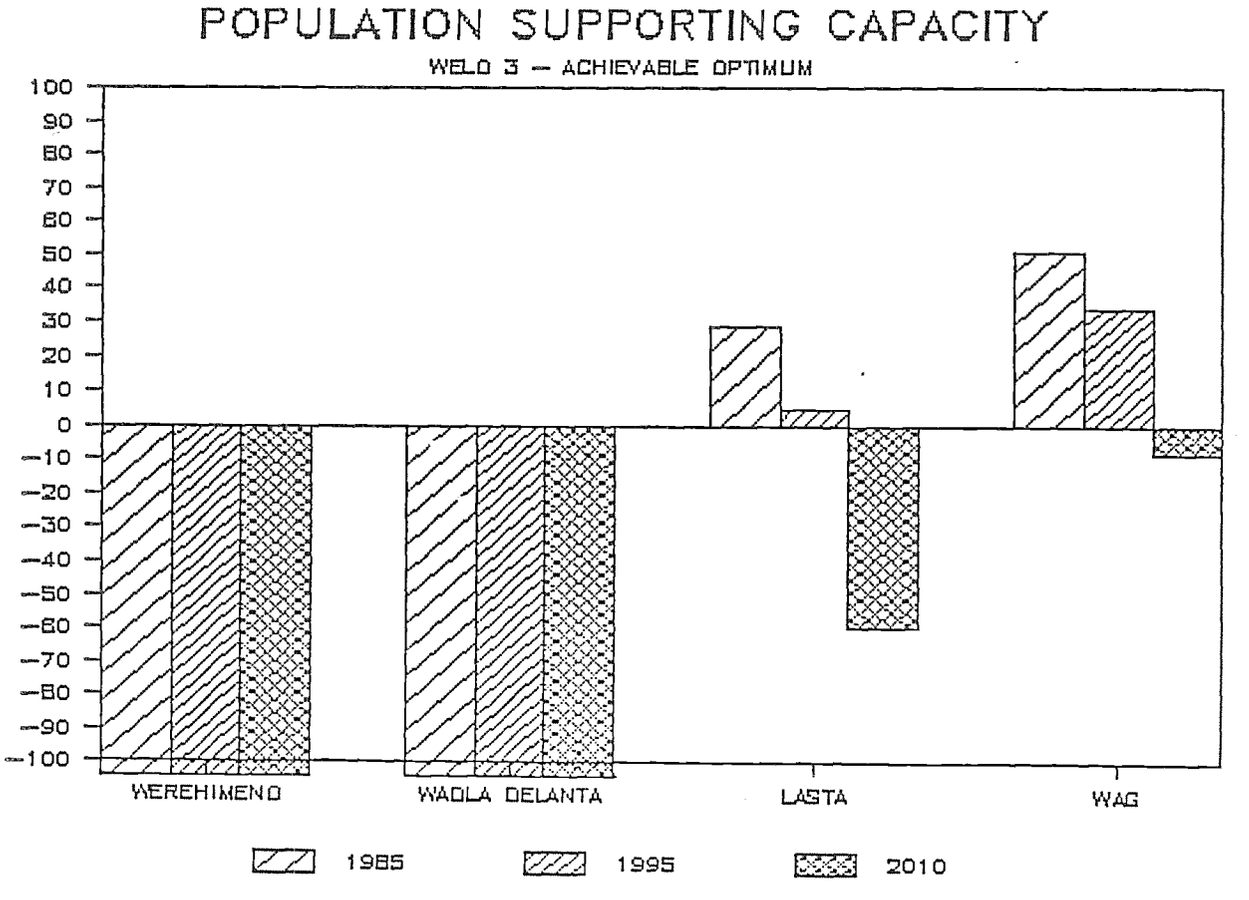
KALU
DESE ZURIA
WEREILU
BORENA
1985
1995
2010


POPULATION SUPPORTING CAPACITY
WELO 3 — ACHIEVABLE OPTIMUM
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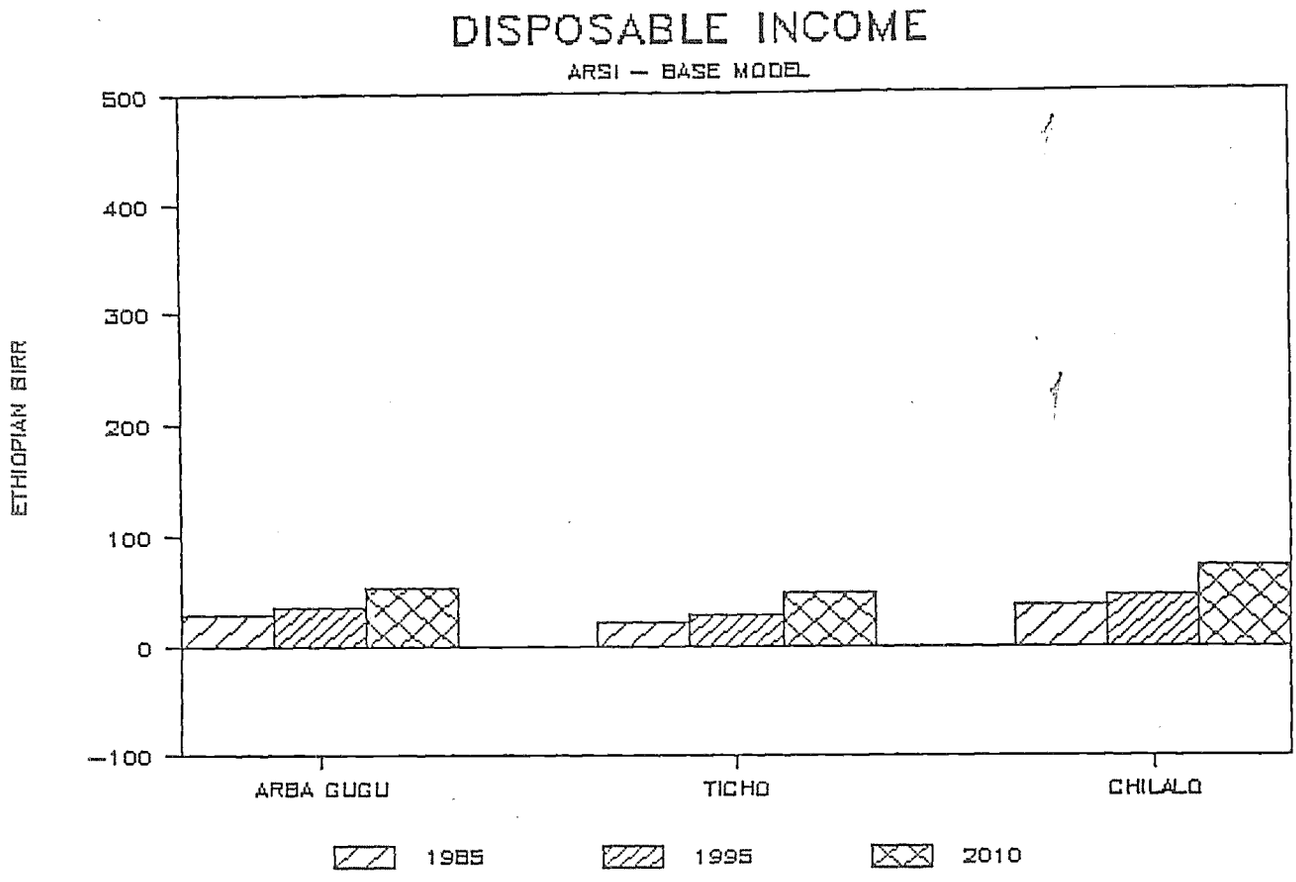
WEREHIMENO
WADLA DELANTA
LASTA
WAG
1985
1995
2010

DISPOSABLE INCOMES LESS FIXED COSTS

BASE MODEL


DISPOSABLE INCOME
ARSI – BASE MODEL
ETHIOPIAN BIRR
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100
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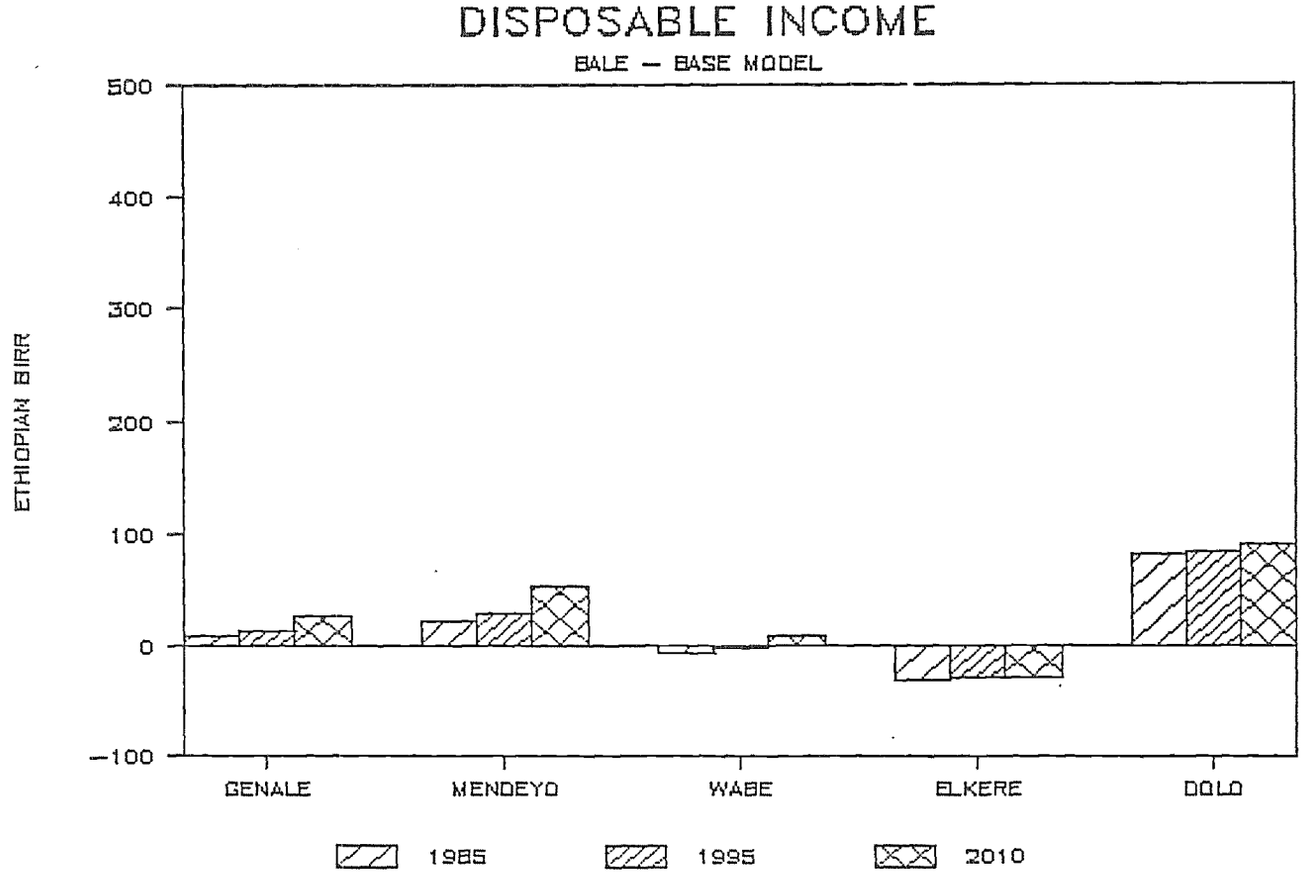
ARBA GUGU
TICHO
CHILALO
1985
1995
2010


DISPOSABLE INCOME
BALE – BASE MODEL
ETHIOPIAN BIRR
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GENALE
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WABE
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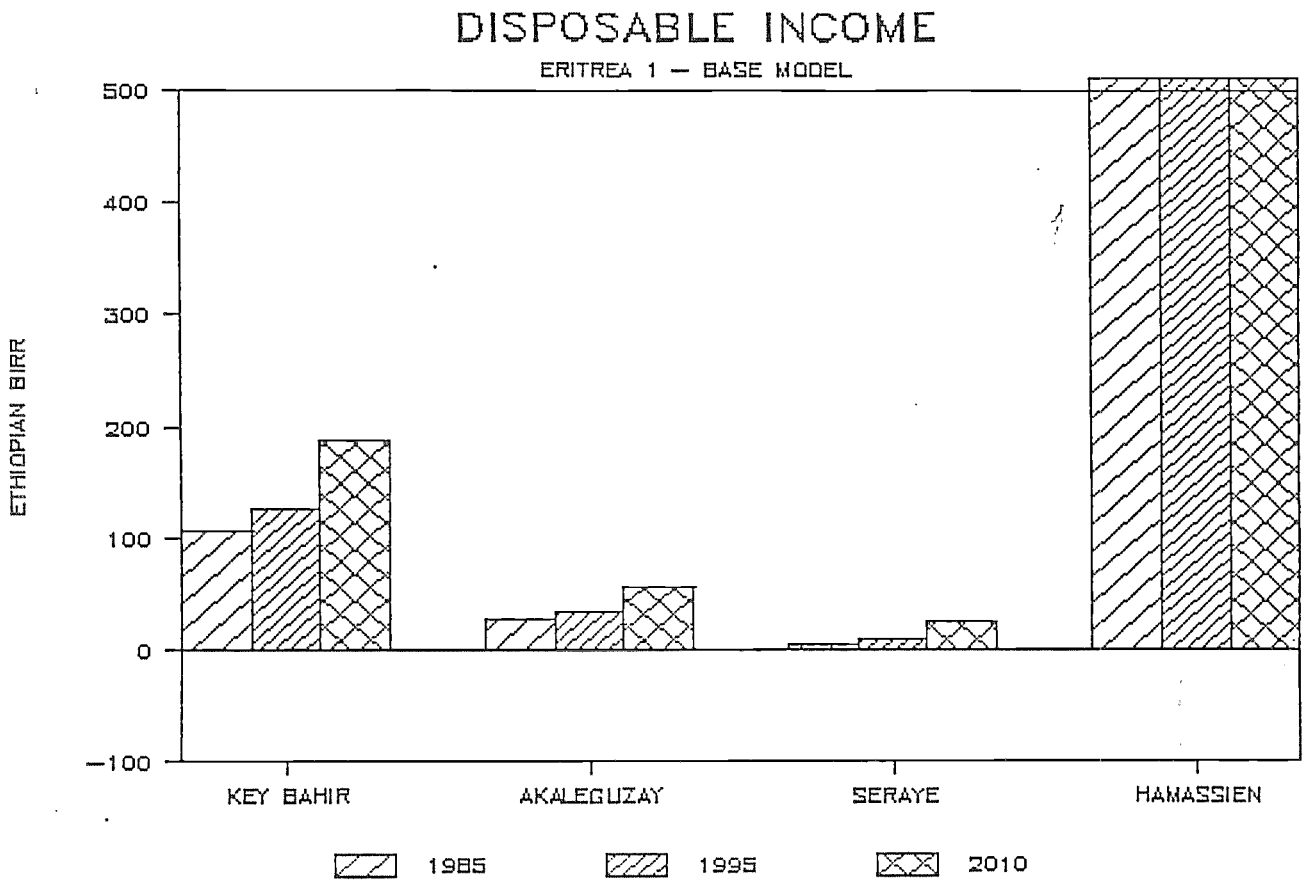
DOLO
1985
1995
2010


DISPOSABLE INCOME
ERITREA 1 — BASE MODEL
ETHIOPIAN BIRR
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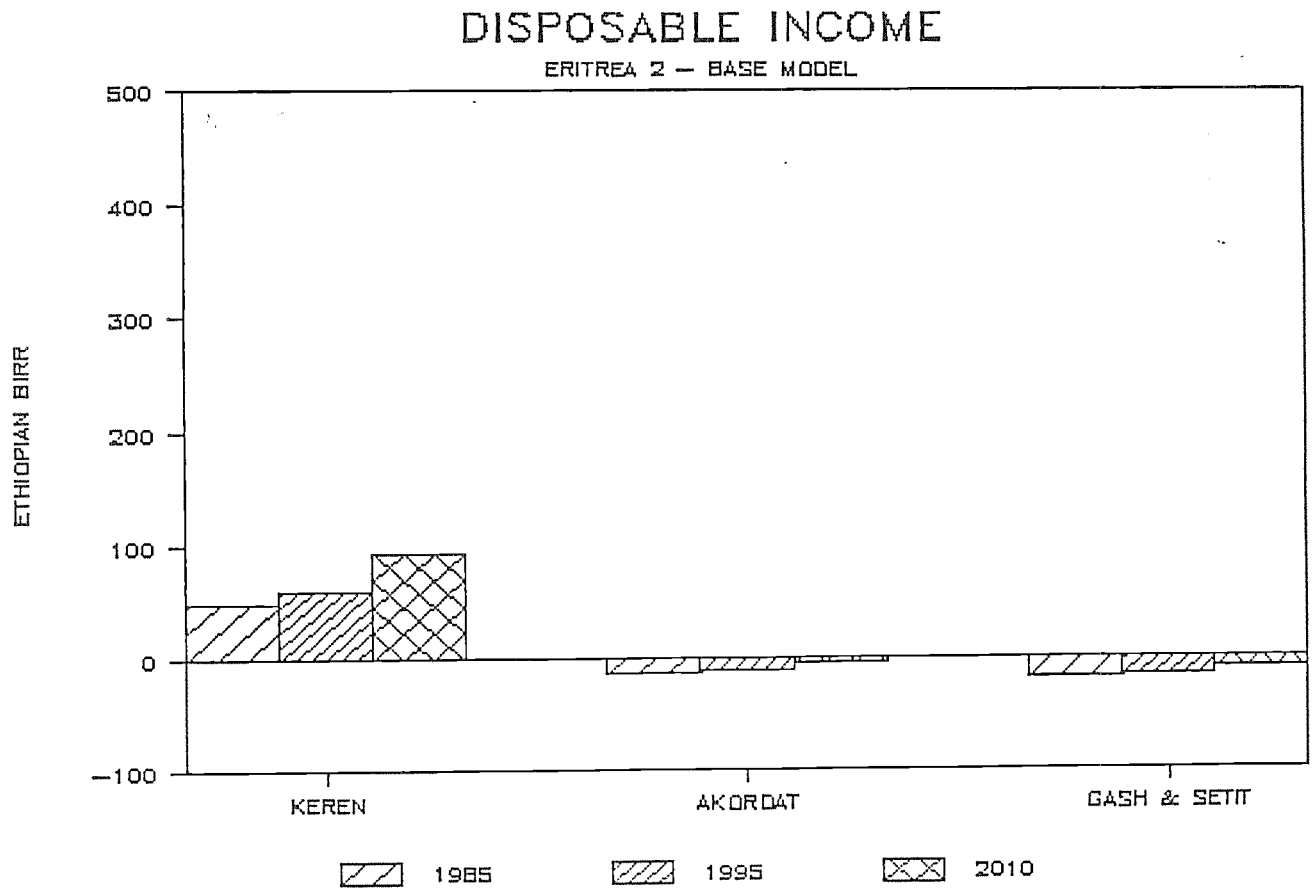
KEY BAHIR
AKALEGUZAY
SERAYE
HAMASSIEN
1985
1995
2010


DISPOSABLE INCOME
ERITREA 2 — BASE MODEL
ETHIOPIAN BIRR
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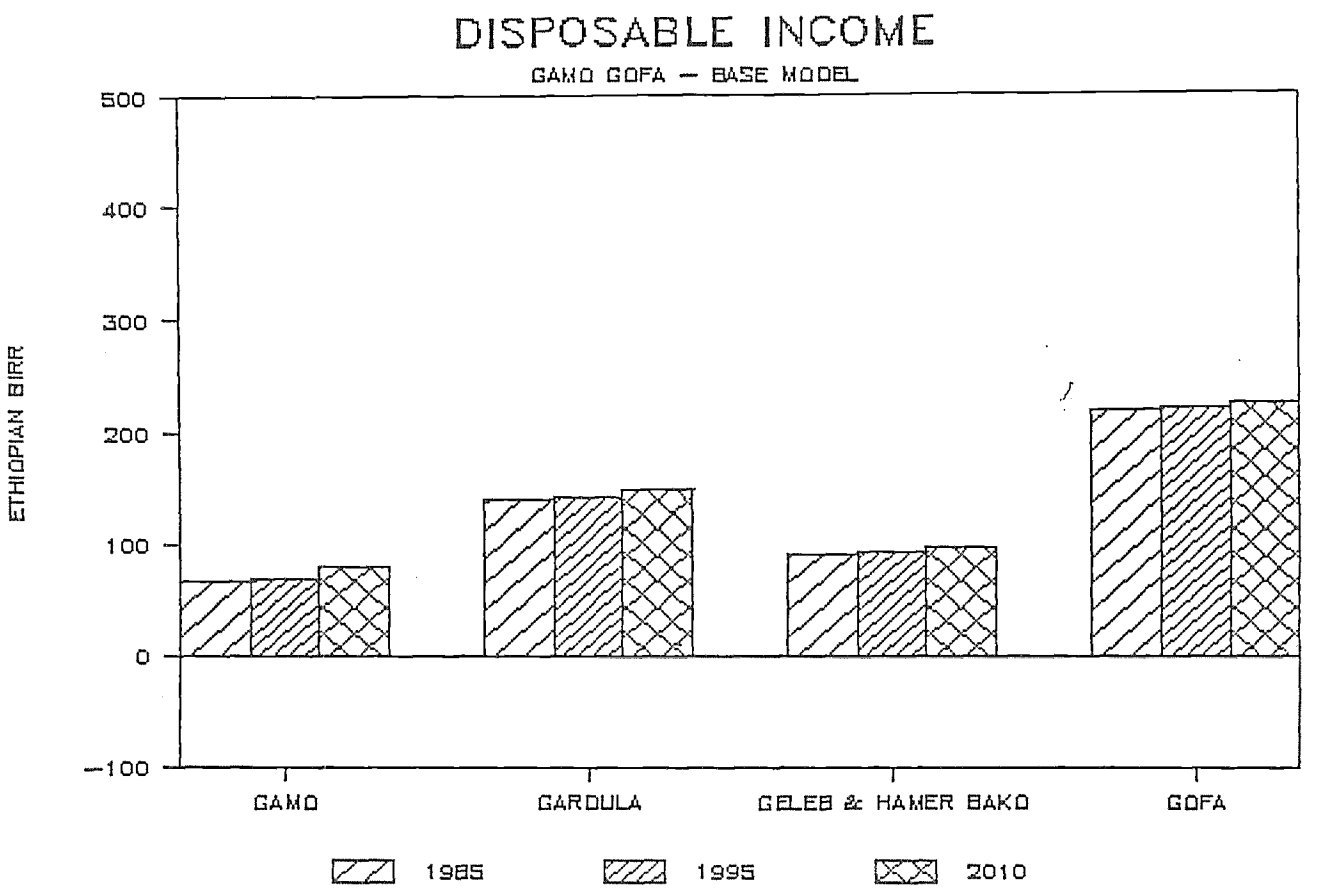
KEREN
AKORDAT
GASH & SETIT
1985
1995
2010


DISPOSABLE INCOME
GAMO GOFA — BASE MODEL
ETHIOPIAN BIRR
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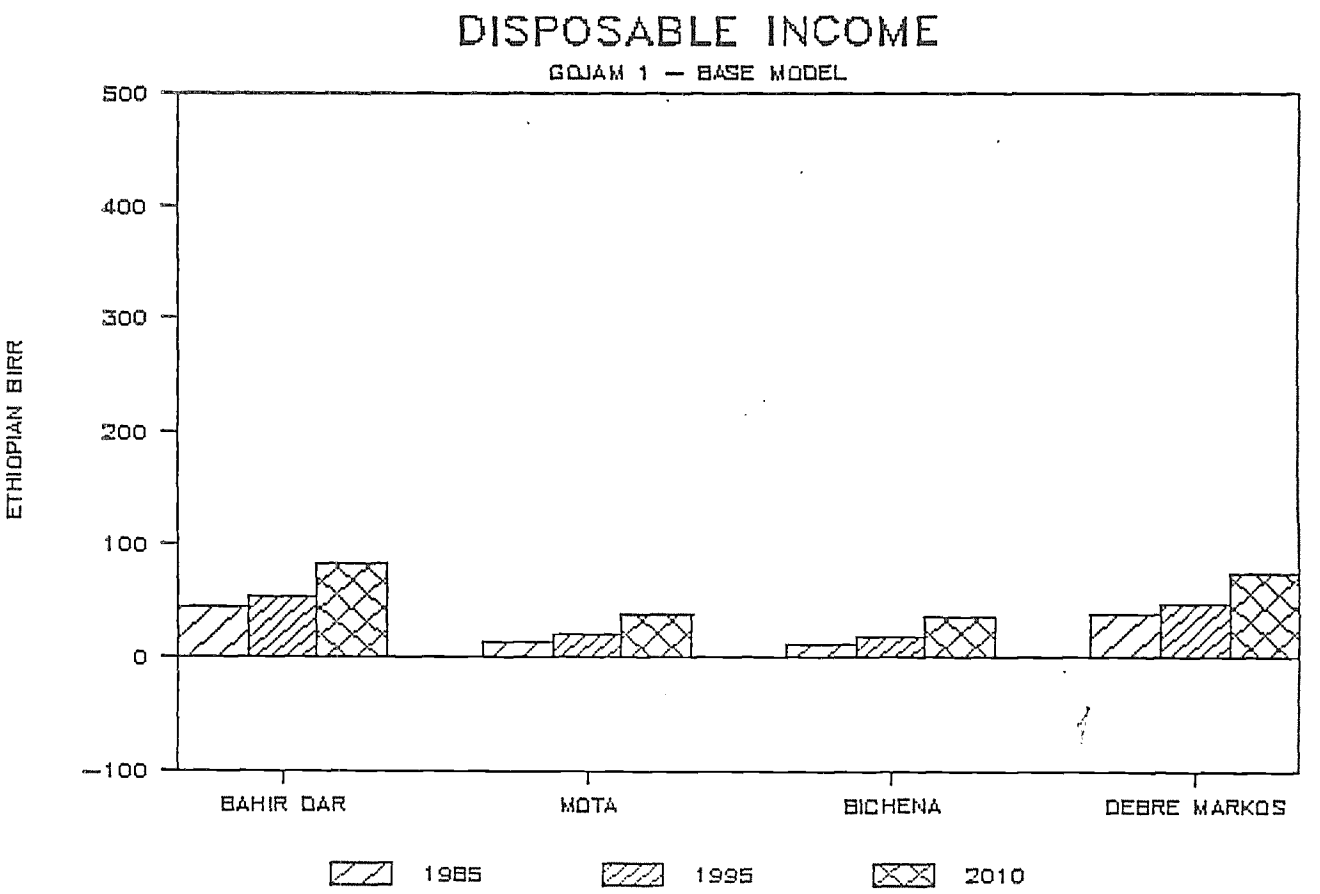
-100
GAMO
GARDULA
GELEB & HAMER BAKO
GOFA
1985
1995
2010


DISPOSABLE INCOME
GOJAM 1 — BASE MODEL
ETHIOPIAN BIRR
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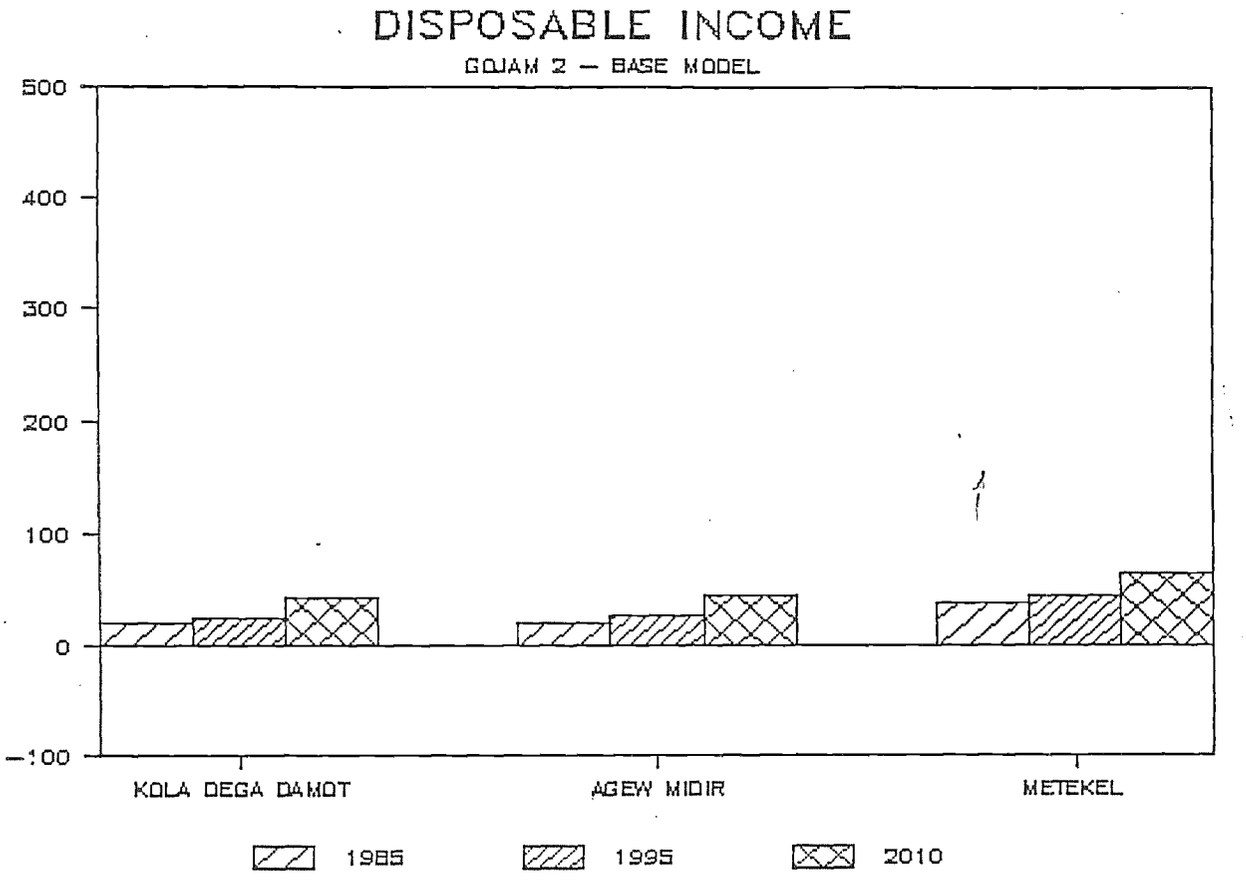
-100
BAHIR DAR
MOTA
BICHENA
DEBRE MARKOS
1985
1995
2010


DISPOSABLE INCOME
GOJAM 2 — BASE MODEL
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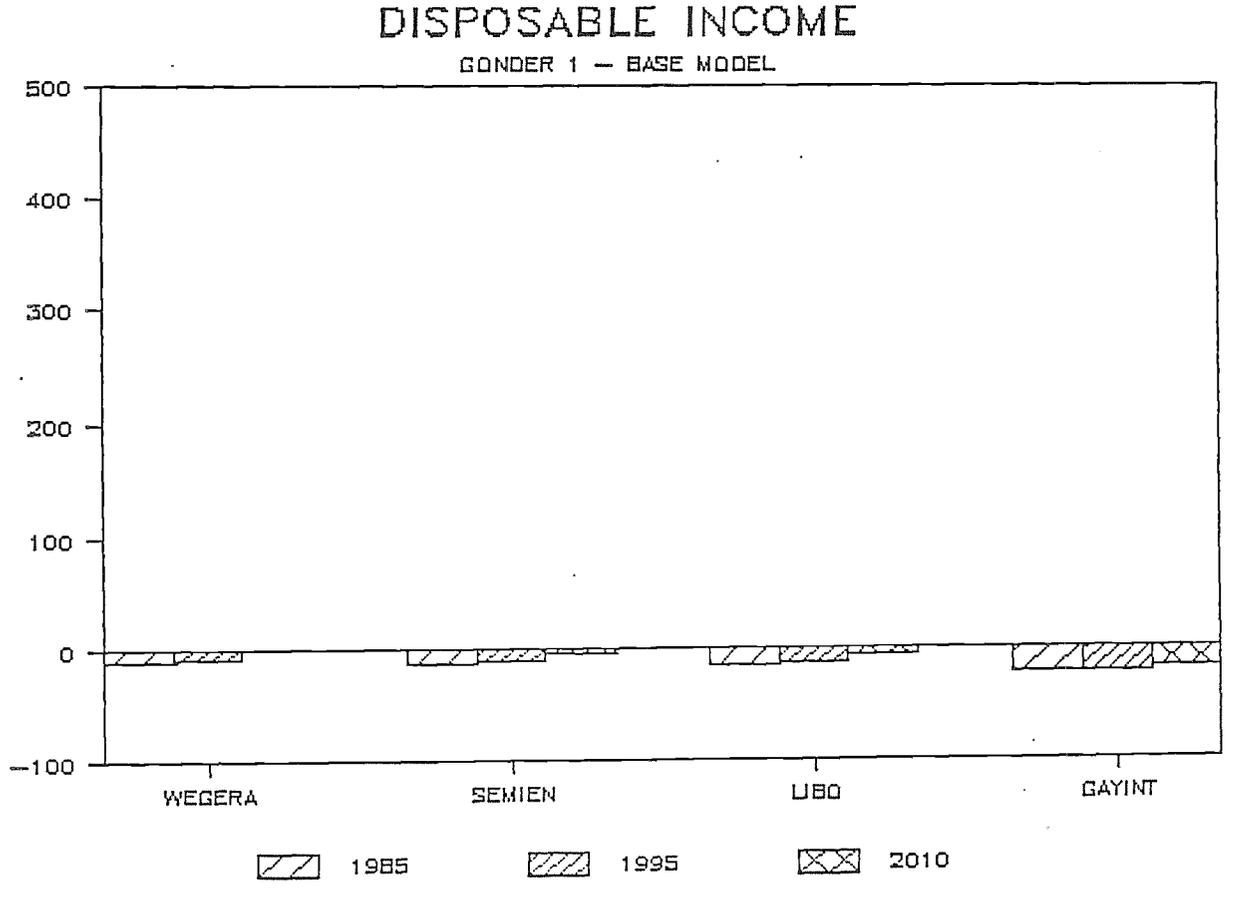
KOLA DEGA DAMOT
AGEW MIDIR
METEKEL
1985
1995
2010


DISPOSABLE INCOME
GONDER 1 — BASE MODEL
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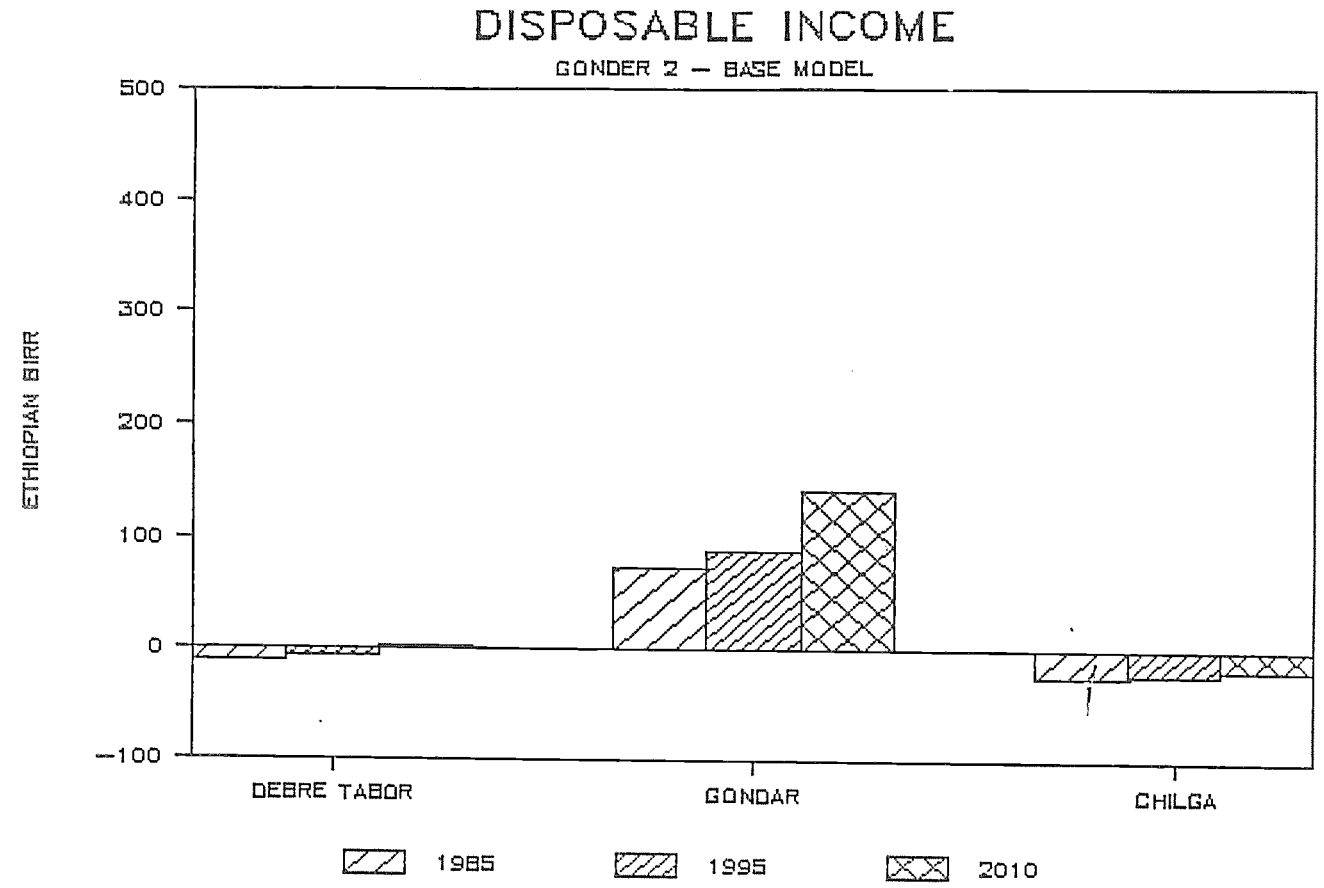
WEGERA
SEMIEN
UBO
GAYINT
1985
1995
2010


DISPOSABLE INCOME
GONDER 2 — BASE MODEL
ETHIOPIAN BIRR
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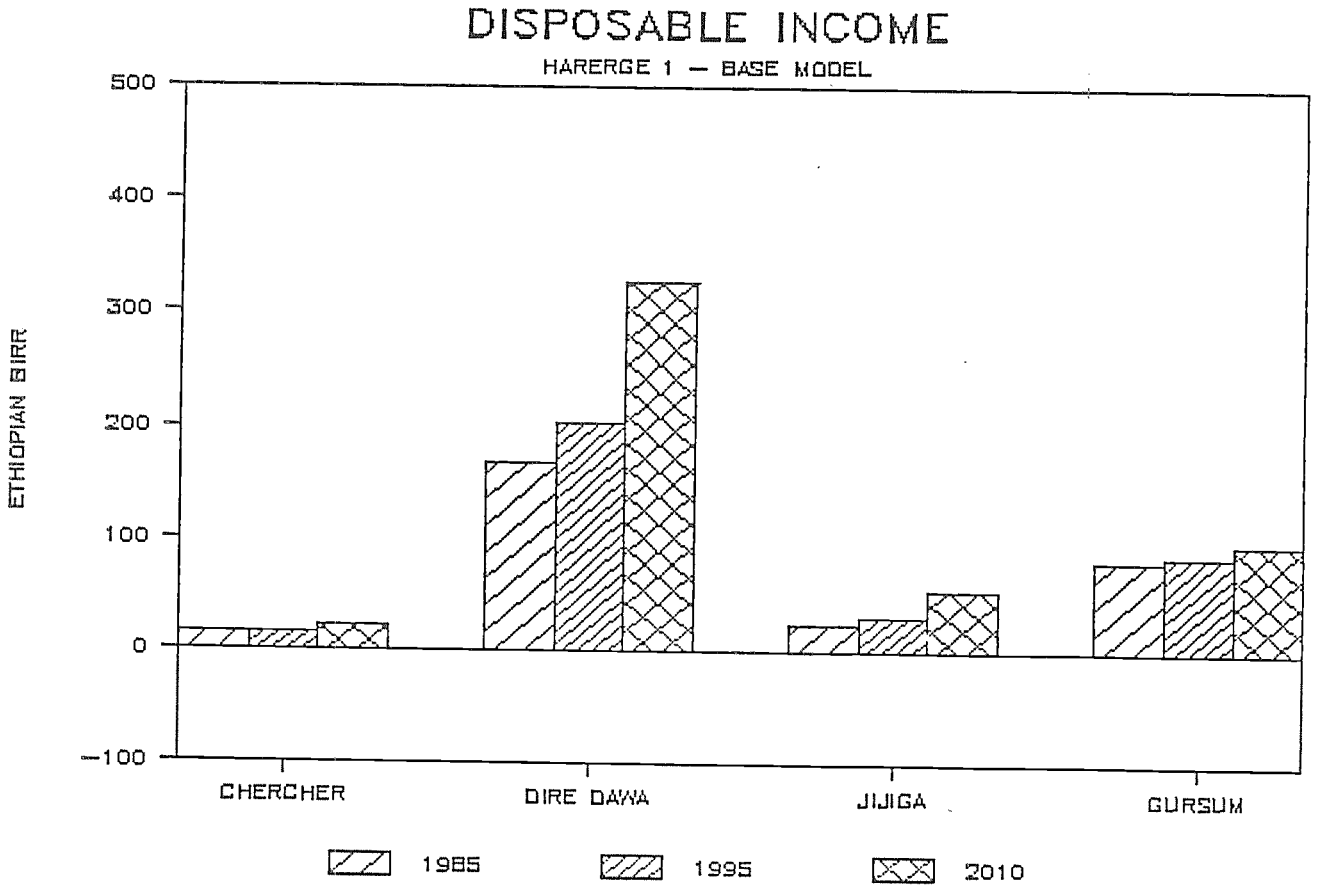
DEBRE TABOR
GONDAR
CHILGA
1985
1995
2010


DISPOSABLE INCOME
HARERGE 1 — BASE MODEL
ETHIOPIAN BIRR
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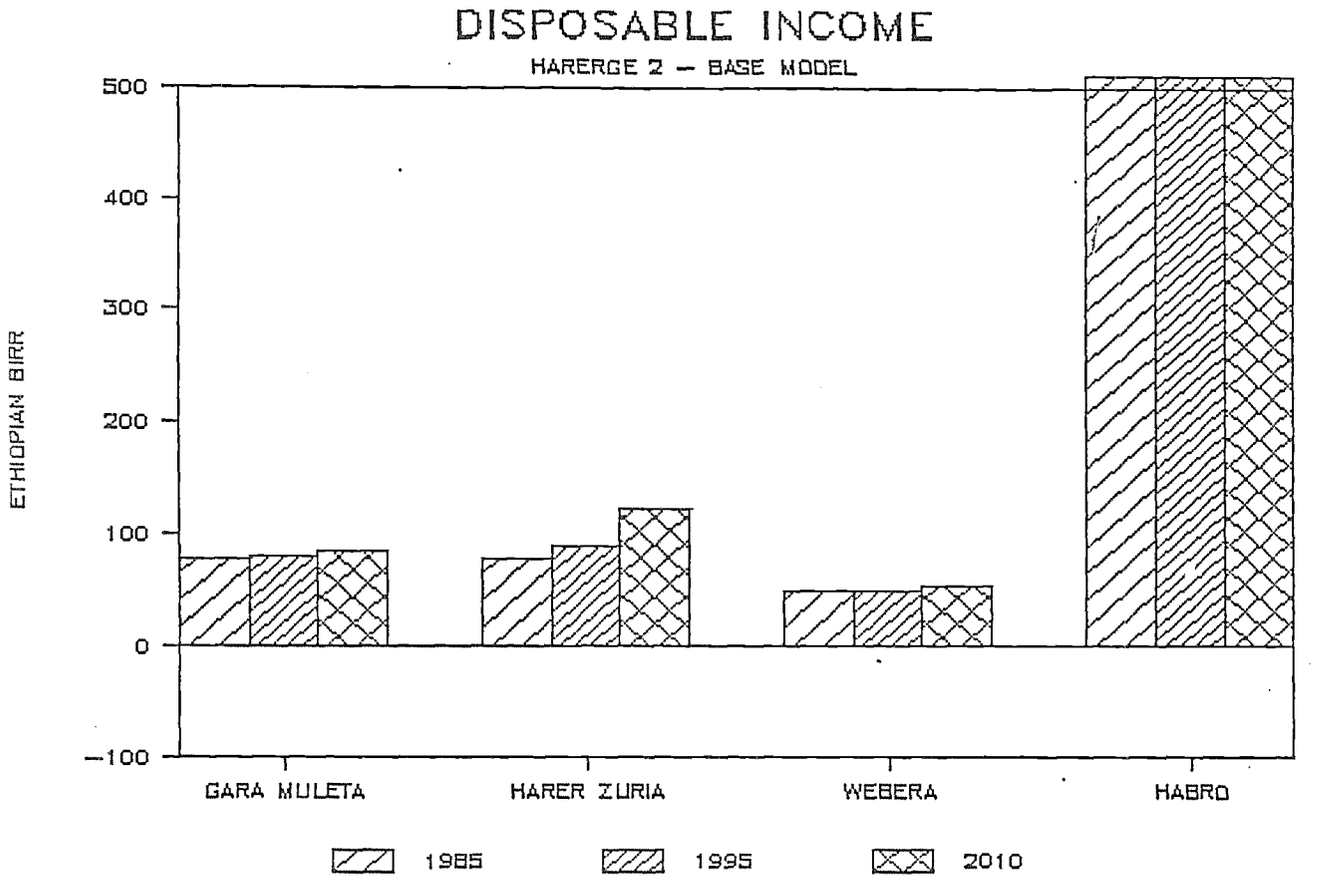
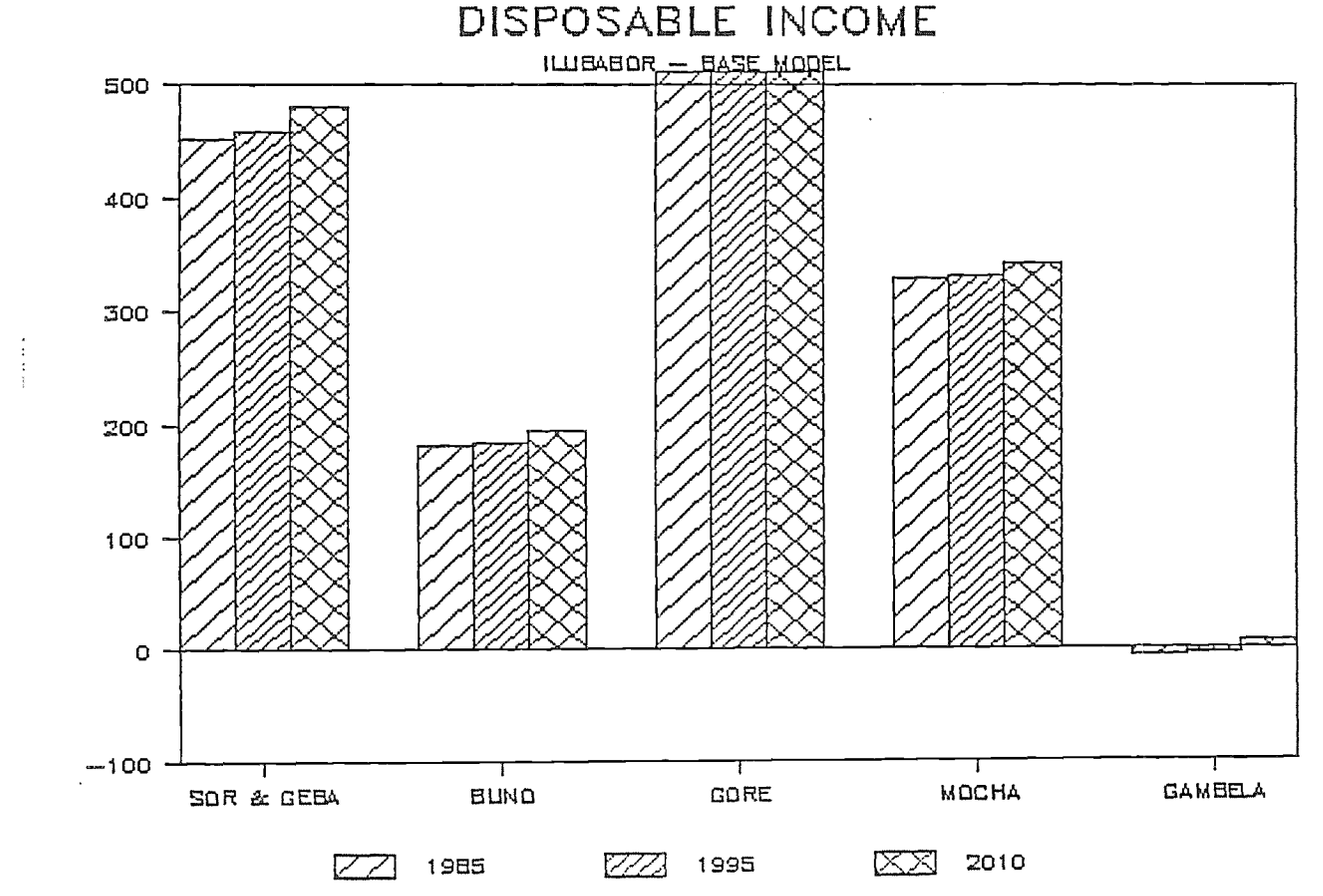
CHERCHER
DIRE DAWA
JIJIGA
GURSUM
1985
1995
2010


DISPOSABLE INCOME
HARERGE 2 — BASE MODEL
ETHIOPIAN BIRR
500
400
300
200
100
0
-100
GARA MULETA
HARER ZURIA
WEBERA
HABRO
1985
1995
2010


DISPOSABLE INCOME
ILUBABOR — BASE MODEL
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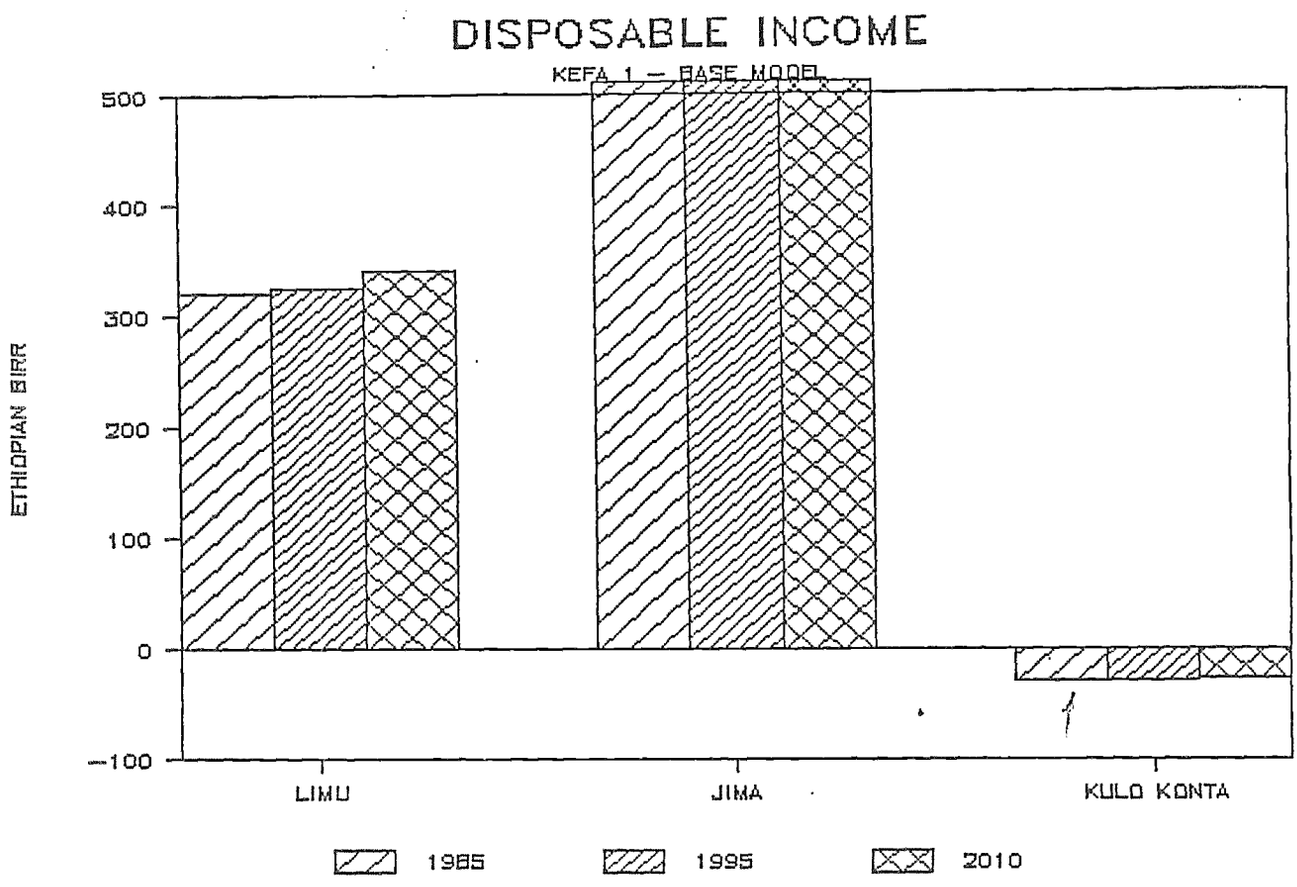
200
100
0
-100
SOR & GEBA
BUNO
GORE
MOCHA
GAMBELA
1985
1995
2010


DISPOSABLE INCOME
KEFA 1 — BASE MODEL
ETHIOPIAN BIRR
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400
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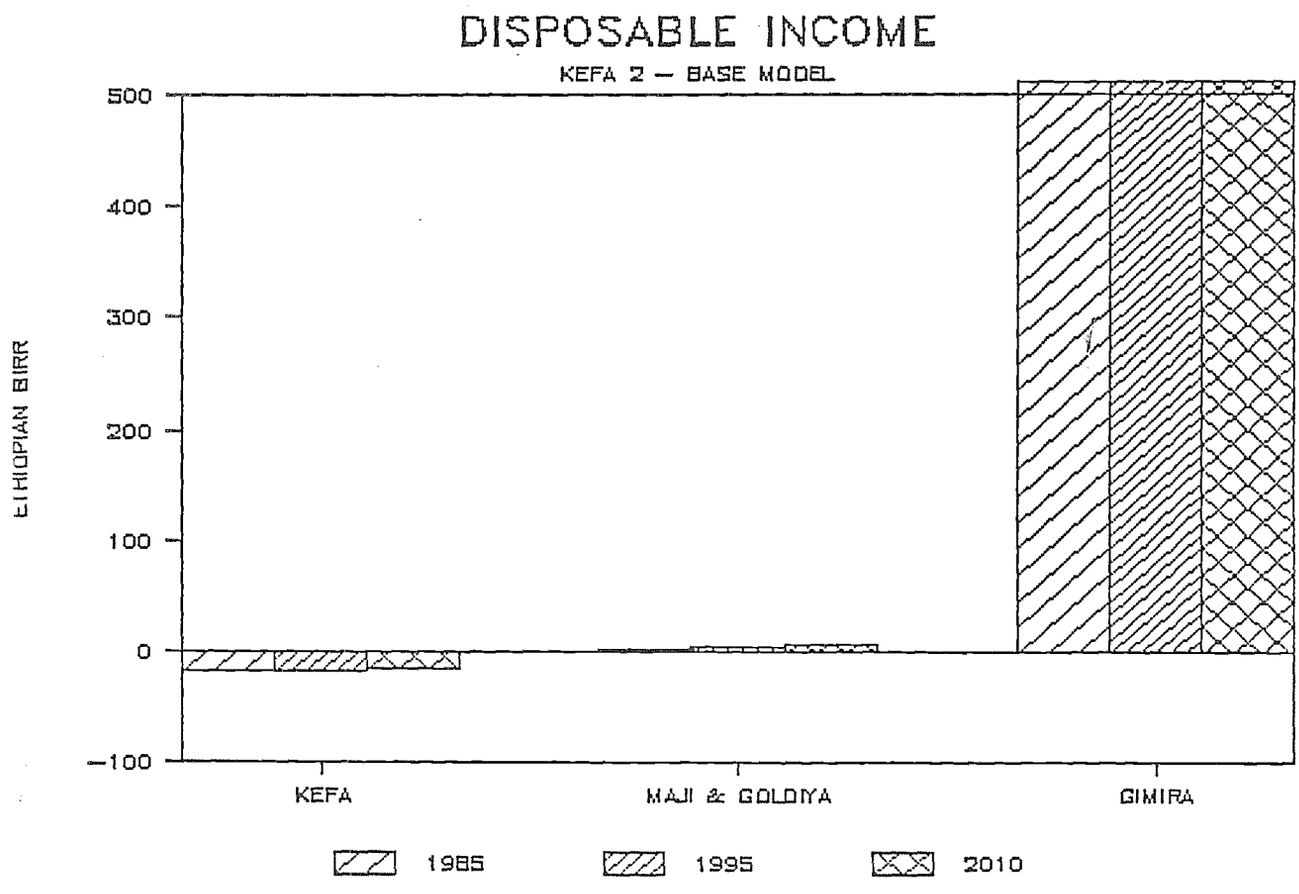
200
100
0
−100
LIMU
JIMA
KULO KONTA
1985
1995
2010


DISPOSABLE INCOME
KEFA 2 — BASE MODEL
ETHIOPIAN BIRR
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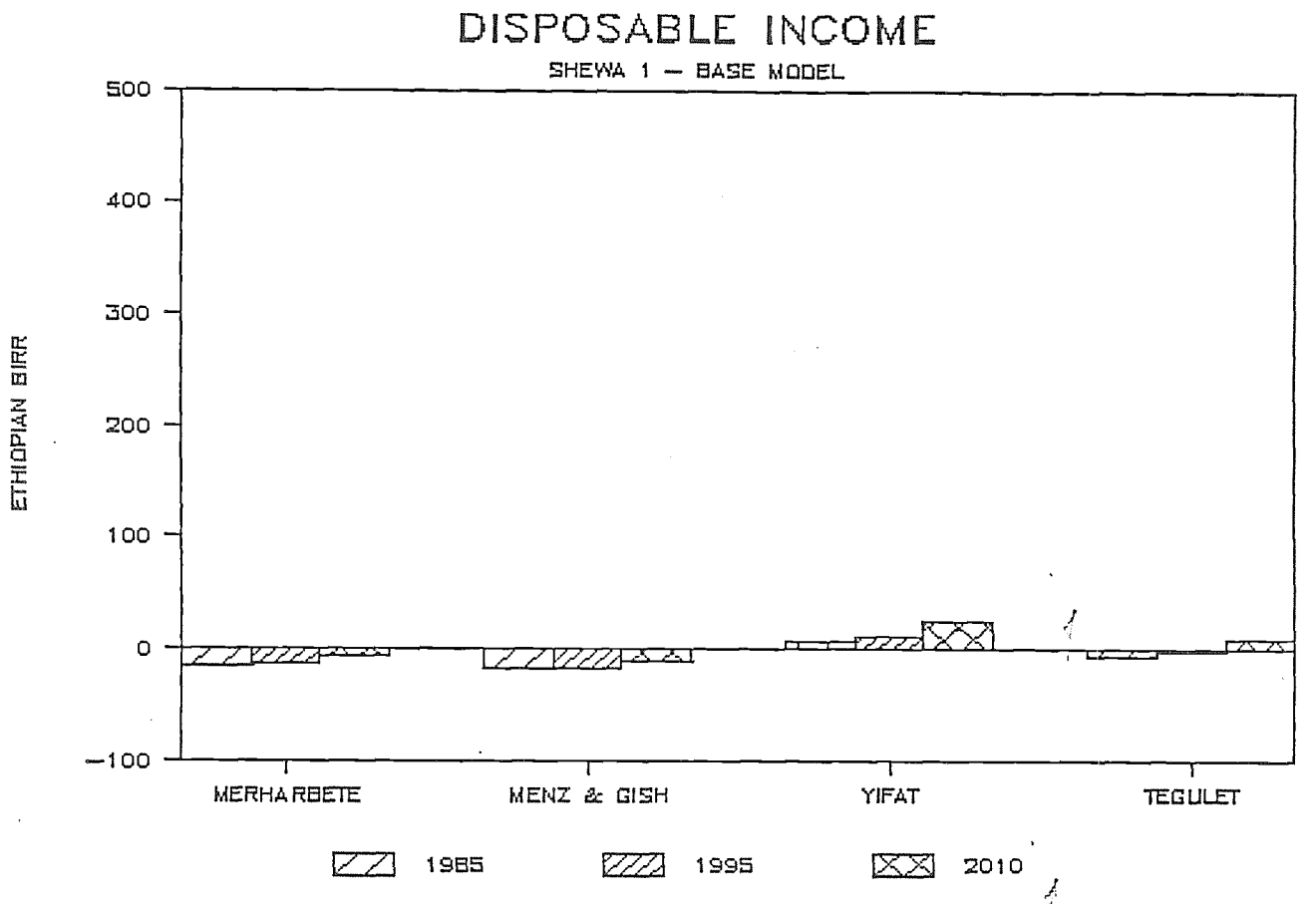
400
300
200
100
0
−100
KEFA
MAJI & GOLDIYA
GIMIRA
1985
1995
2010


DISPOSABLE INCOME
SHEWA 1 — BASE MODEL
ETHIOPIAN BIRR
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400
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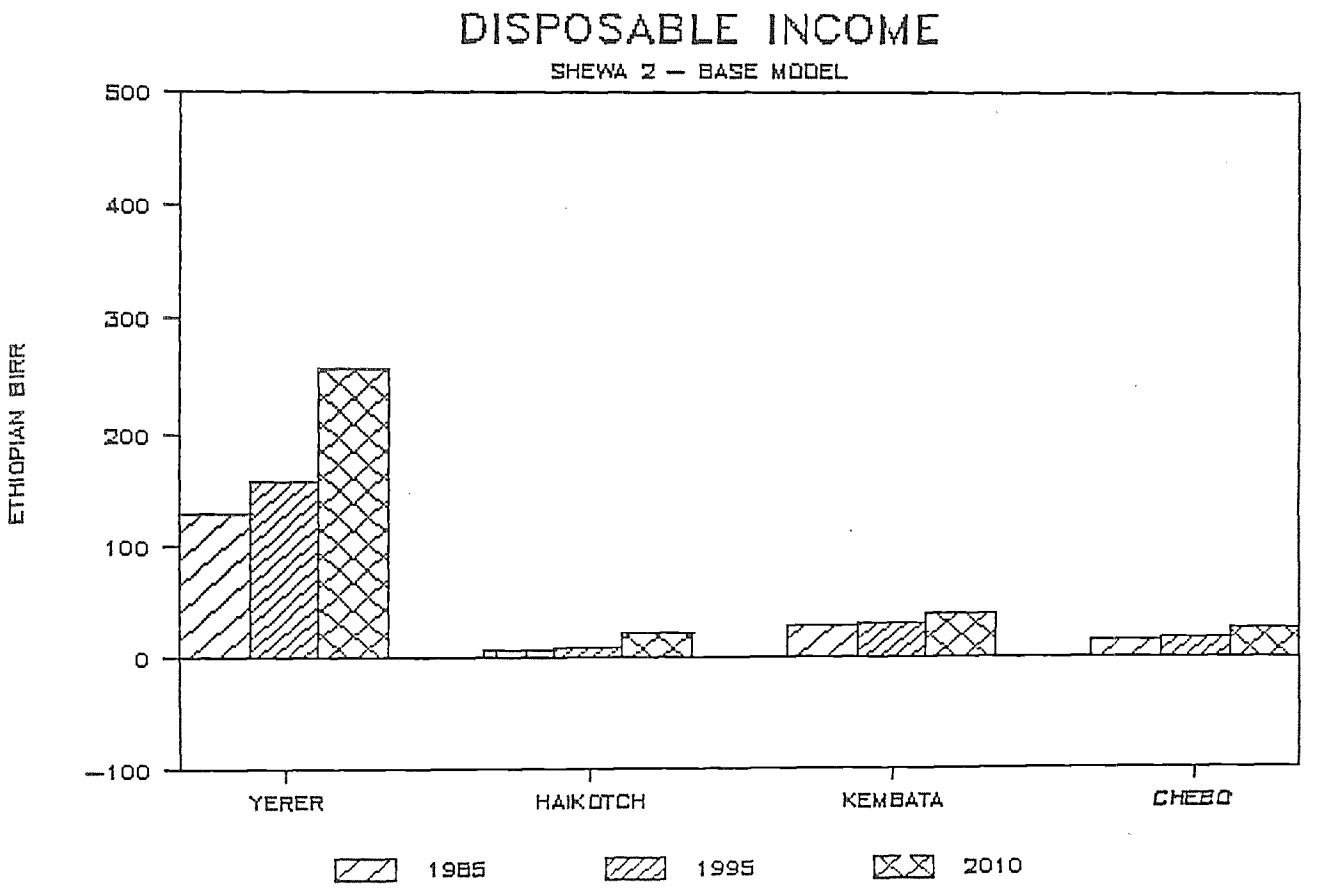
200
100
0
−100
MERHARBETE
MENZ & GISH
YIFAT
TEGULET
1985
1995
2010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200
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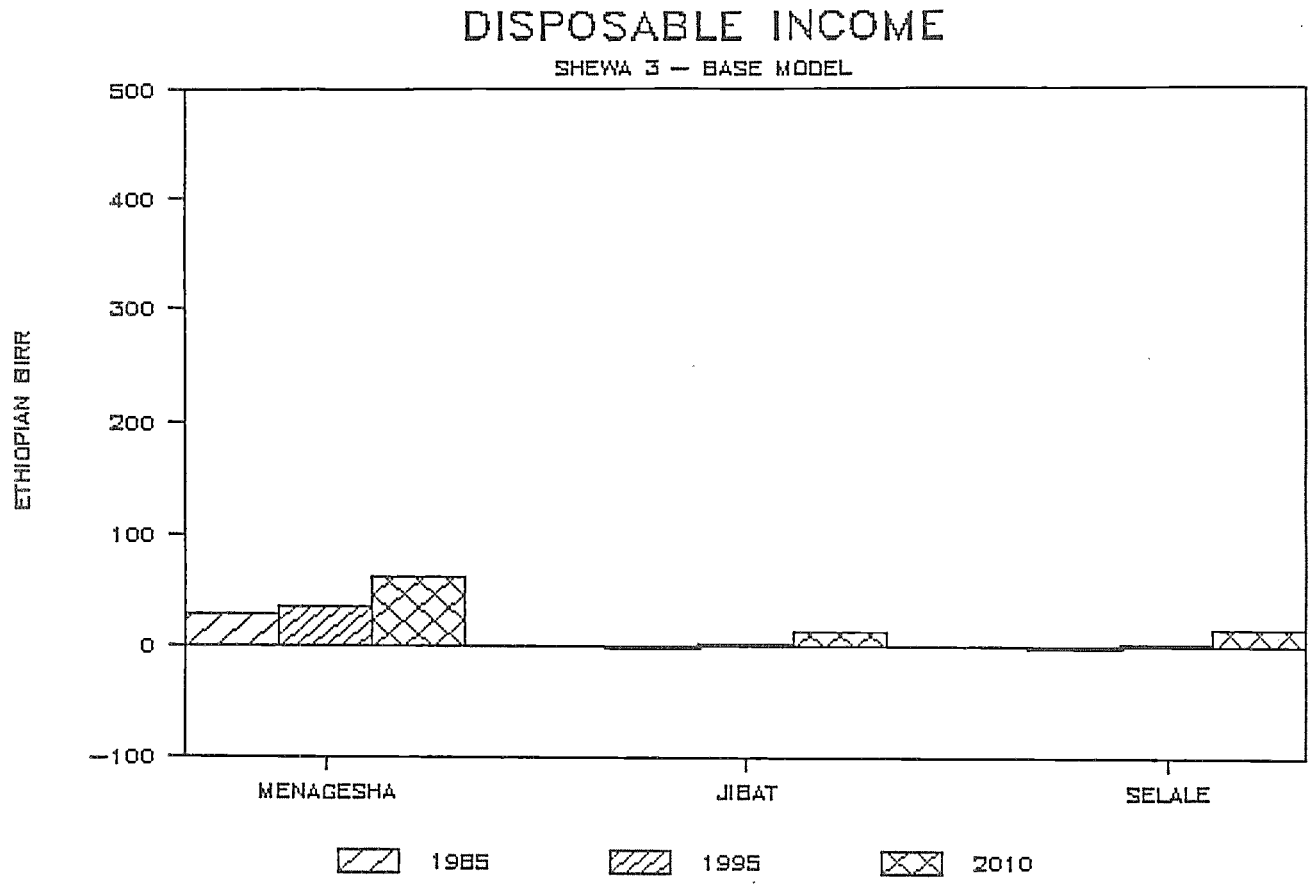
−100
YERER
HAIKOTCH
KEMBATA
CHEBO
1985
1995
2010


DISPOSABLE INCOME
SHEWA 3 — BASE MODEL
ETHIOPIAN BIRR
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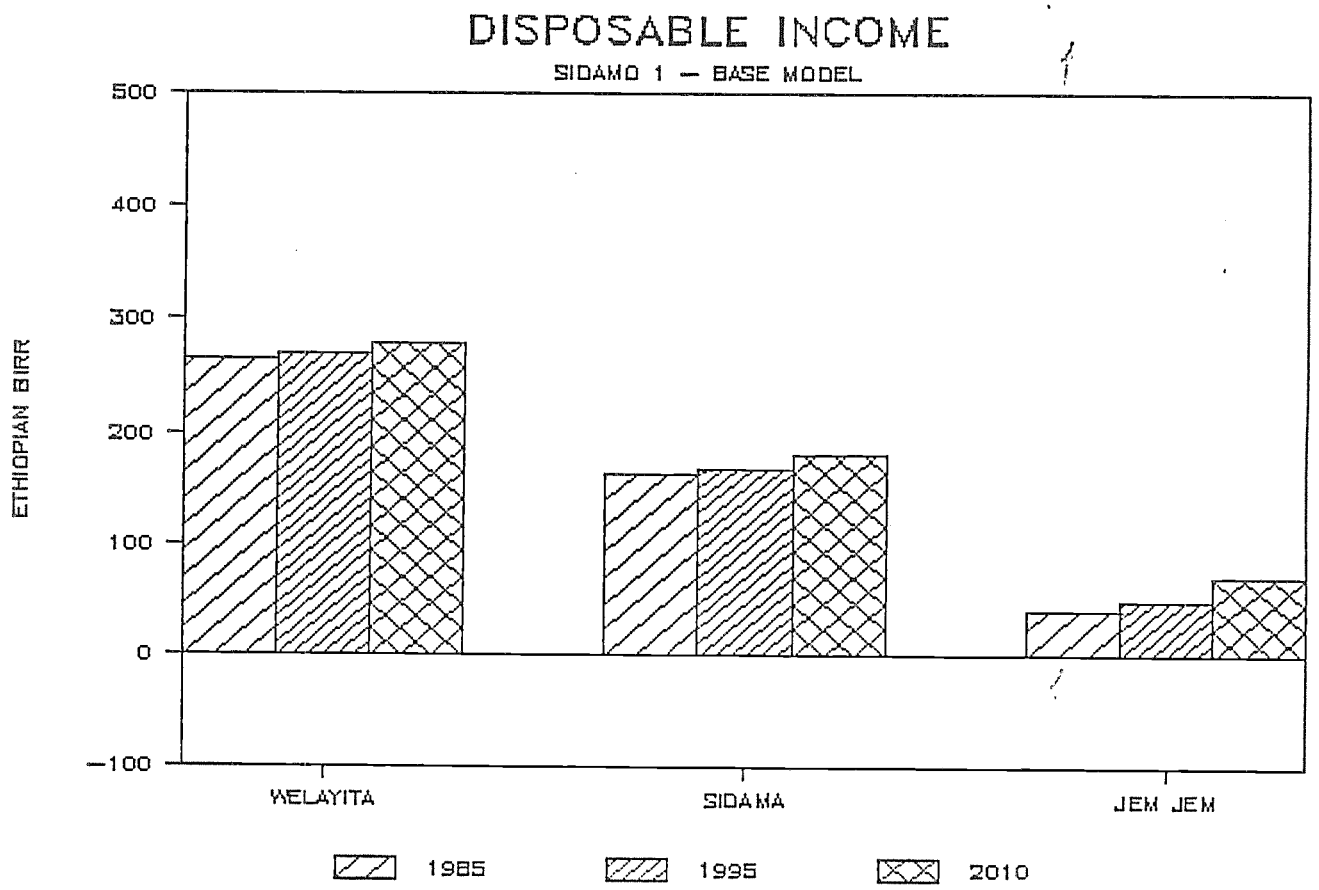
300
200
100
0
-100
MENAGESHA
JIBAT
SELALE
1985
1995
2010


DISPOSABLE INCOME
SIDAMO 1 — BASE MODEL
ETHIOPIAN BIRR
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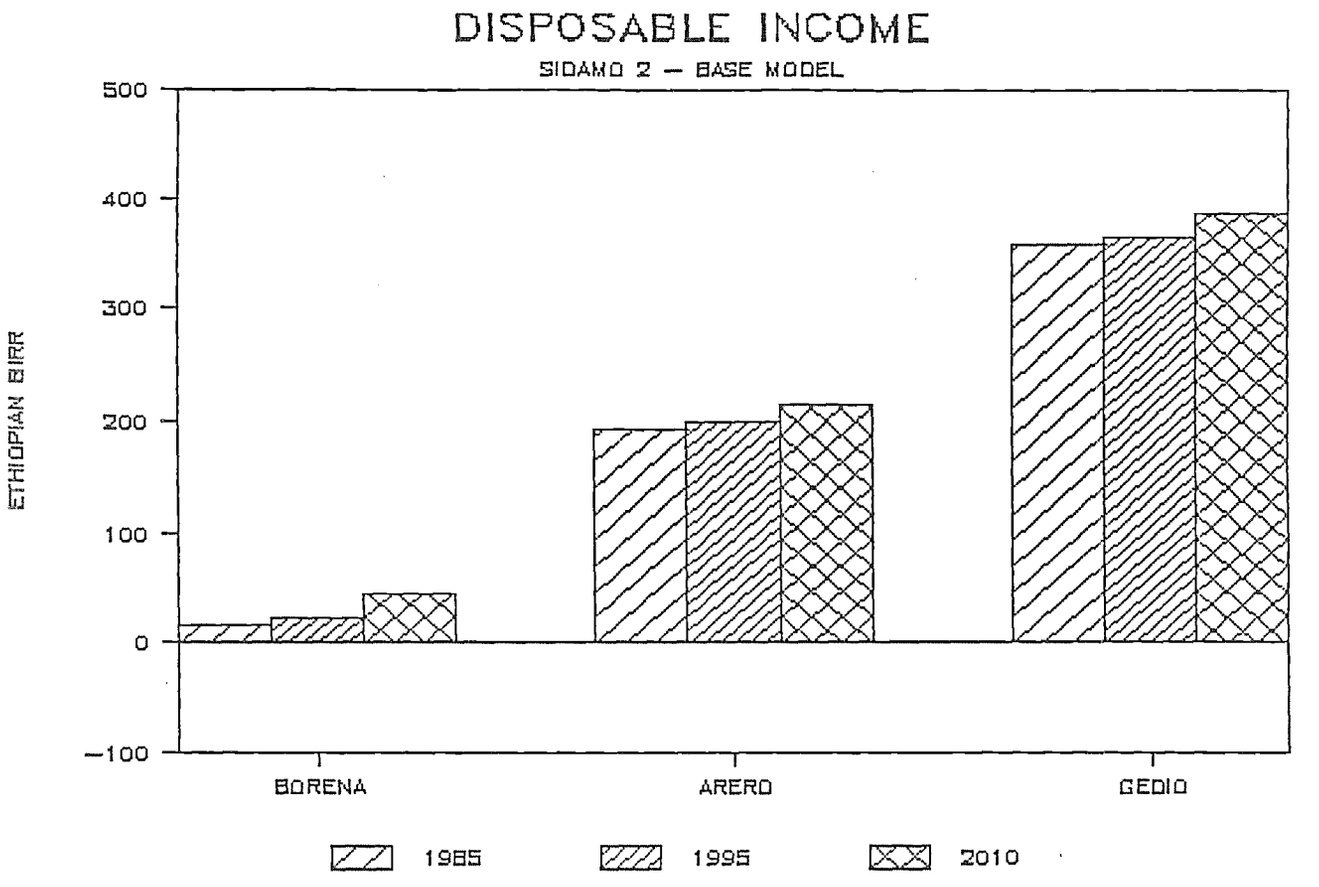
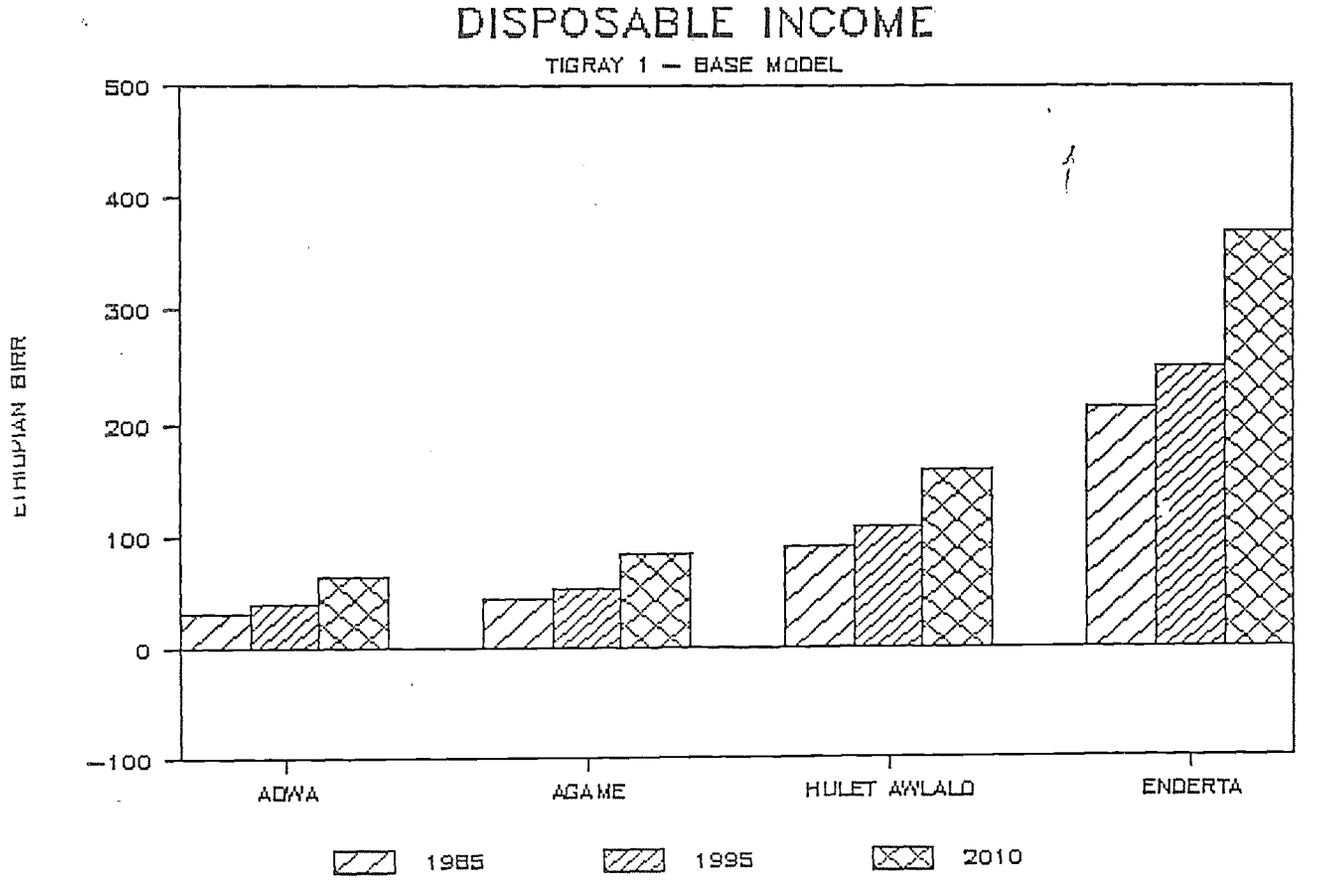
400
300
200
100
0
-100
WELAYITA
SIDAMA
JEM JEM
1985
1995
2010


DISPOSABLE INCOME
SIDAMO 2 — BASE MODEL
ETHIOPIAN BIRR
500
400
300
200
100
0
−100
BORENA
ARERO
GEDIO
1985
1995
2010


DISPOSABLE INCOME
TIGRAY 1 — BASE MODEL
ETHIOPIAN BIRR
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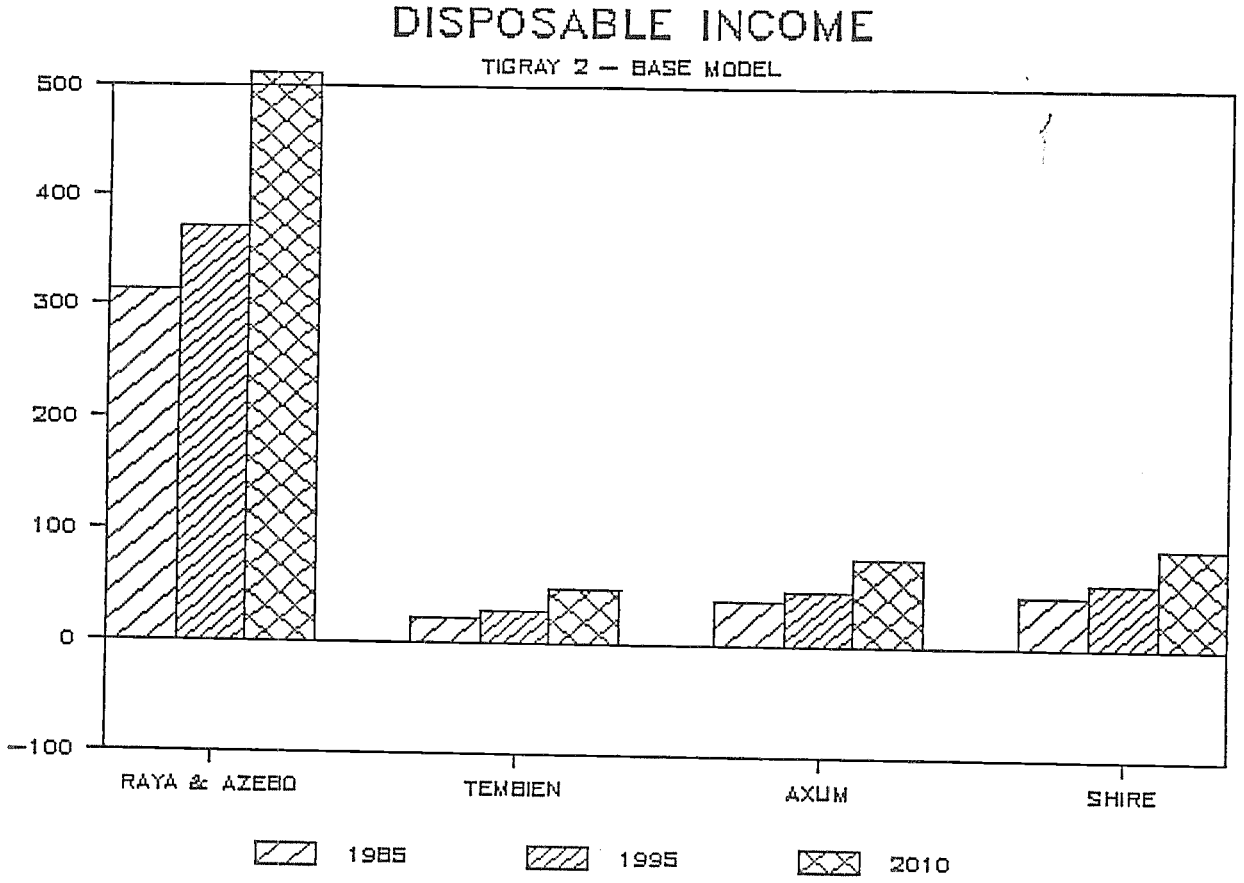
400
300
200
100
0
−100
ADWA
AGAME
HULET AWLALO
ENDERTA
1985
1995
2010


DISPOSABLE INCOME
TIGRAY 2 — BASE MODEL
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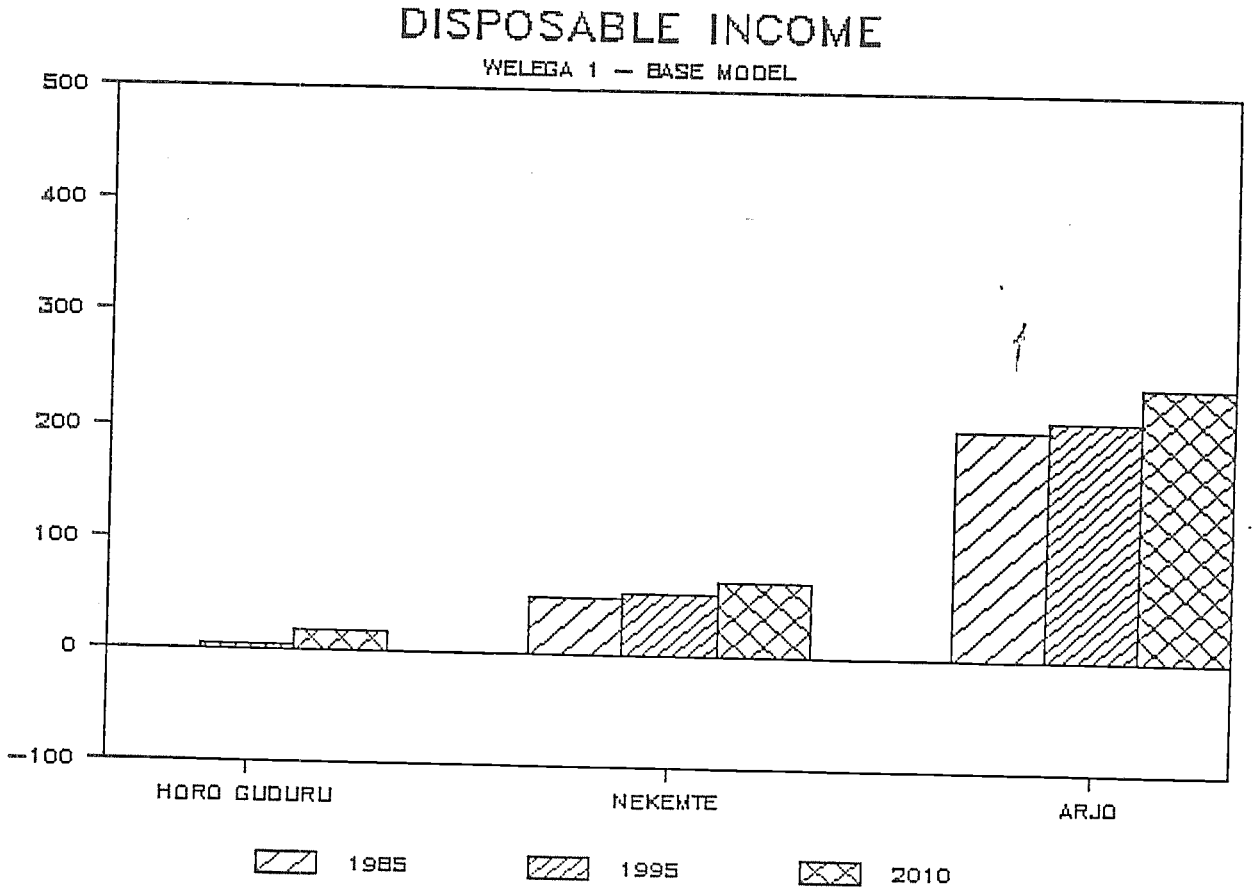
400
300
200
100
0
-100
RAYA & AZEBO
TEMBIEN
AXUM
SHIRE
1985
1995
2010


DISPOSABLE INCOME
WELEGA 1 — BASE MODEL
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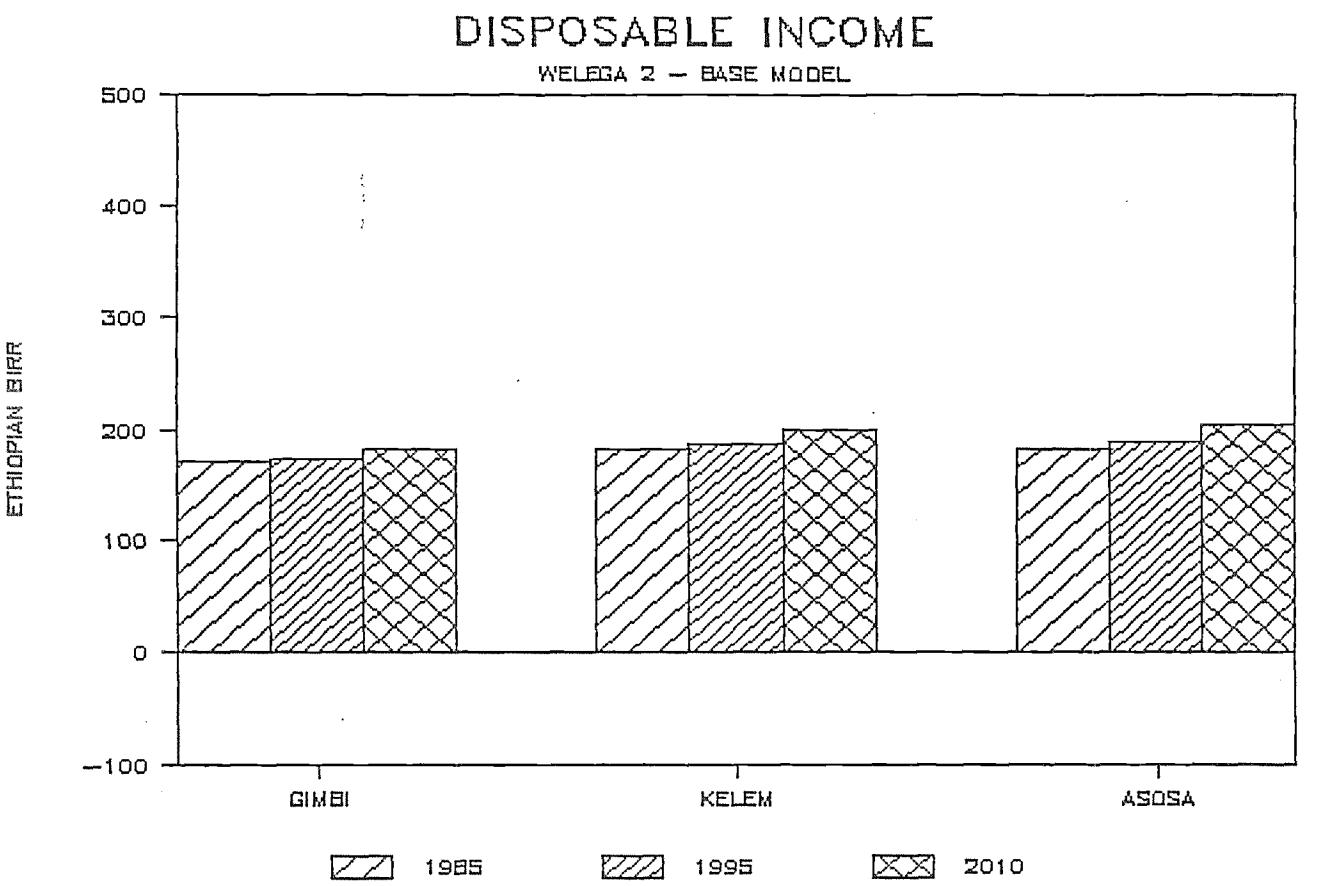
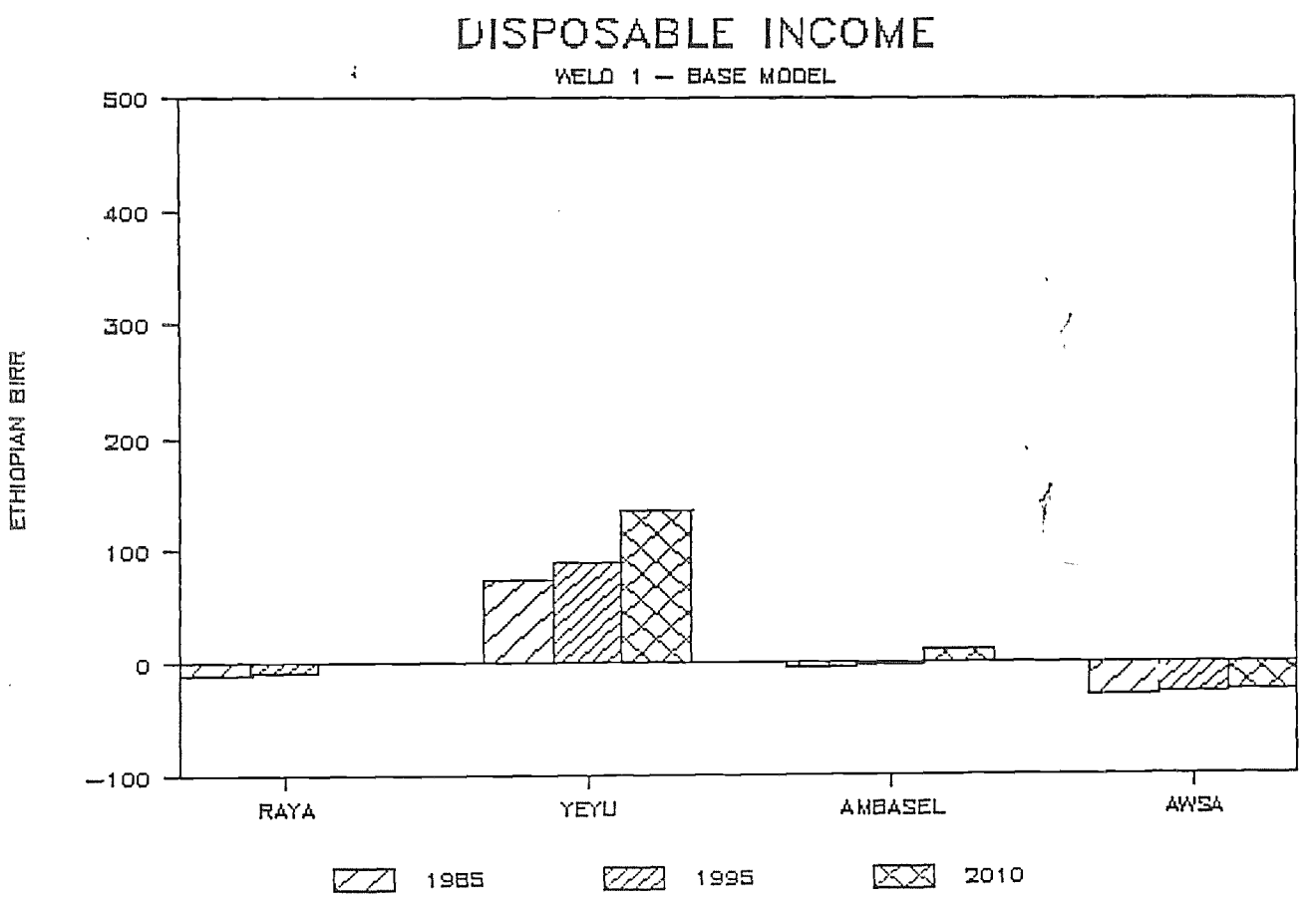
400
300
200
100
0
-100
HORO GUDURU
NEKEMTE
ARJO
1985
1995
2010


DISPOSABLE INCOME
WELEGA 2 — BASE MODEL
ETHIOPIAN BIRR
500
400
300
200
100
0
-100
GIMBI
KELEM
ASOSA
1985
1995
2010


DISPOSABLE INCOME
WELO 1 — BASE MODEL
ETHIOPIAN BIRR
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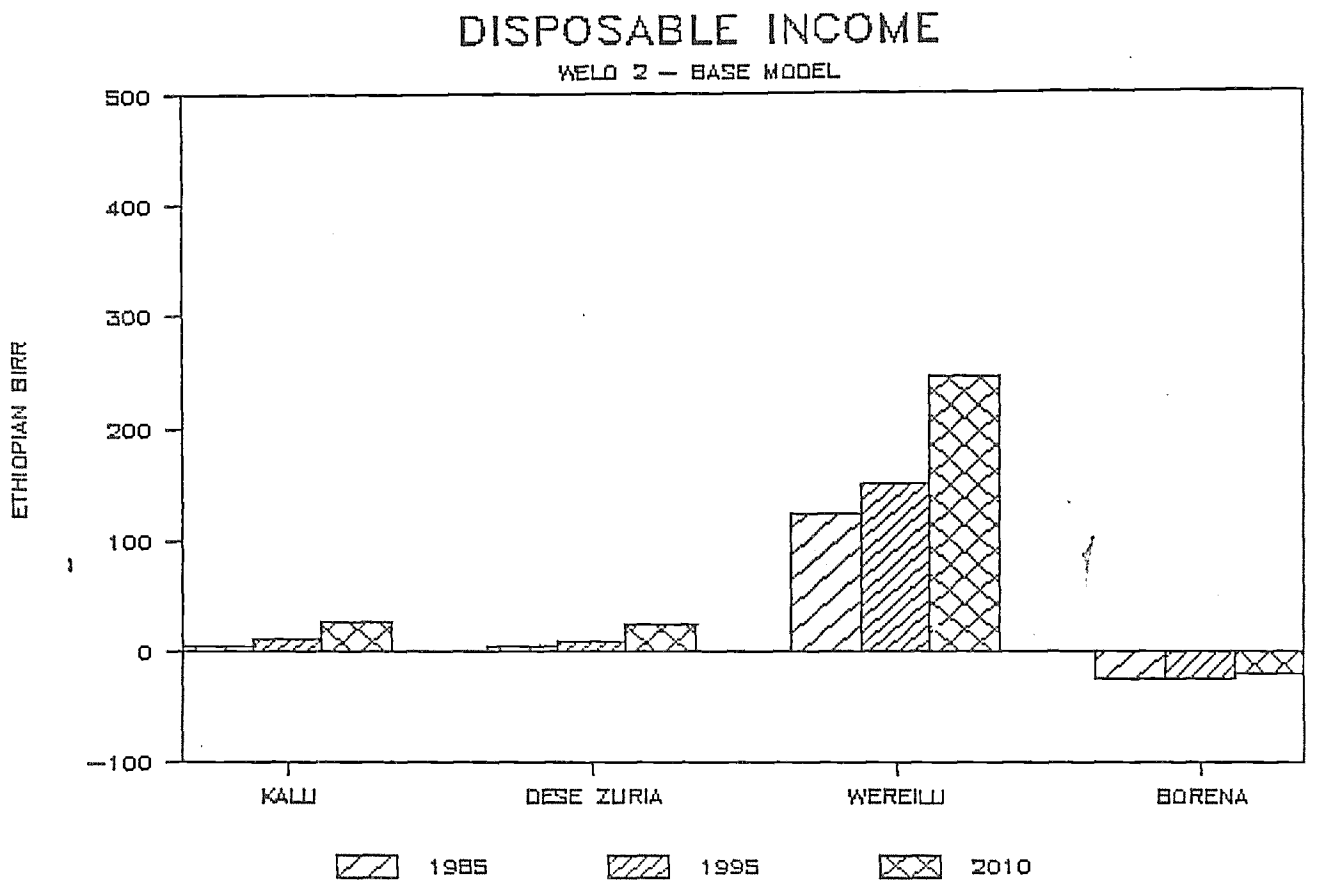
200
100
0
-100
RAYA
YEYU
AMBASEL
AWSA
1985
1995
2010


DISPOSABLE INCOME
WELO 2 — BASE MODEL
ETHIOPIAN BIRR
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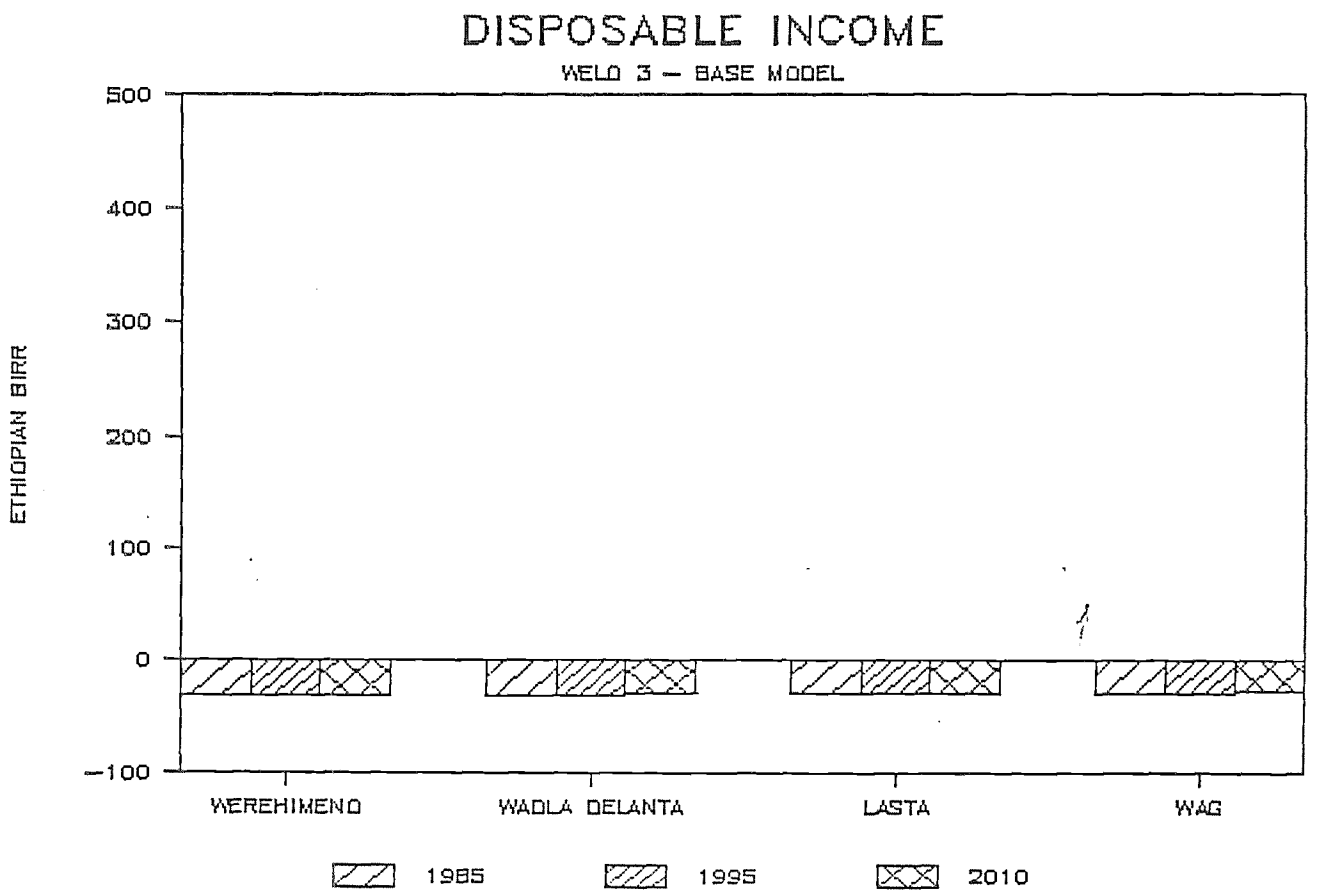
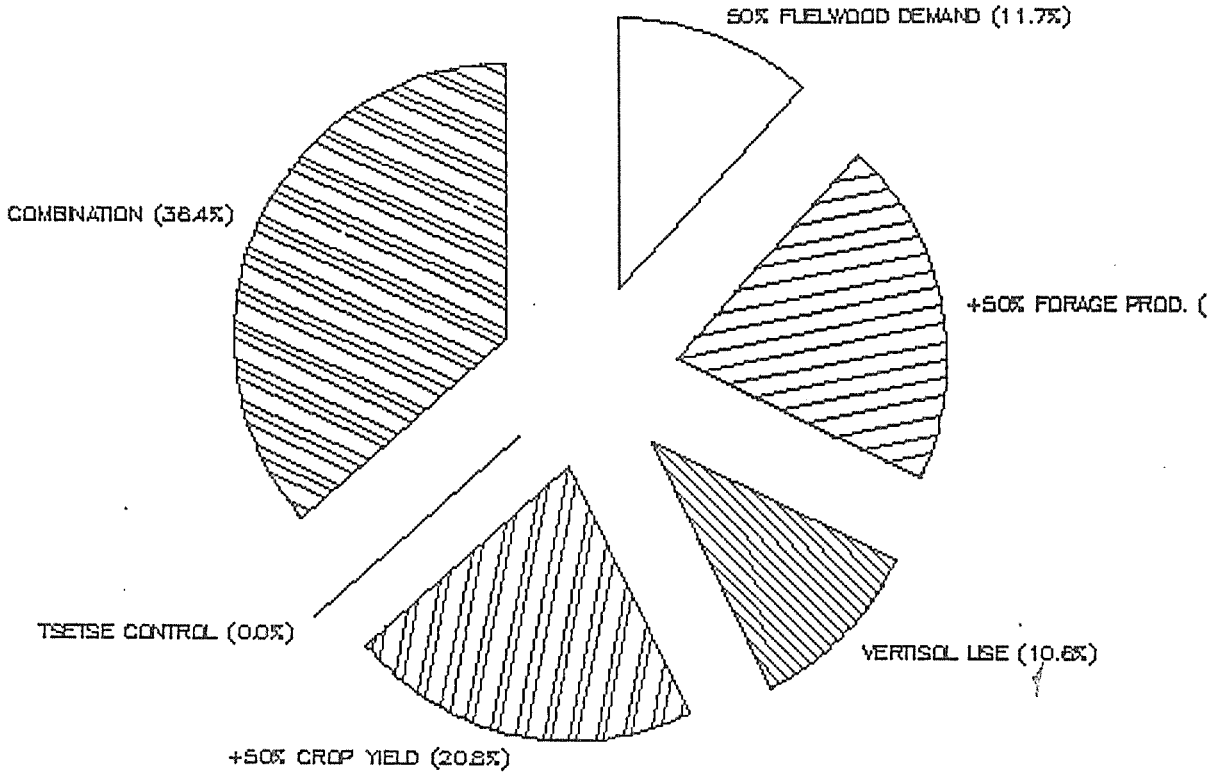
300
200
100
0
-100
KALU
DESE ZURIA
WEREILU
BORENA
1985
1995
2010


DISPOSABLE INCOME
WELO 3 — BASE MODEL
ETHIOPIAN BIRR
500
400
300
200
100
0
-100
WEREHIMENO
WADLA DELANTA
LASTA
WAG
1985
1995
2010

COMPARISON OF THE RELATIVE IMPACT OF SELECTED INTERVENTIONS

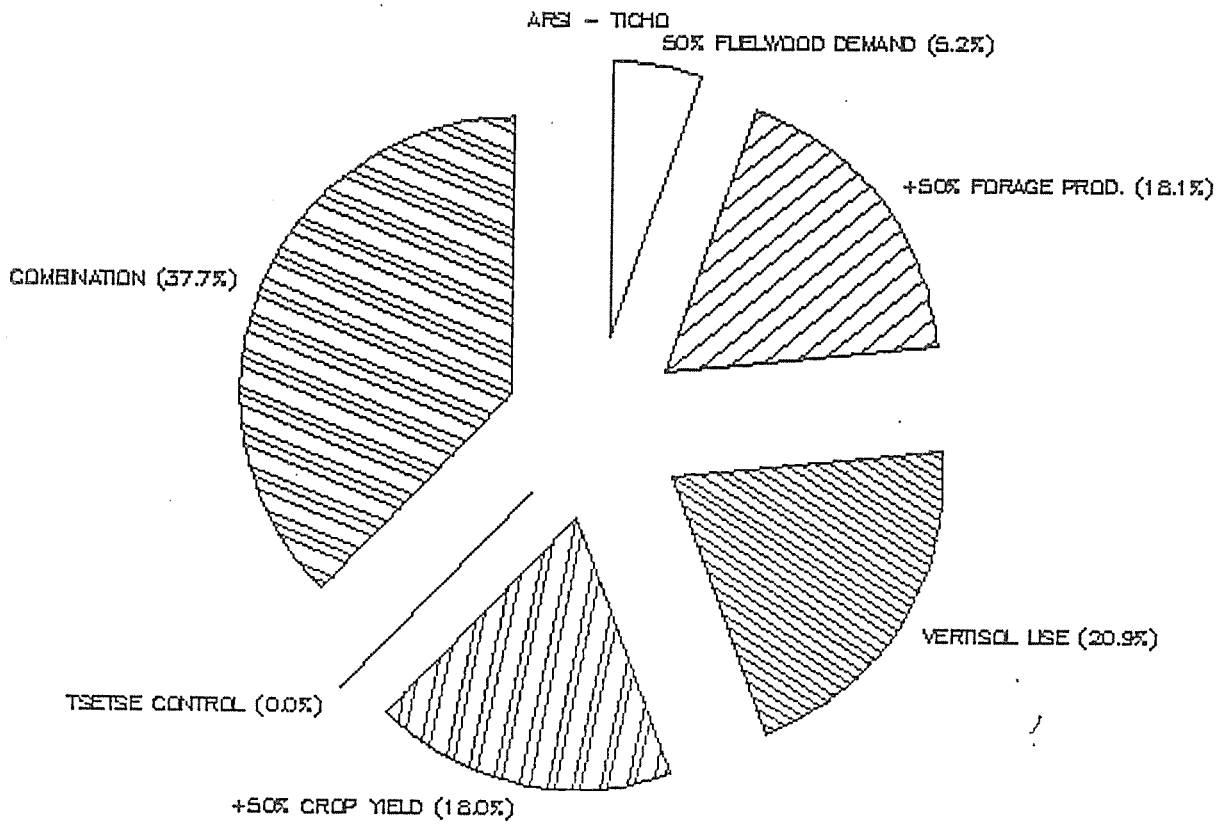
RELATIVE IMPACT OF INTERVENTIONS – 1995

ARSI – AREA GUGU



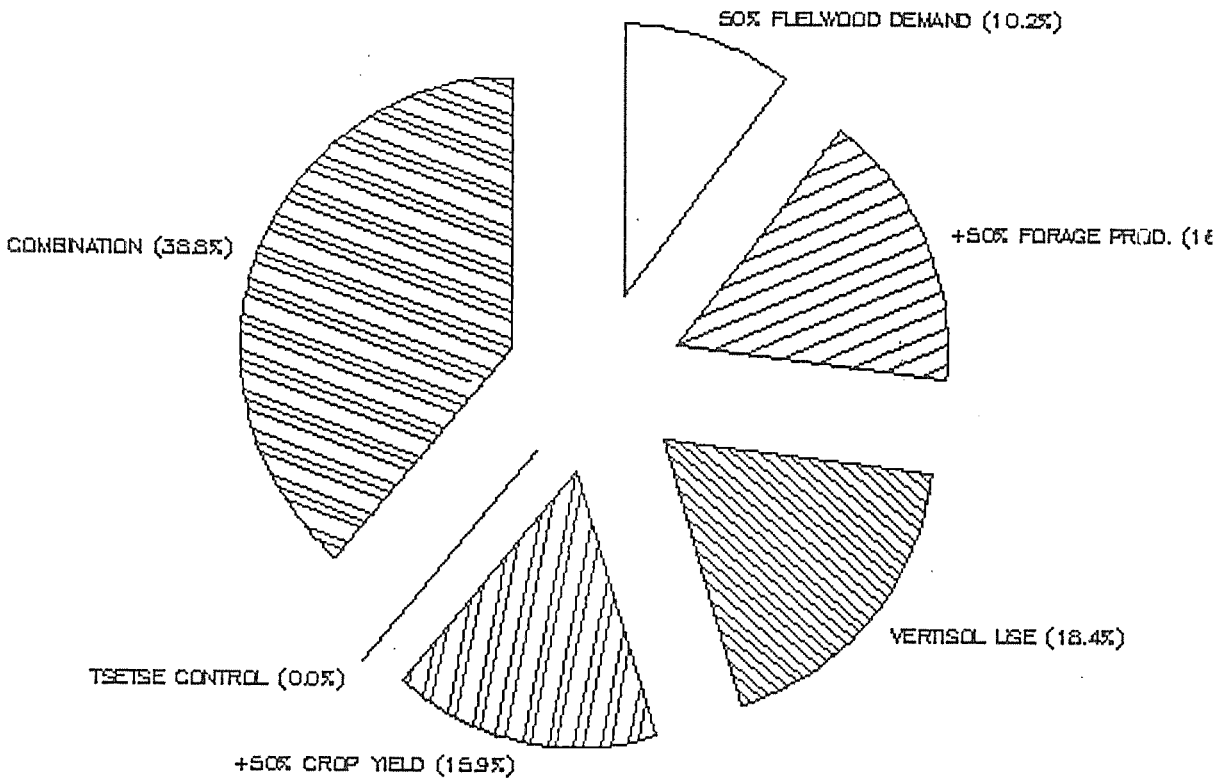
RELATIVE IMPACT OF INTERVENTIONS – 1995

ARSI – TICHO



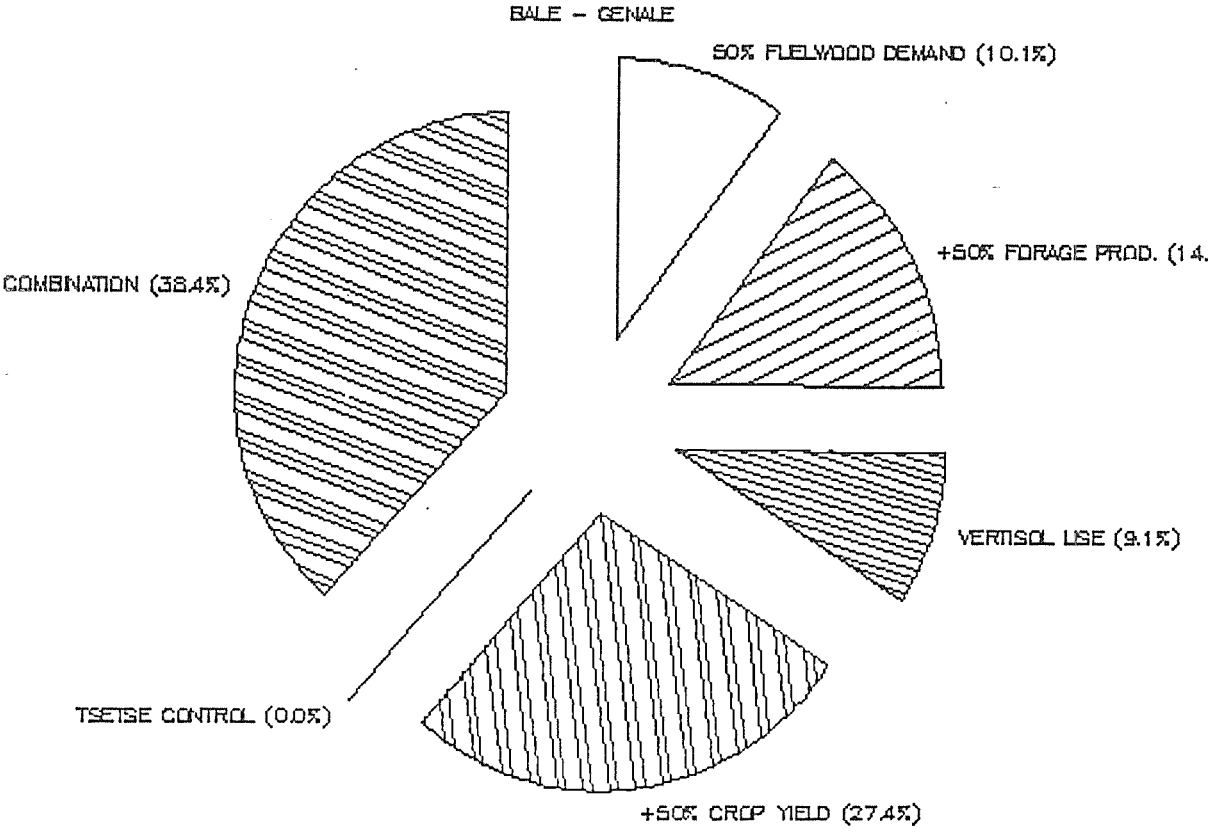
RELATIVE IMPACT OF INTERVENTIONS — 1995

ARSI – CHILALO



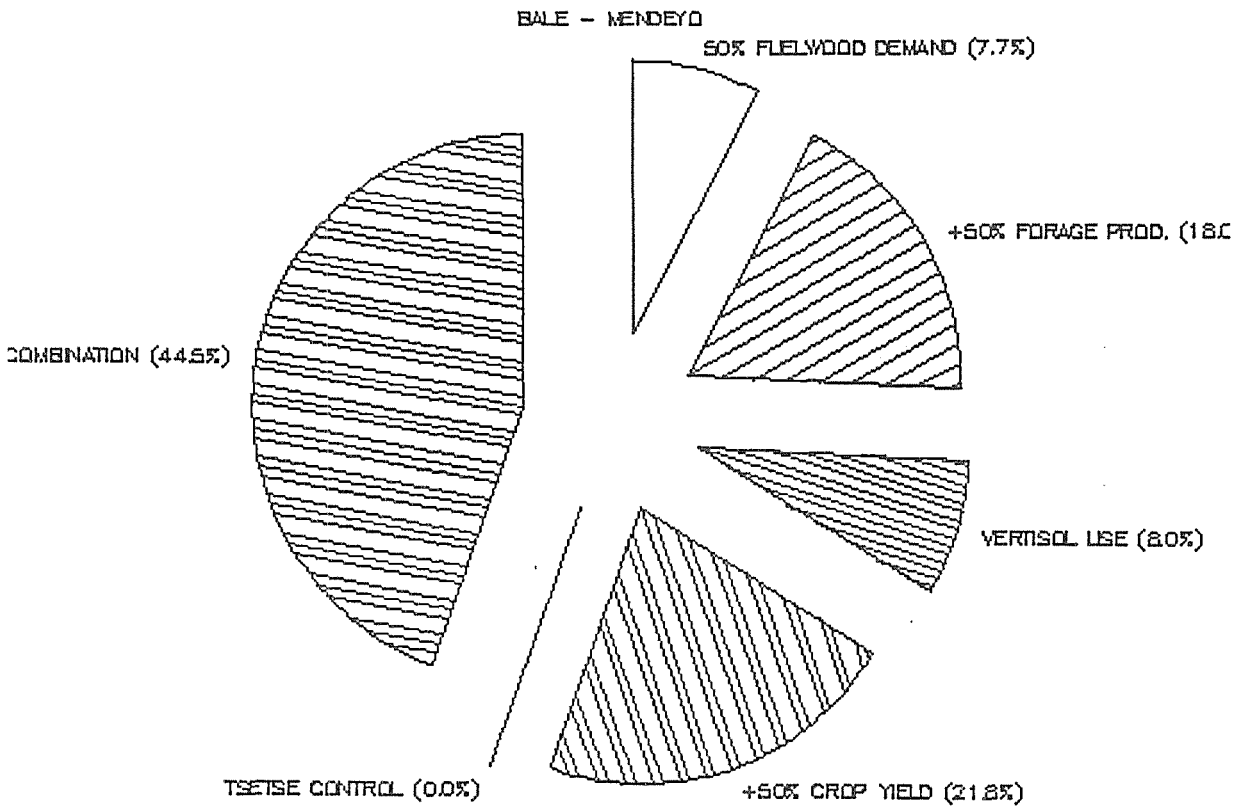
RELATIVE IMPACT OF INTERVENTIONS — 1995

BALE – GENALE



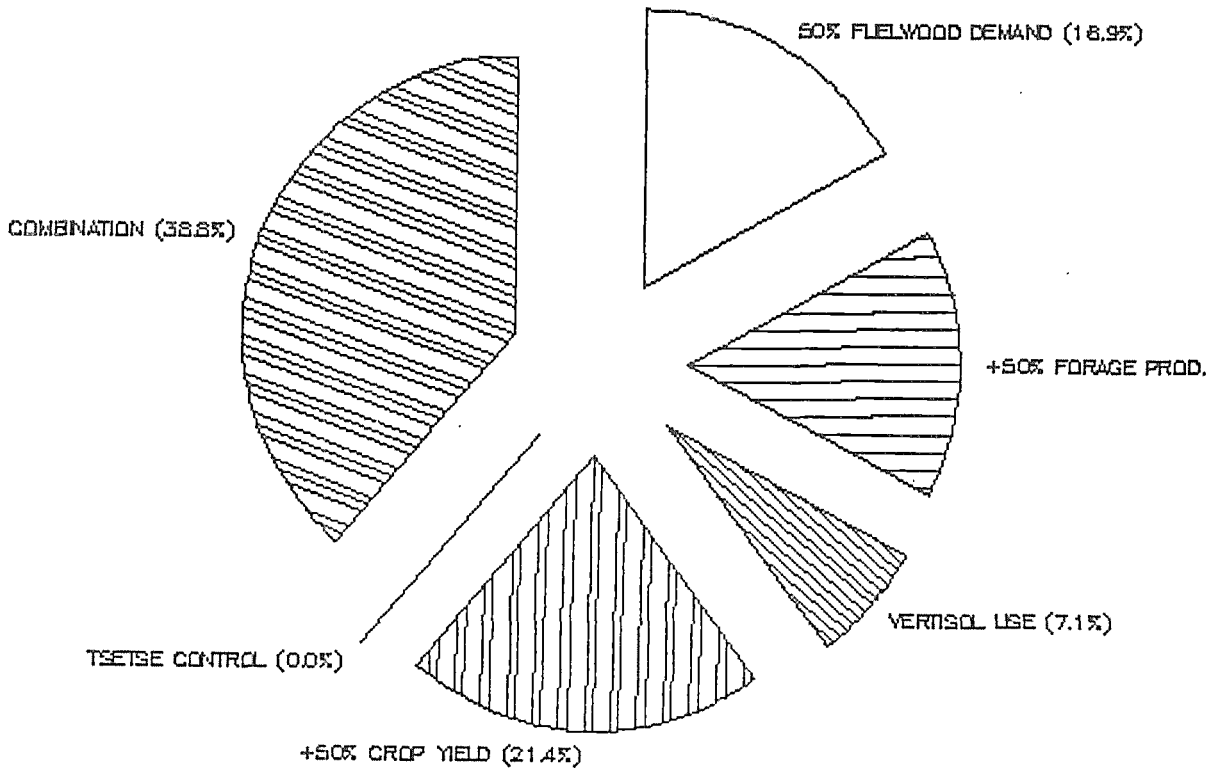
RELATIVE IMPACT OF INTERVENTIONS – 1995

BALE – MENDEYO



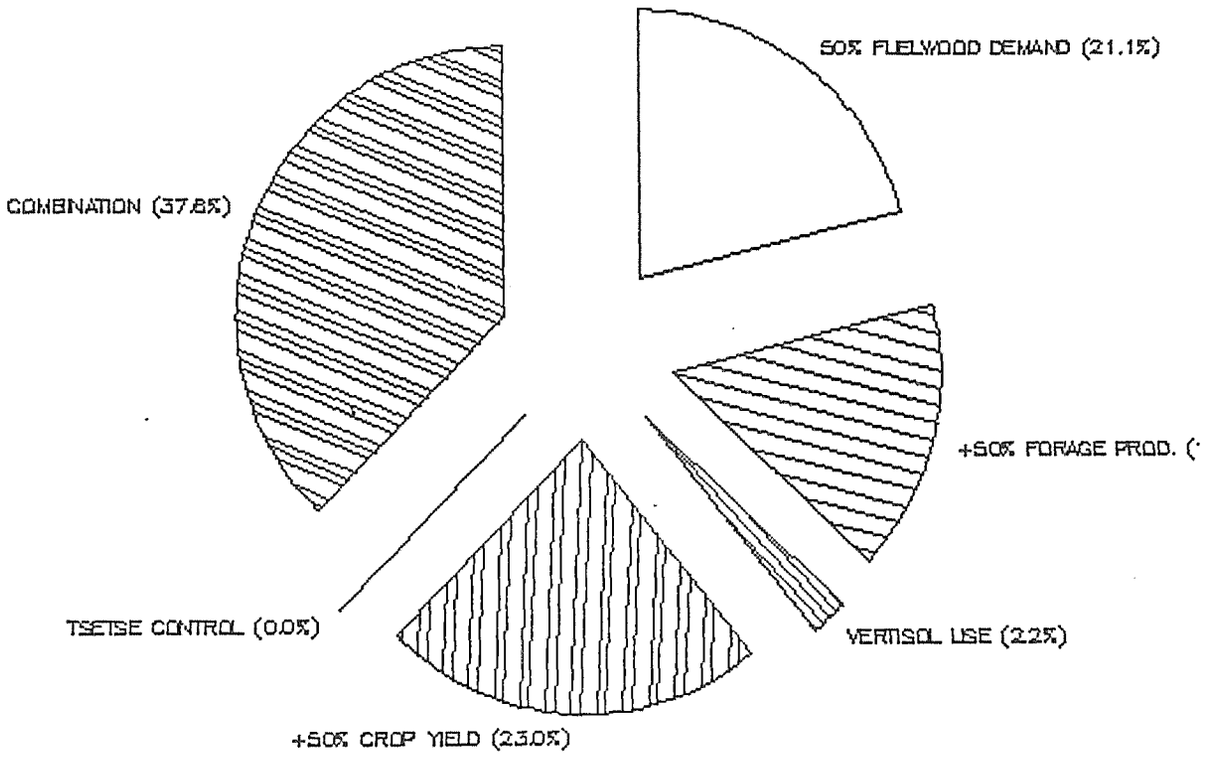
RELATIVE IMPACT OF INTERVENTIONS – 1995

BALE – WABE



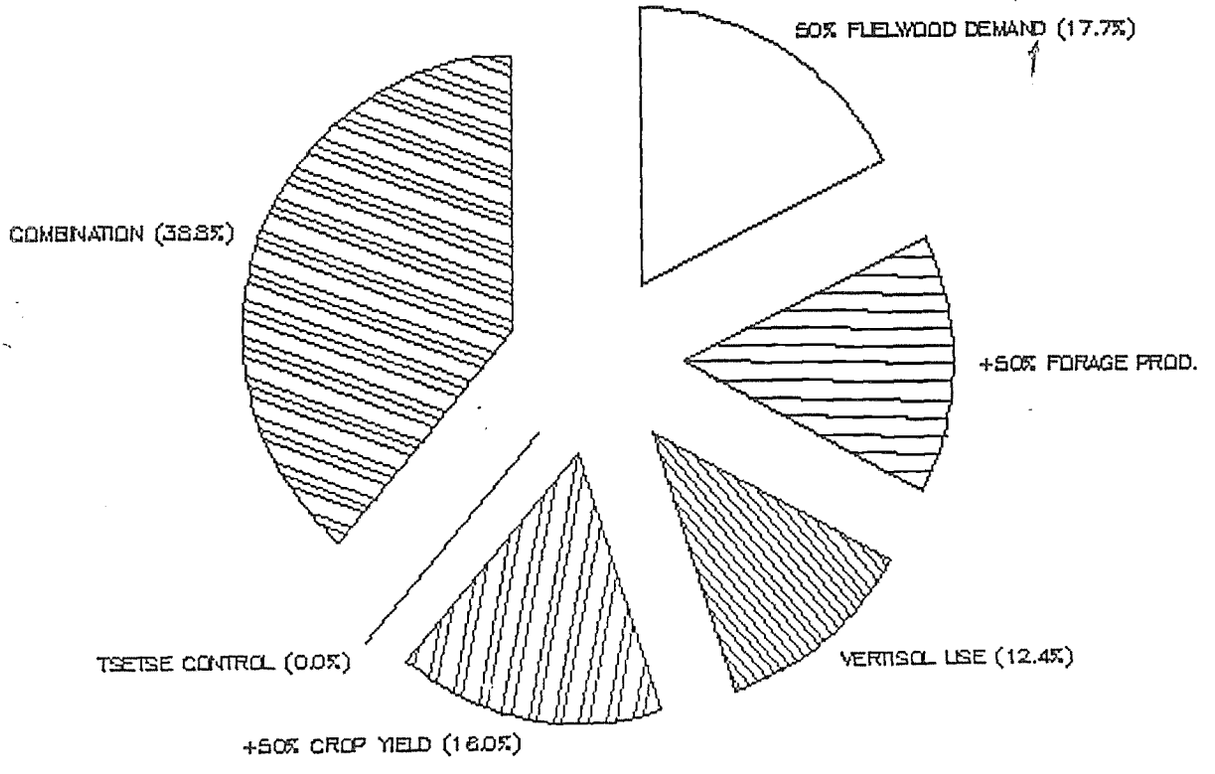
RELATIVE IMPACT OF INTERVENTIONS – 1995

BALE – ELKERE



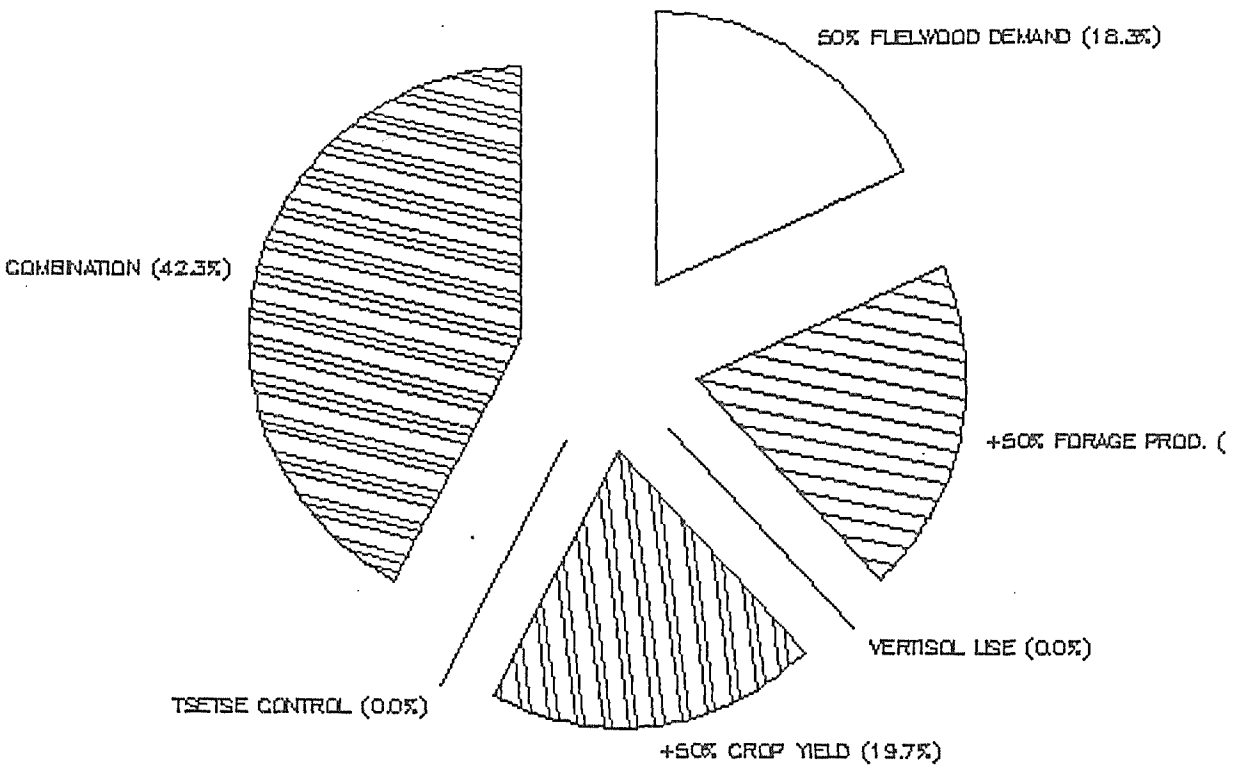
RELATIVE IMPACT OF INTERVENTIONS – 1995

BALE – DOLO



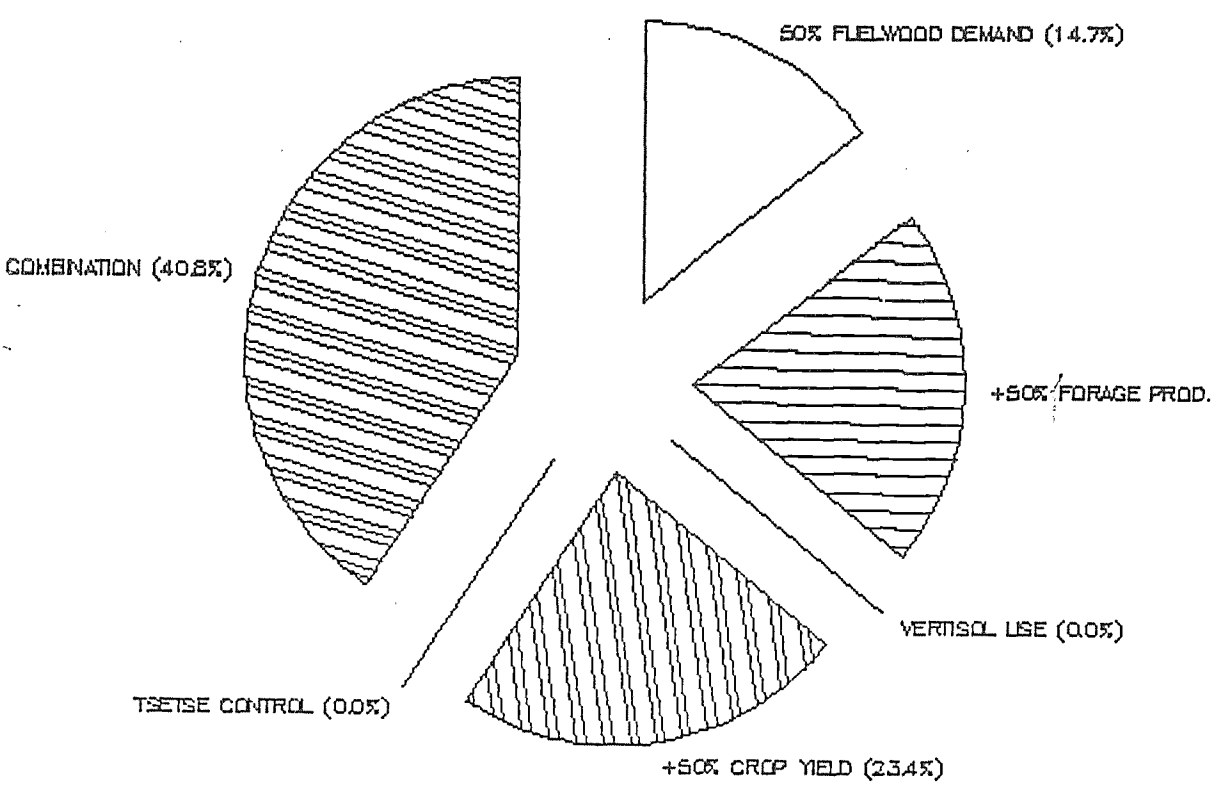
RELATIVE IMPACT OF INTERVENTIONS – 1995

ERITREA – KEY BAHR



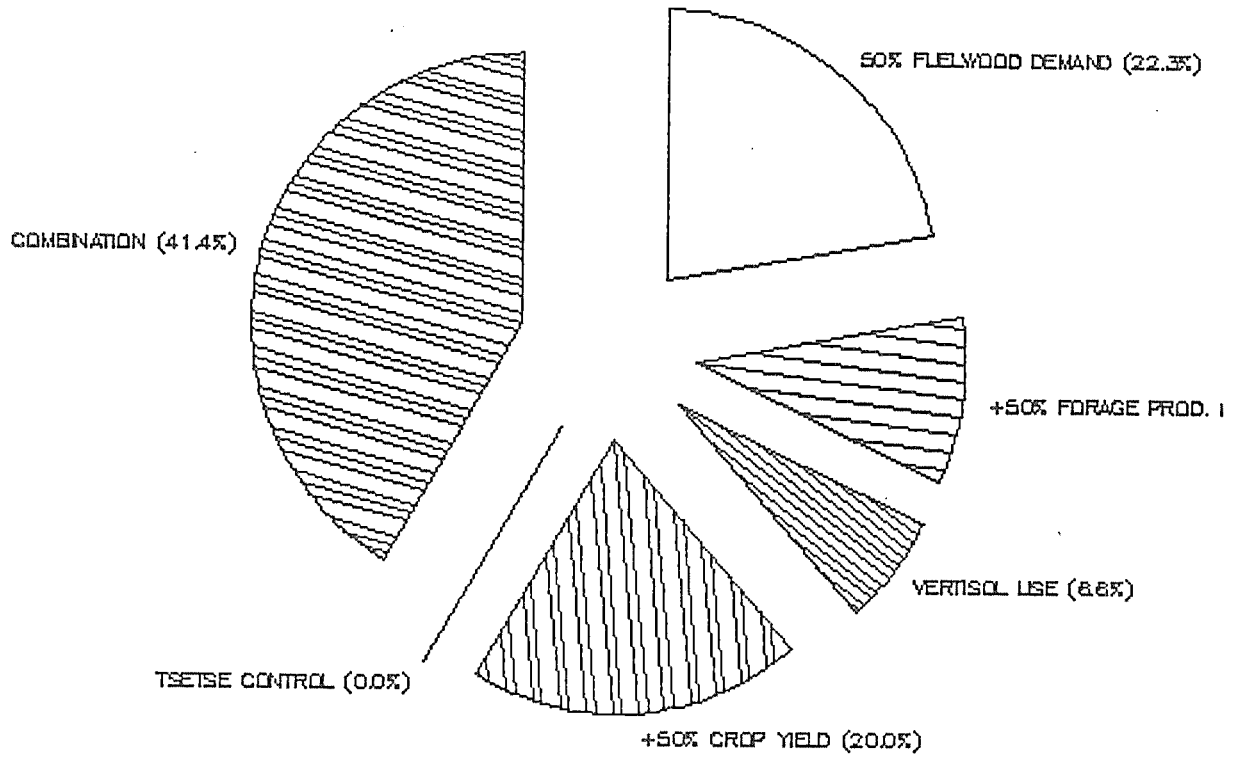
RELATIVE IMPACT OF INTERVENTIONS – 1995

ERITREA – AKALEGUZAY



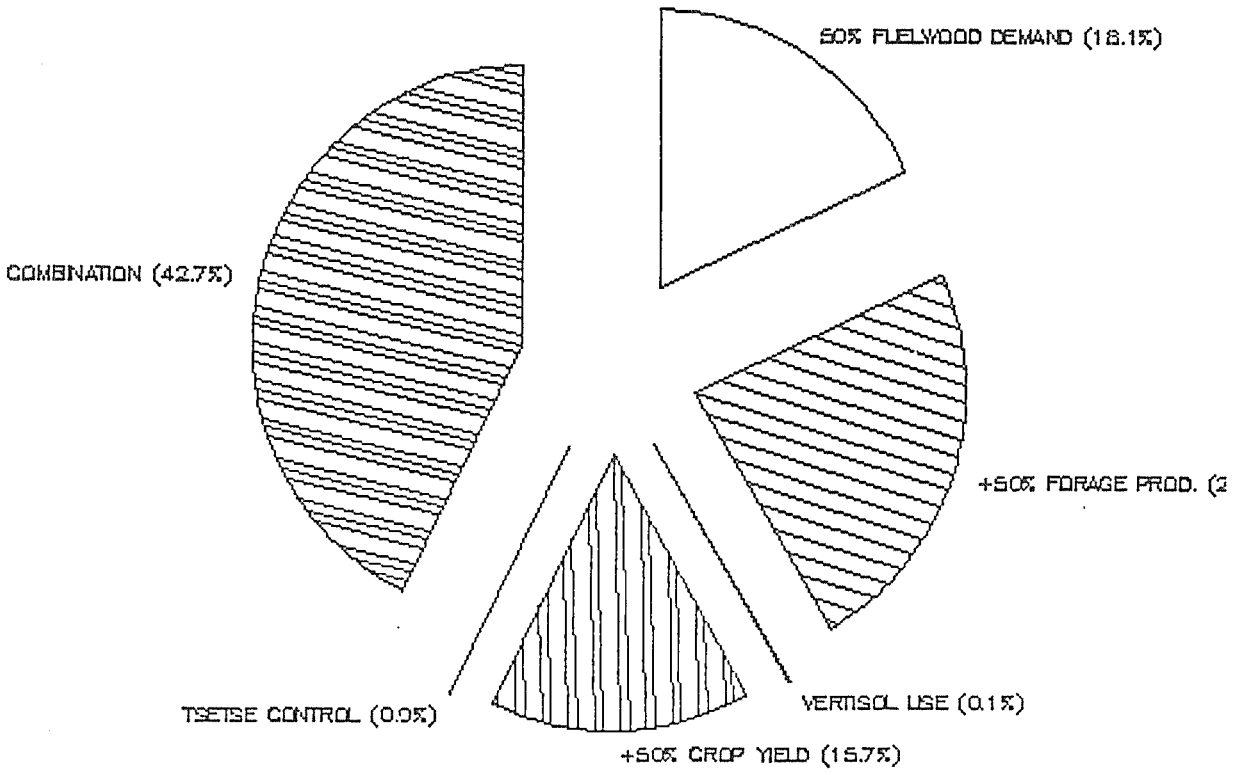
RELATIVE IMPACT OF INTERVENTIONS – 1995

ERITREA – SERAYE



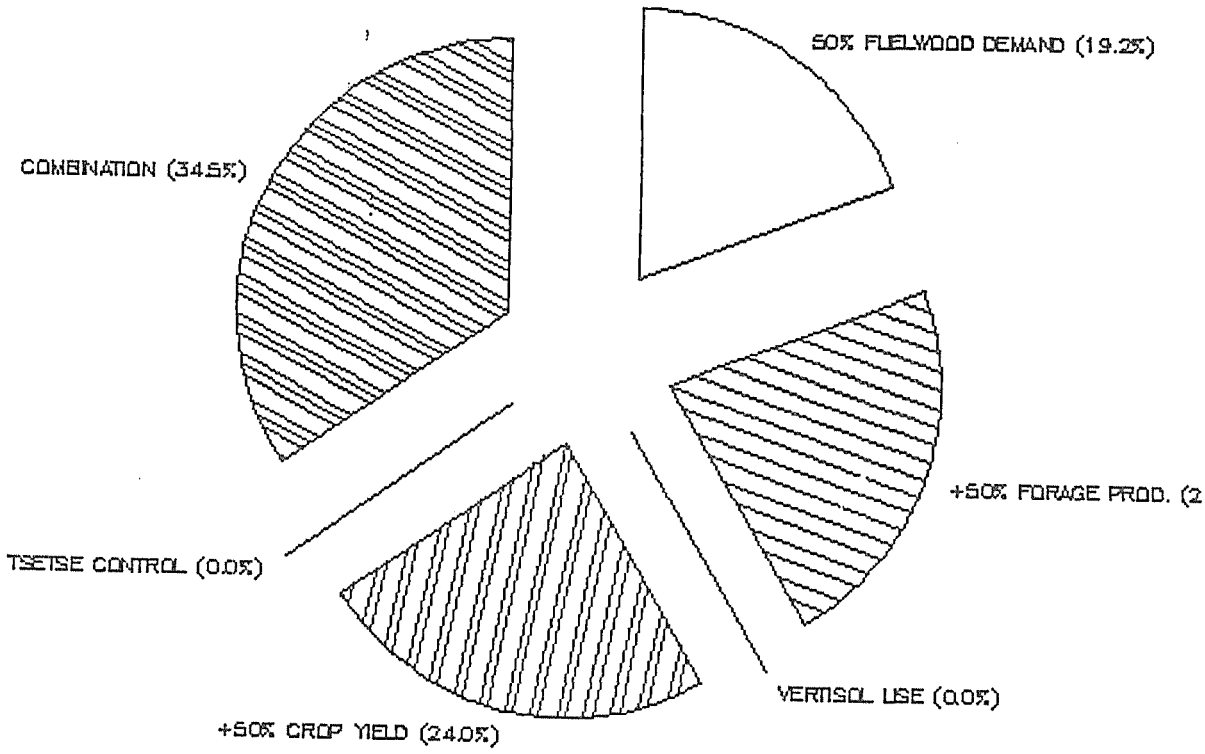
RELATIVE IMPACT OF INTERVENTIONS – 1995

ERITREA – HAMASSIEN



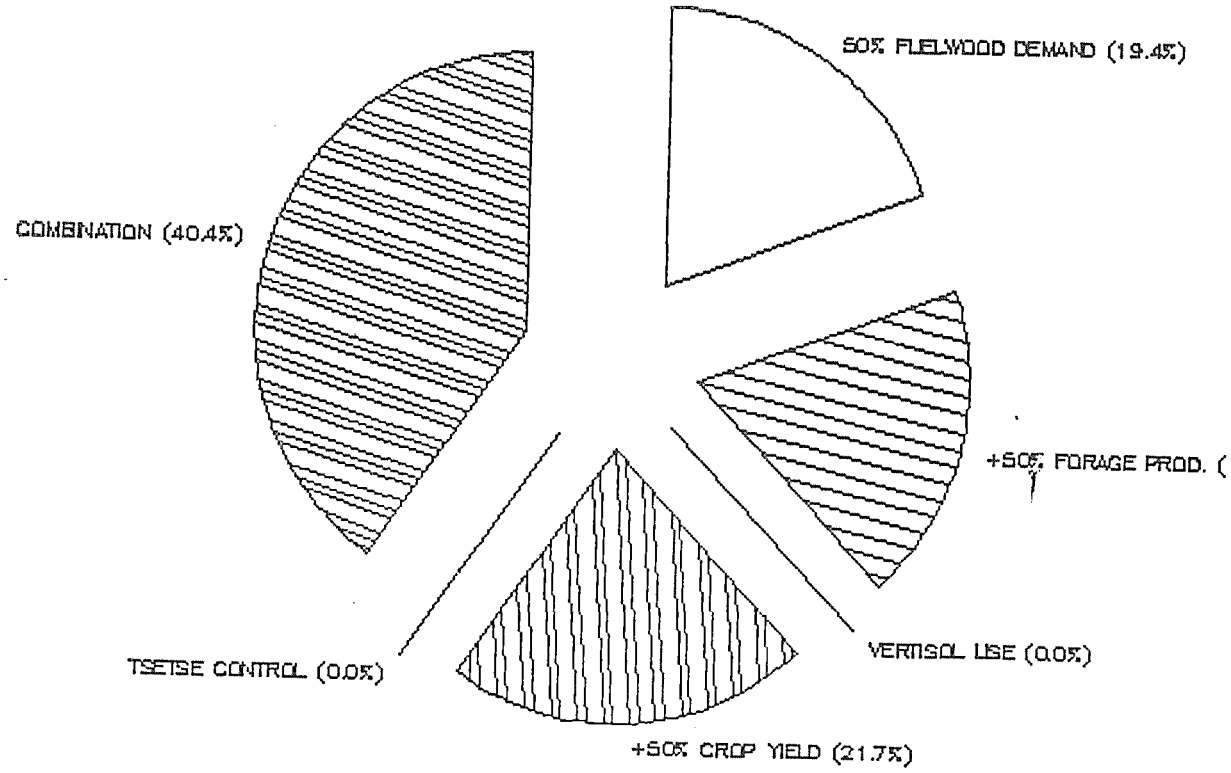
RELATIVE IMPACT OF INTERVENTIONS – 1995

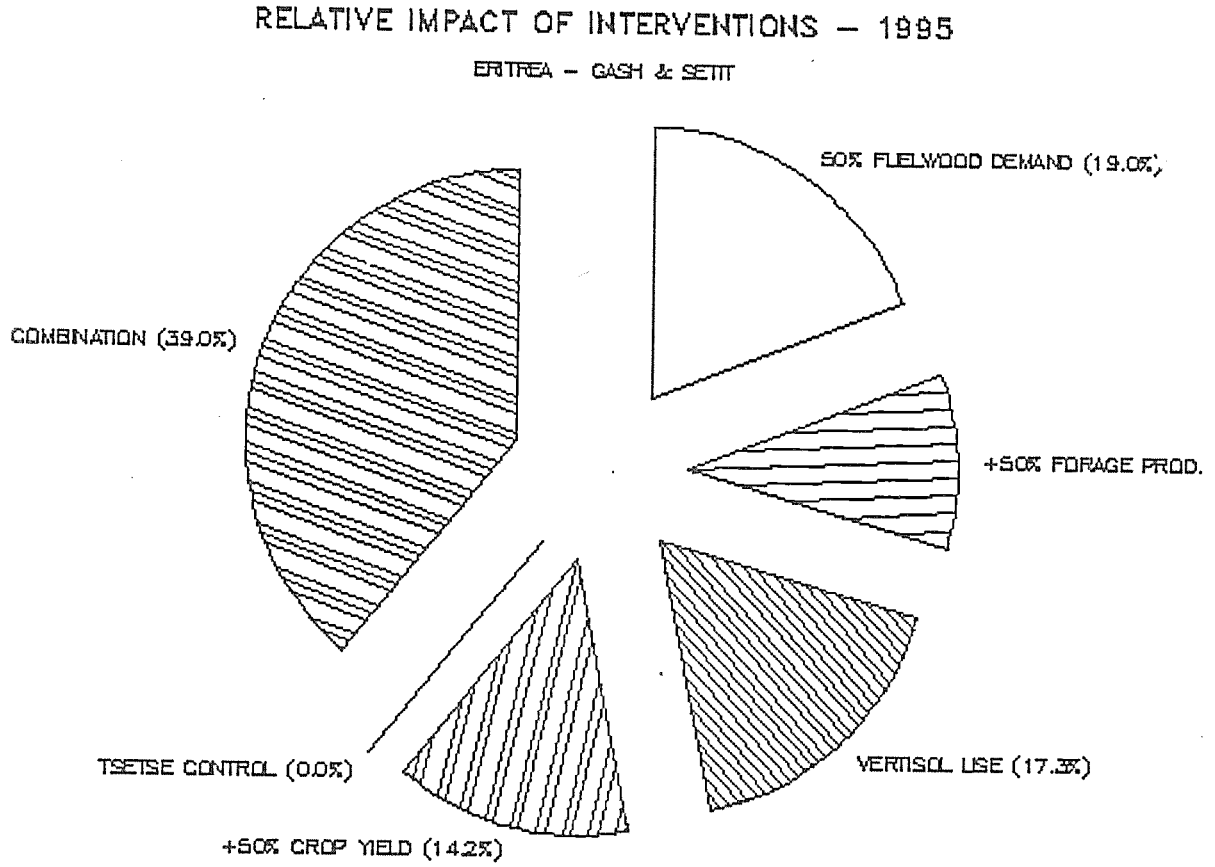
ERITREA – KEREN

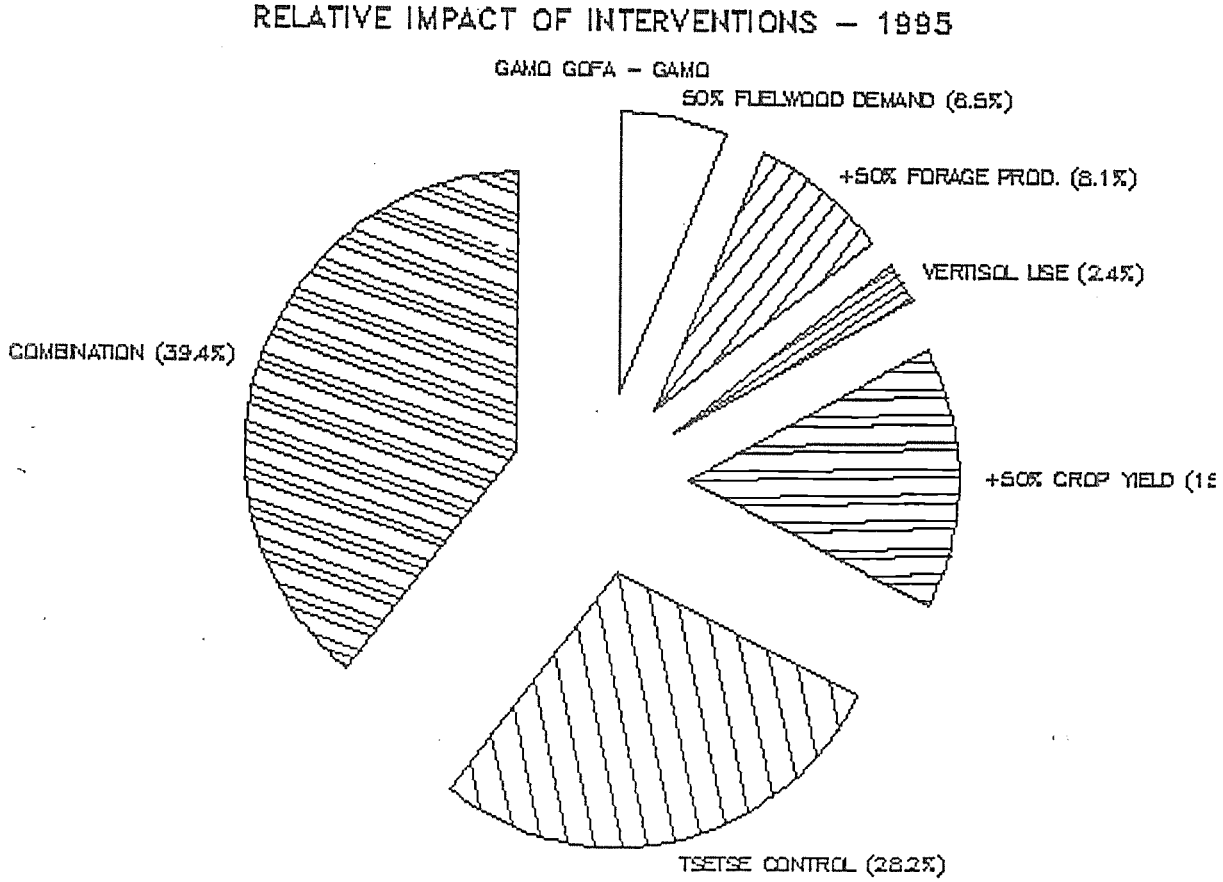


RELATIVE IMPACT OF INTERVENTIONS – 1995

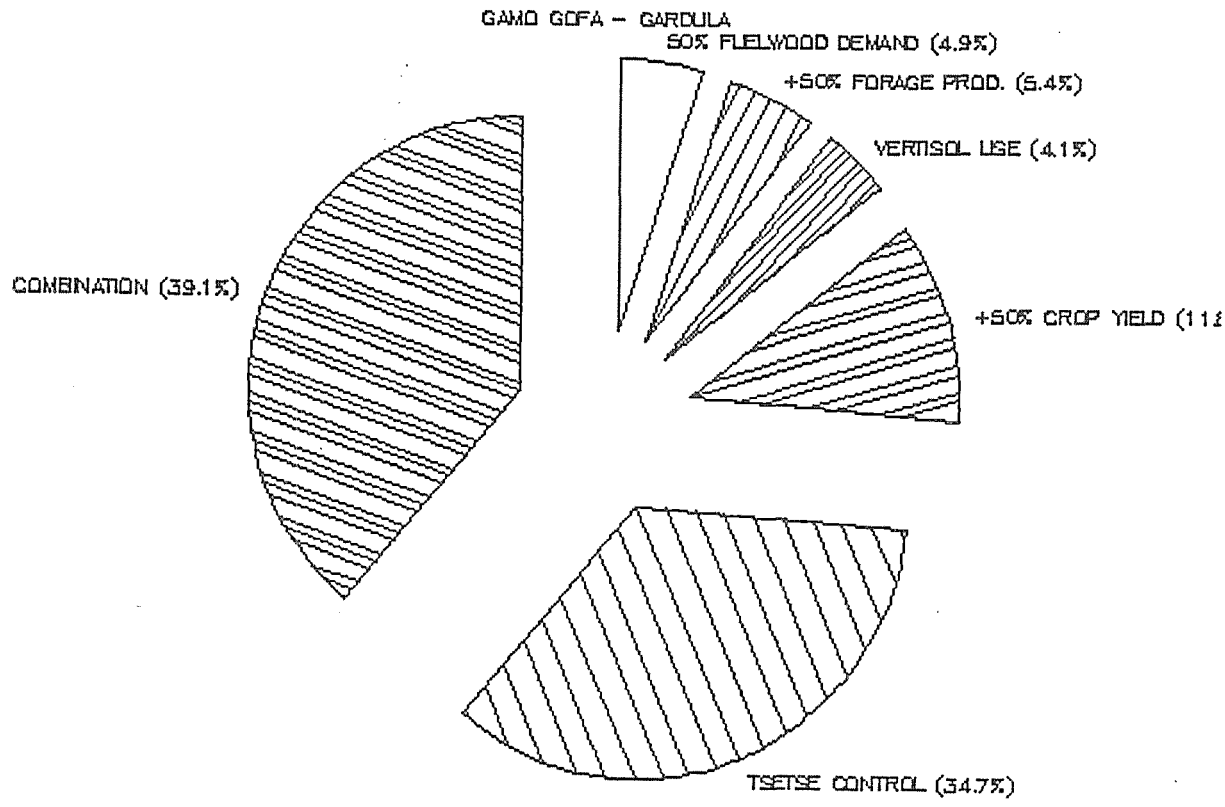
ERITREA – AKORDAT



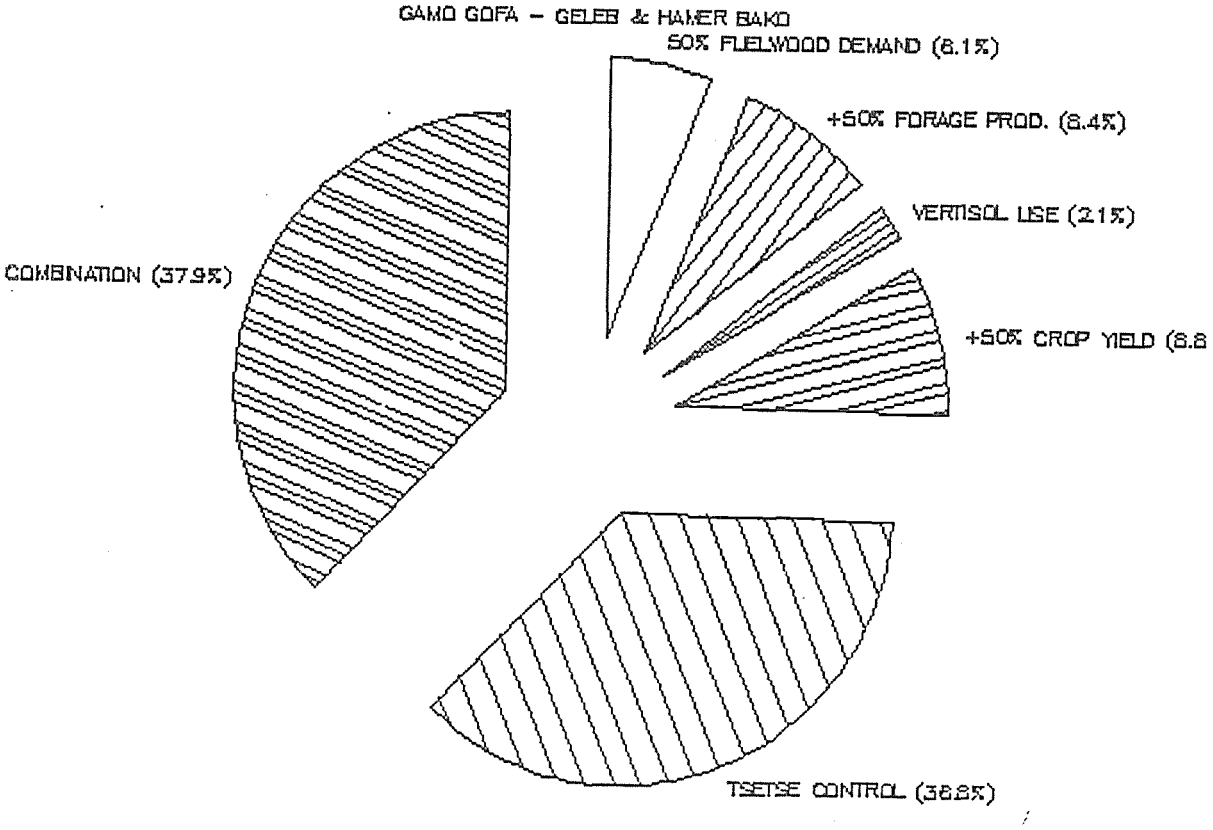

RELATIVE IMPACT OF INTERVENTIONS – 1995
ERITREA – GASH & SETIT
50% FUELWOOD DEMAND (19.0%)
+50% FORAGE PROD.
VERTISOL USE (17.3%)
+50% CROP YIELD (14.2%)
TSETSE CONTROL (0.0%)
COMBINATION (39.0%)


RELATIVE IMPACT OF INTERVENTIONS – 1995
GAMO GOFA – GAMO
50% FUELWOOD DEMAND (6.5%)
+50% FORAGE PROD. (8.1%)
VERTISOL USE (2.4%)
+50% CROP YIELD (1
TSETSE CONTROL (28.2%)
COMBINATION (39.4%)

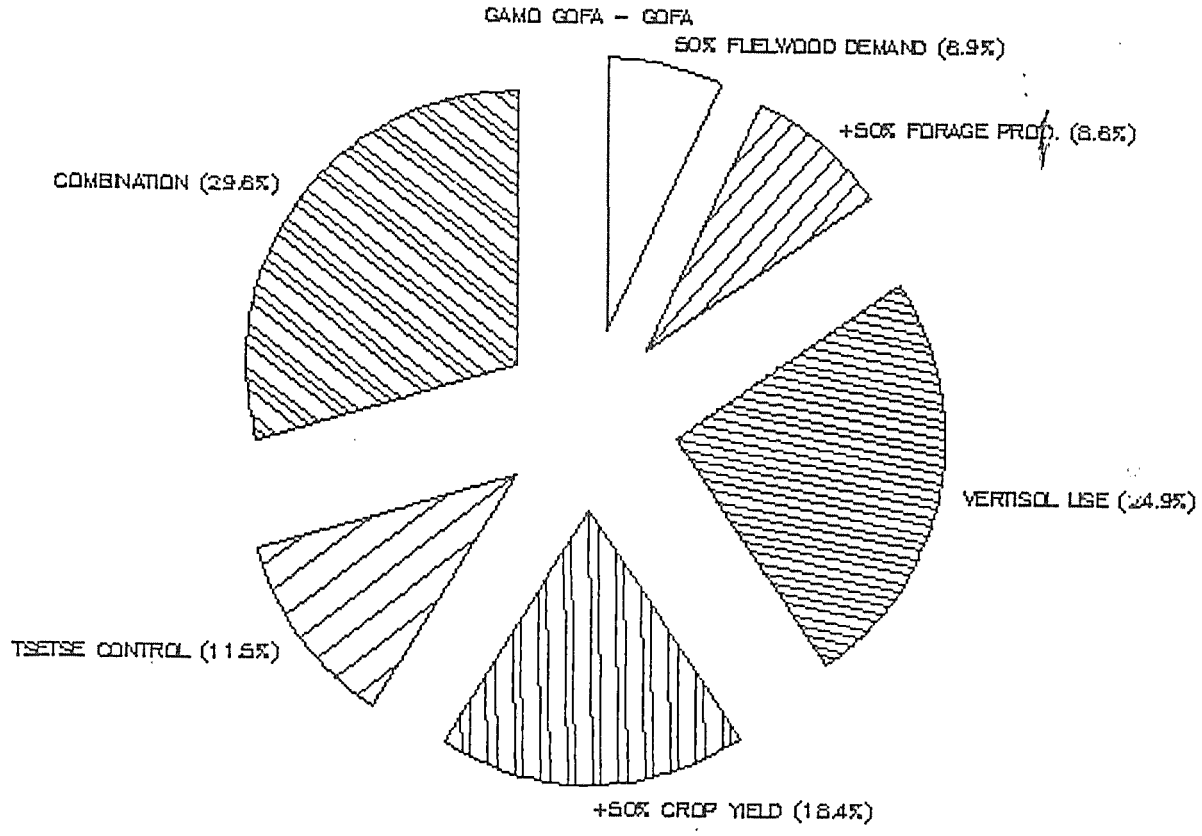
RELATIVE IMPACT OF INTERVENTIONS – 1995



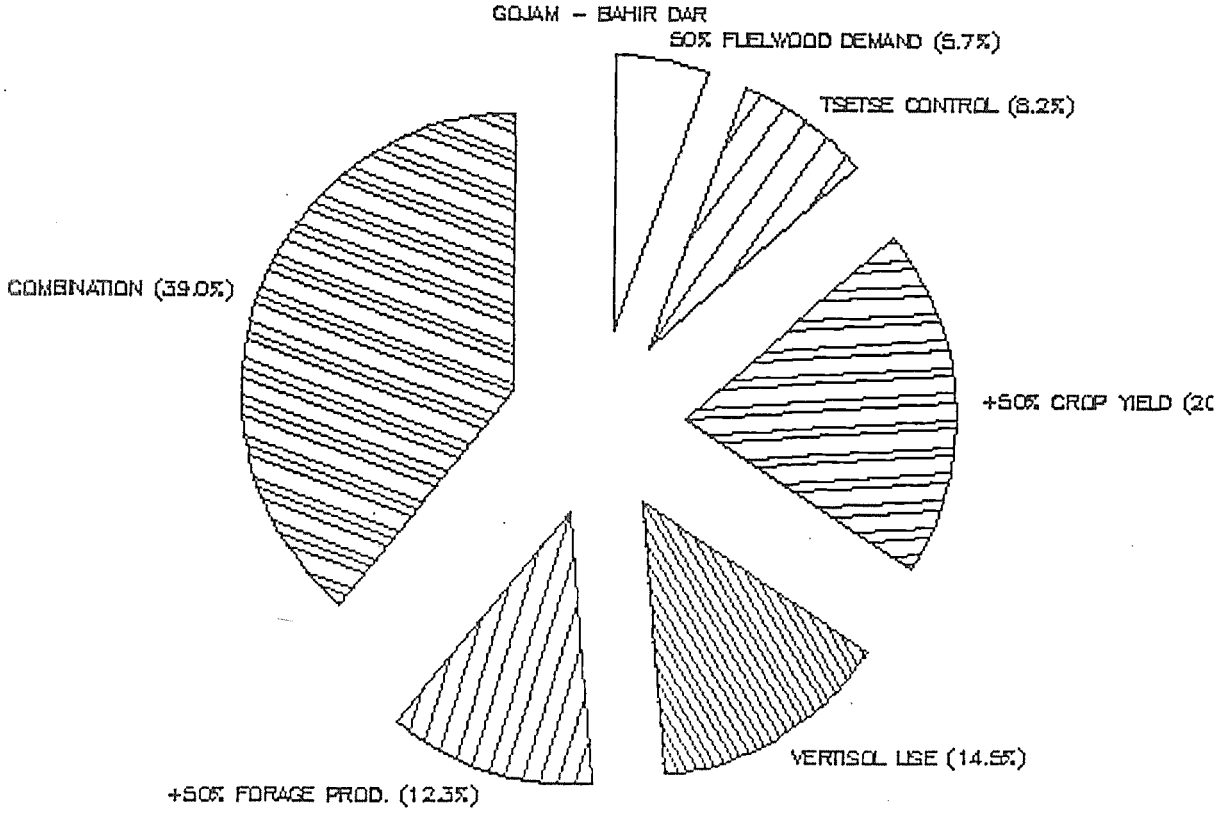
RELATIVE IMPACT OF INTERVENTIONS – 1995

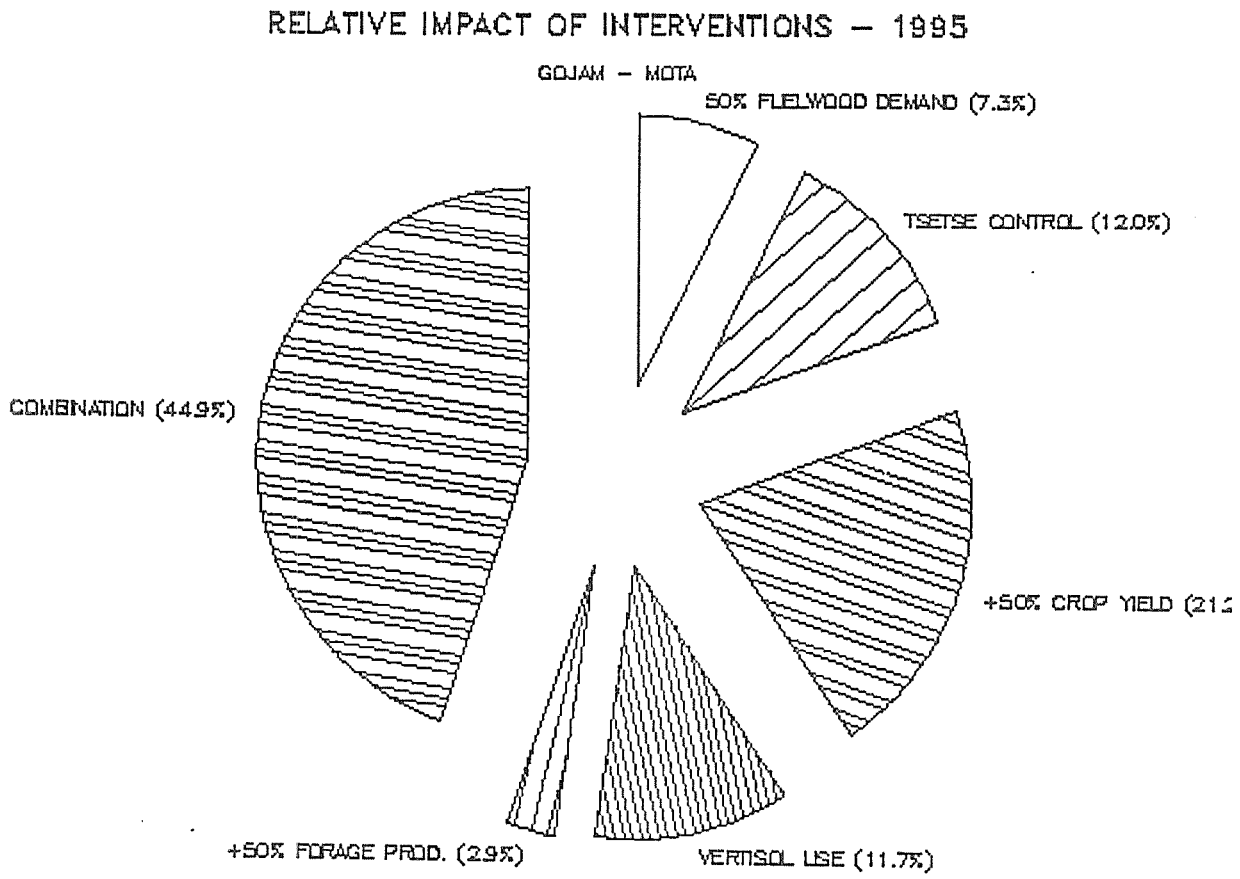


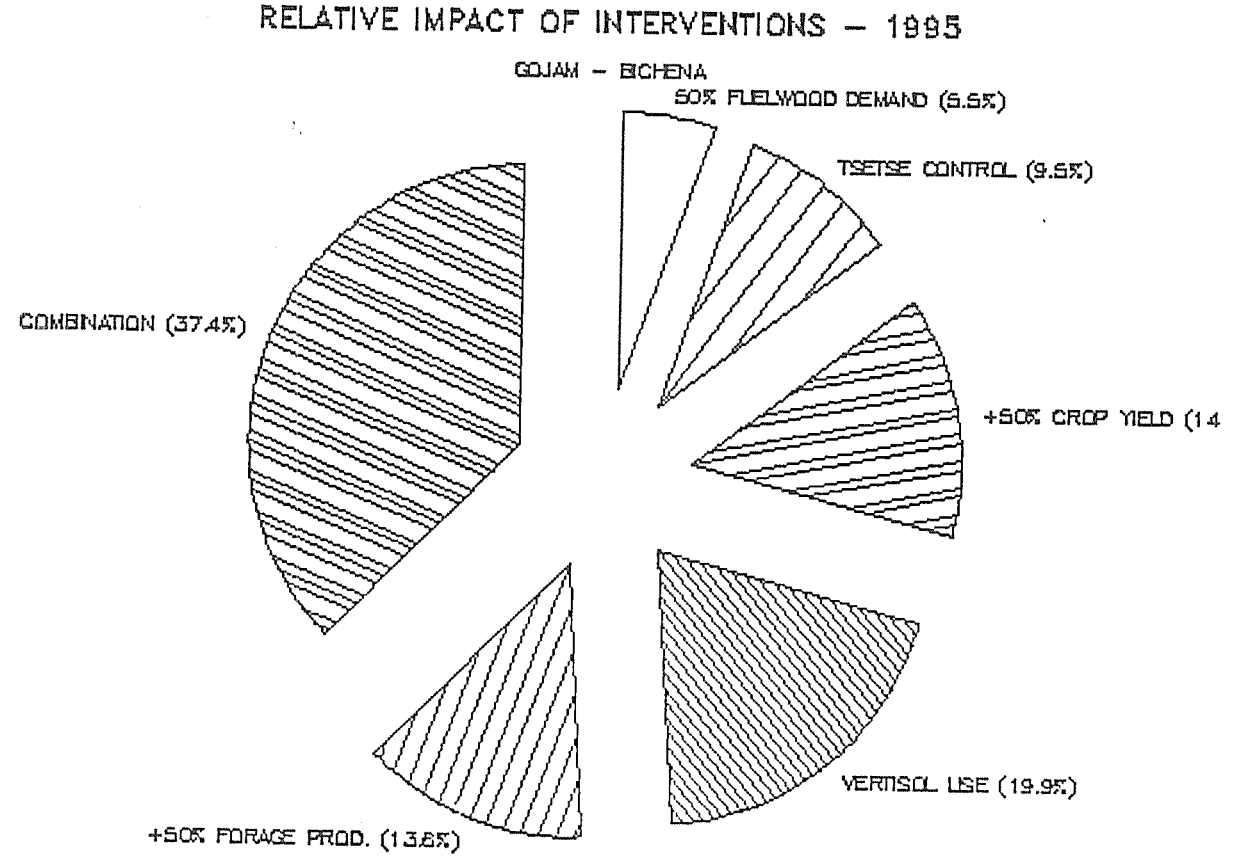
RELATIVE IMPACT OF INTERVENTIONS – 1995



RELATIVE IMPACT OF INTERVENTIONS – 1995

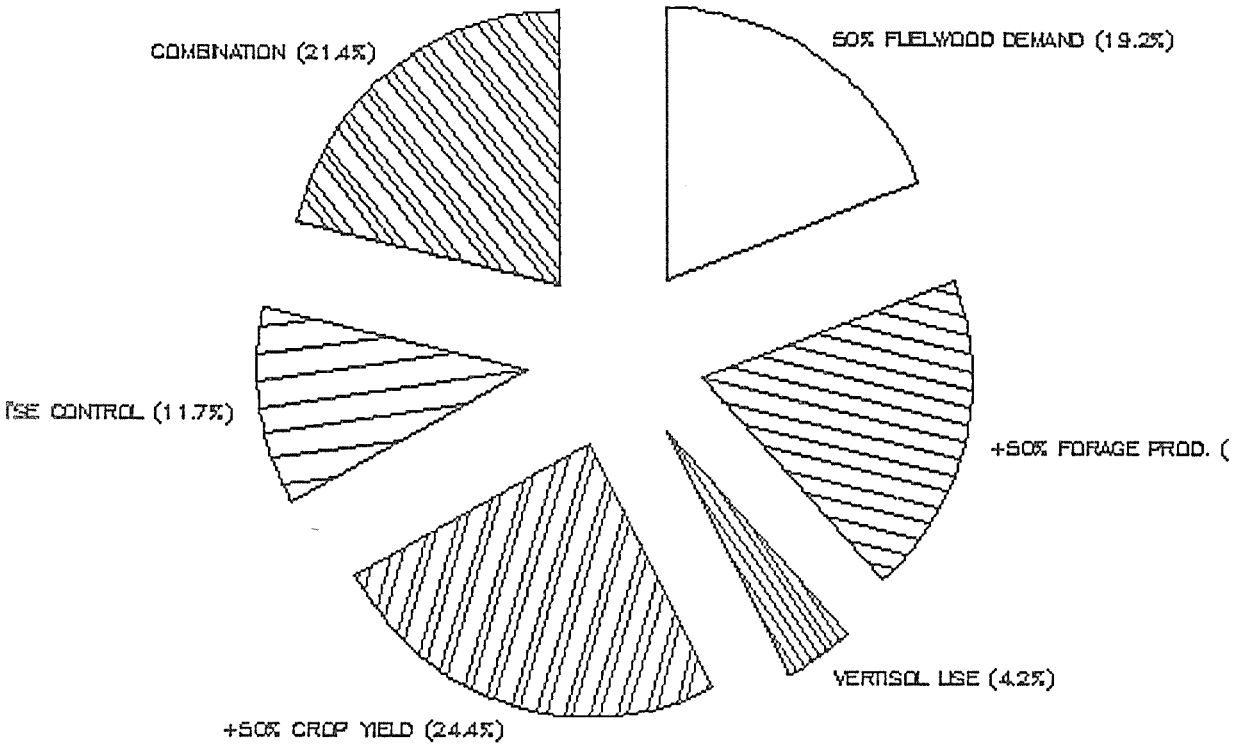



RELATIVE IMPACT OF INTERVENTIONS – 1995
GOJAM – MOTA
50% FUELWOOD DEMAND (7.3%)
TSETSE CONTROL (12.0%)
COMBINATION (44.9%)
+50% CROP YIELD (21.
+50% FORAGE PROD. (2.9%)
VERTISOL USE (11.7%)


RELATIVE IMPACT OF INTERVENTIONS – 1995
GOJAM – BICHENA
50% FUELWOOD DEMAND (6.6%)
TSETSE CONTROL (9.6%)
COMBINATION (37.4%)
+50% CROP YIELD (14
VERTISOL USE (19.9%)
+50% FORAGE PROD. (13.6%)

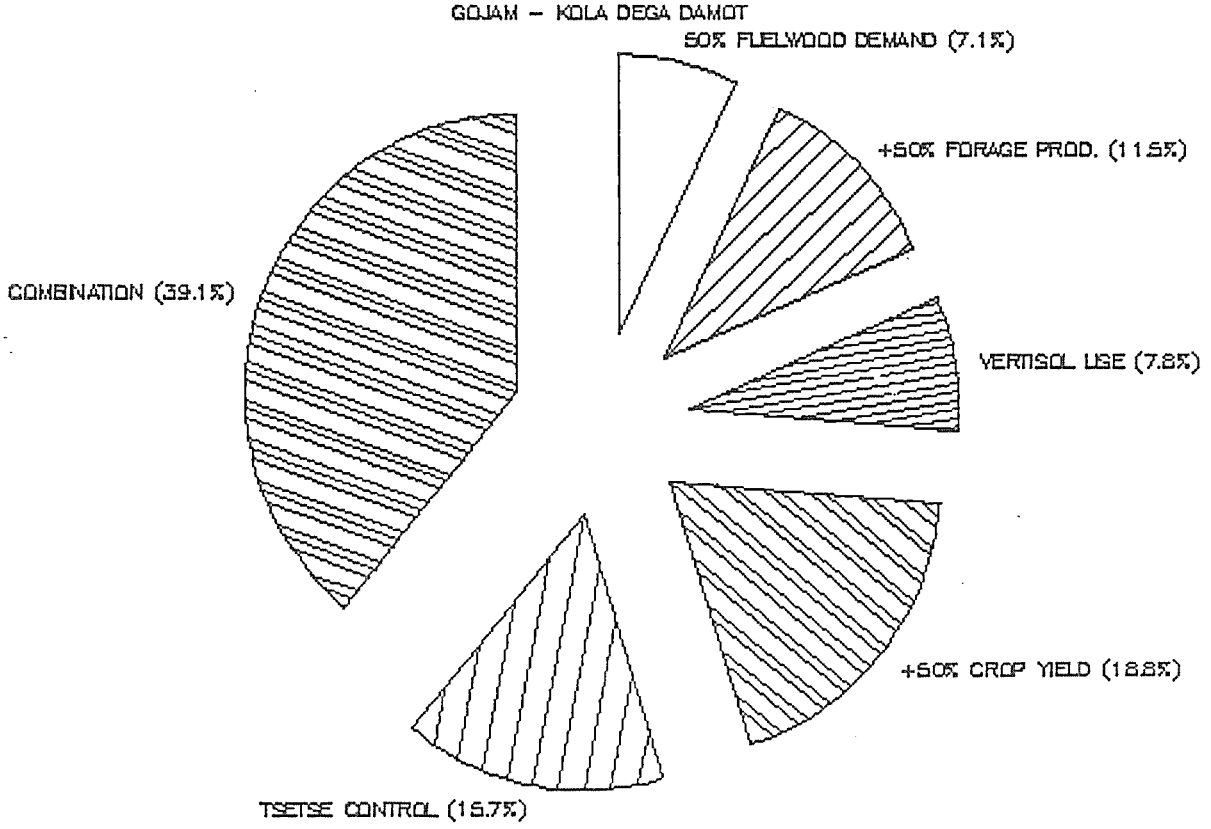
RELATIVE IMPACT OF INTERVENTIONS – 1995

GOJAM – DEBRE MARKOS

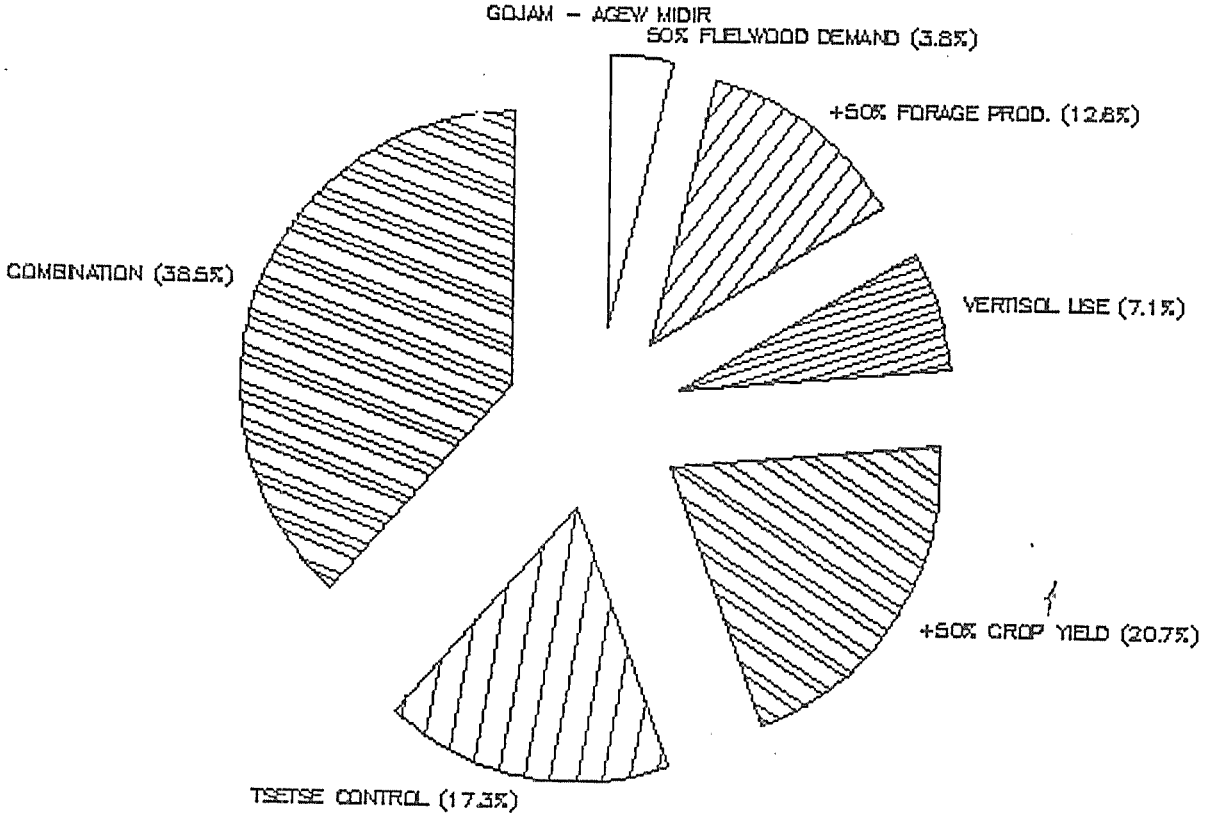


RELATIVE IMPACT OF INTERVENTIONS – 1995

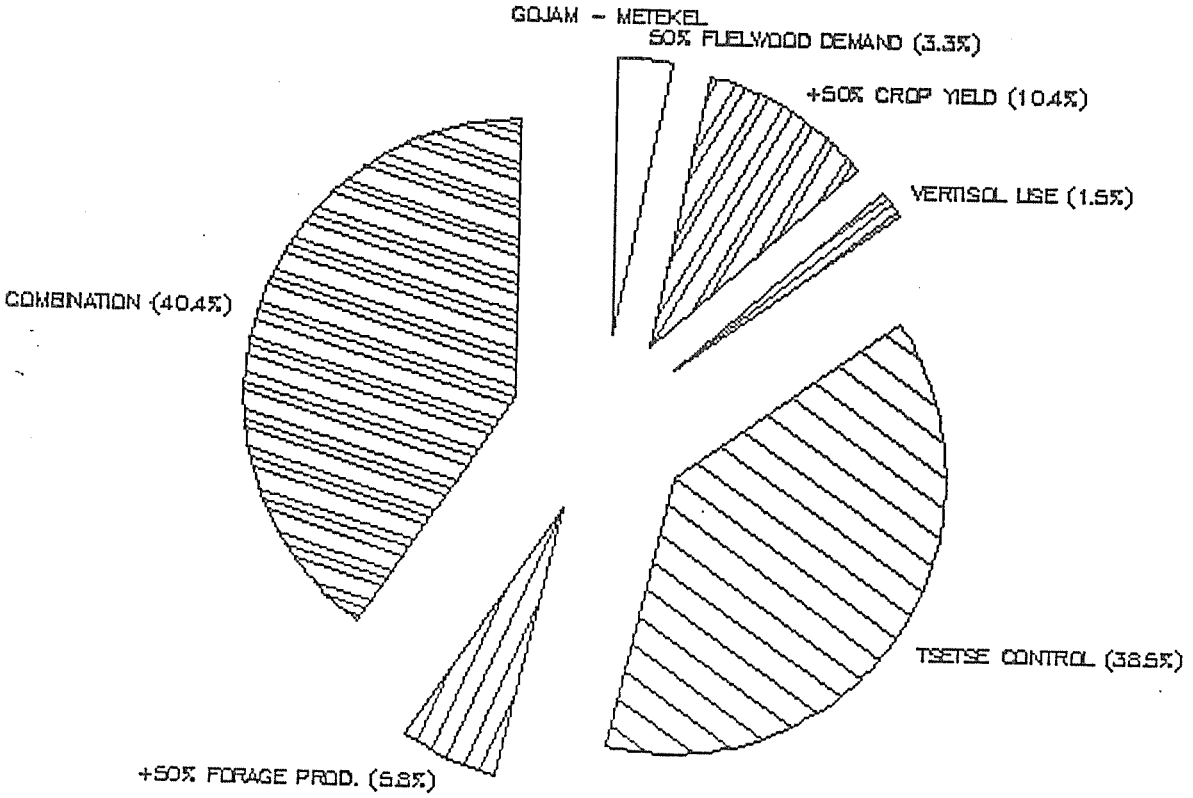
GOJAM – KOLA DEGA DAMOT

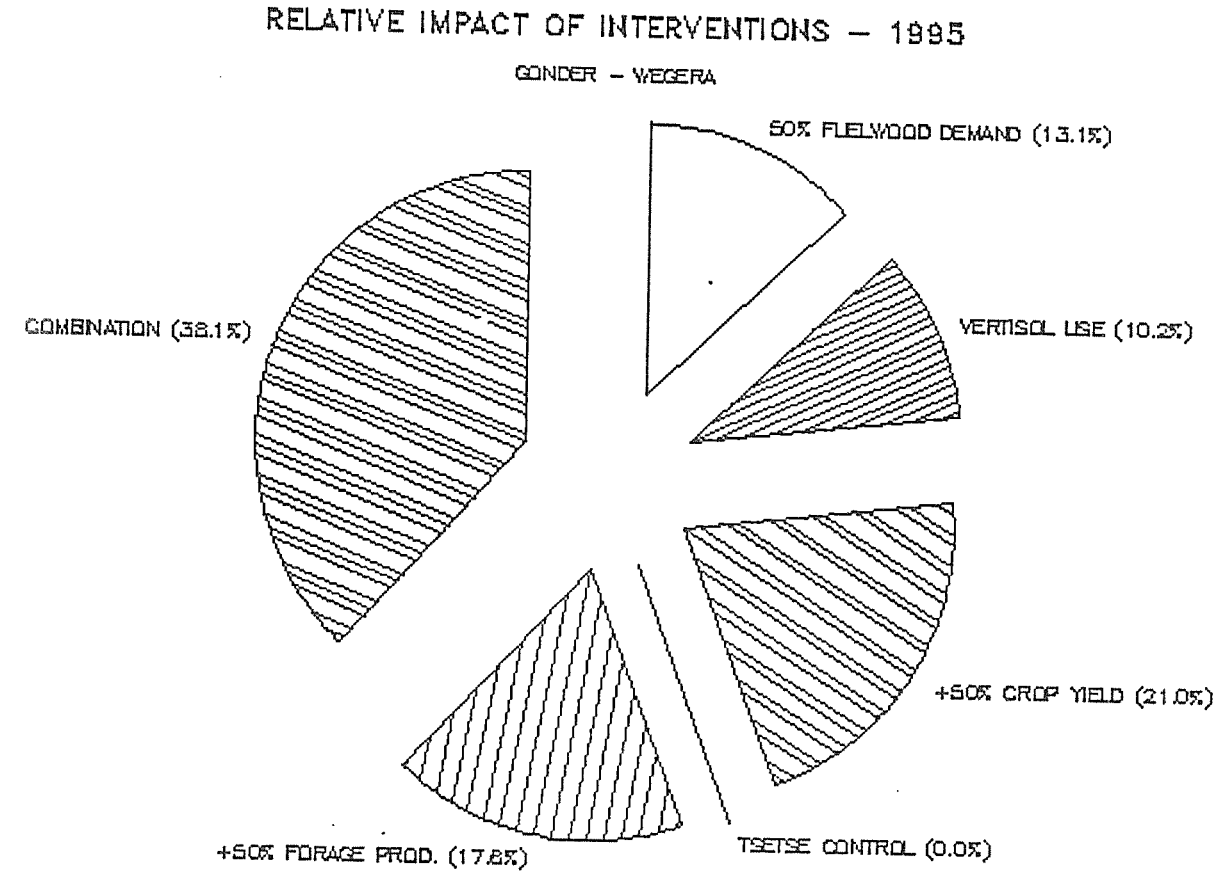


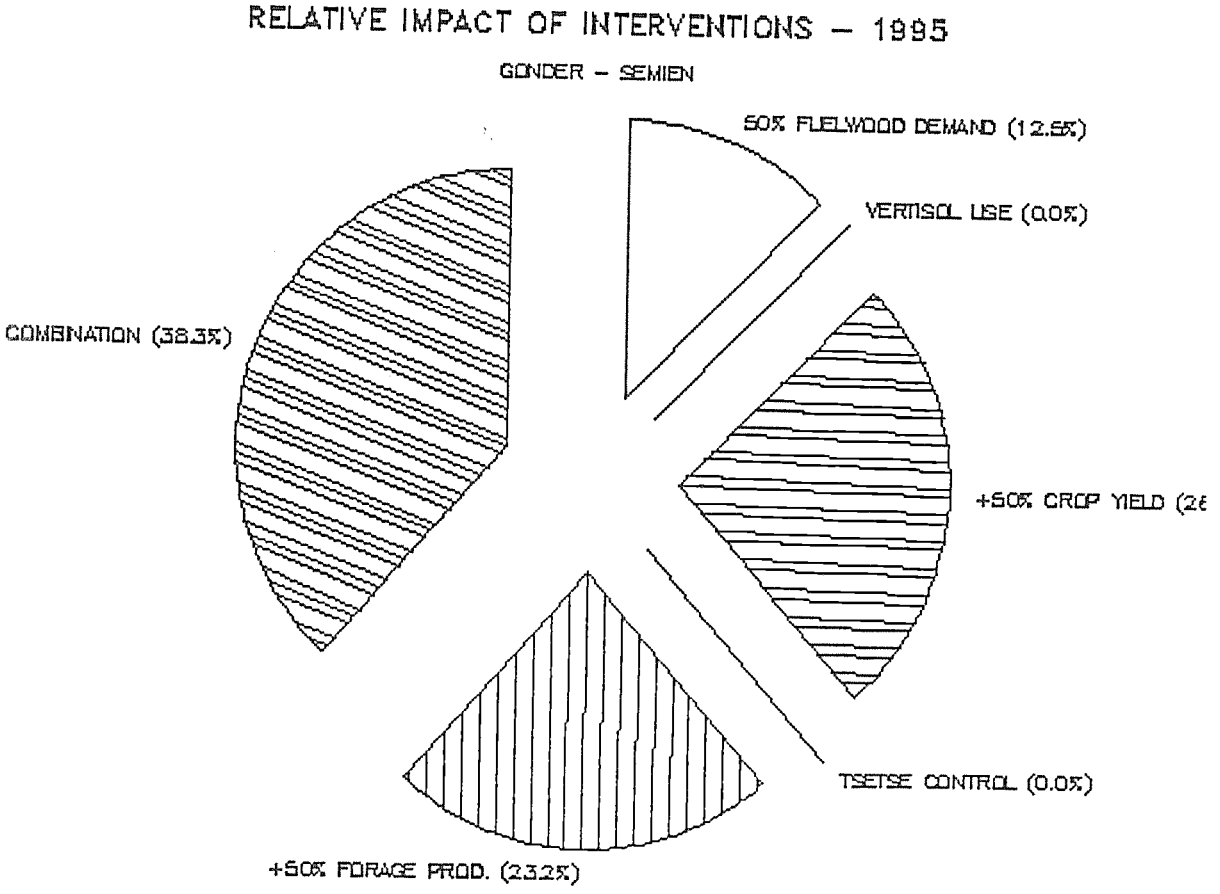
RELATIVE IMPACT OF INTERVENTIONS – 1995



RELATIVE IMPACT OF INTERVENTIONS – 1995

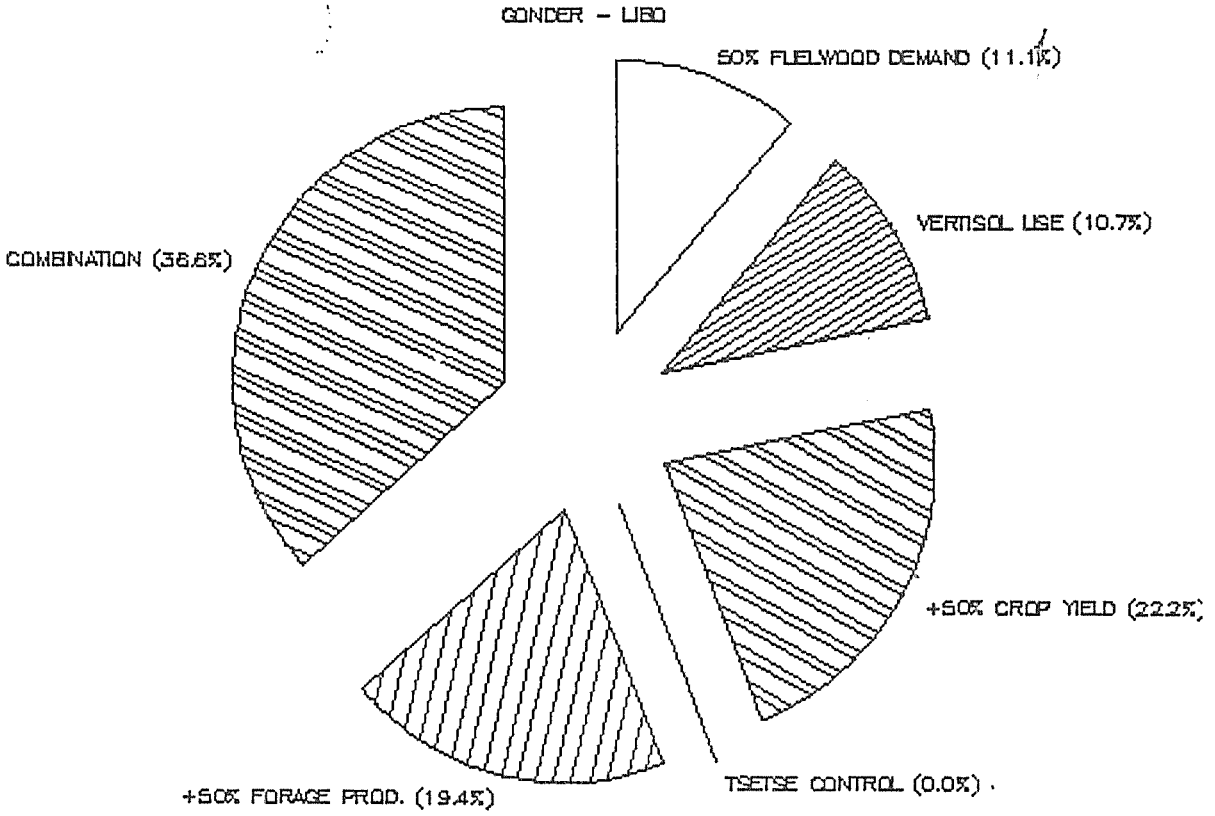



RELATIVE IMPACT OF INTERVENTIONS – 1995
GONDER – WEGERA
50% FUELWOOD DEMAND (13.1%)
VERTISOL USE (10.2%)
+50% CROP YIELD (21.0%)
TSETSE CONTROL (0.0%)
+50% FORAGE PROD. (17.8%)
COMBINATION (38.1%)


RELATIVE IMPACT OF INTERVENTIONS – 1995
GONDER – SEMIEN
50% FUELWOOD DEMAND (12.5%)
VERTISOL USE (0.0%)
+50% CROP YIELD (2
TSETSE CONTROL (0.0%)
+50% FORAGE PROD. (23.2%)
COMBINATION (38.3%)

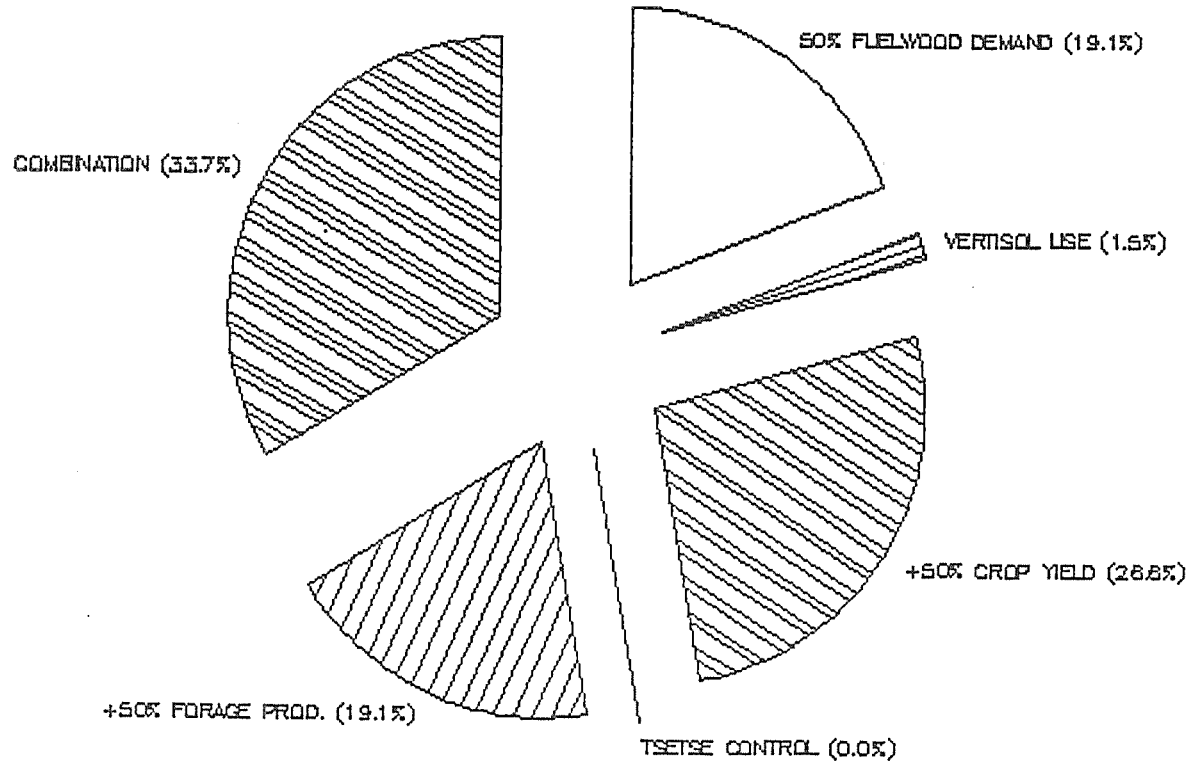
RELATIVE IMPACT OF INTERVENTIONS – 1995

GONDER – LIBO



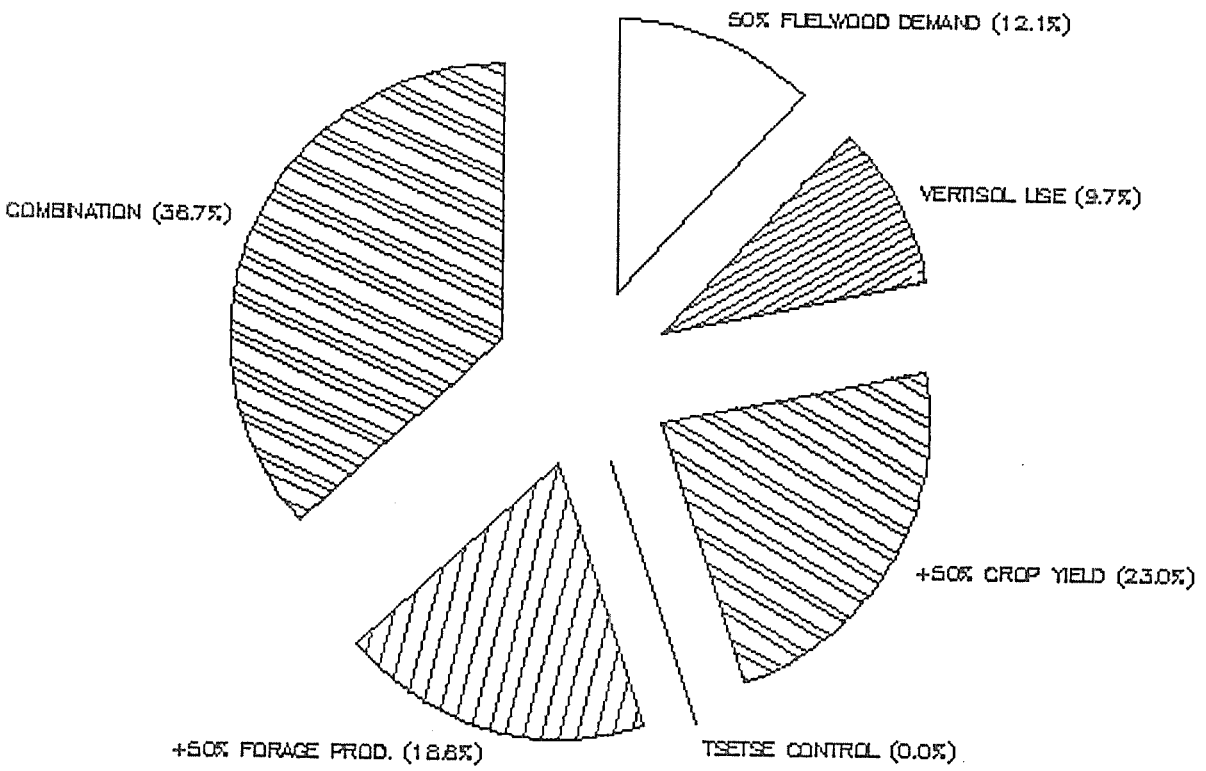
RELATIVE IMPACT OF INTERVENTIONS – 1995

GONDER – GAYINT



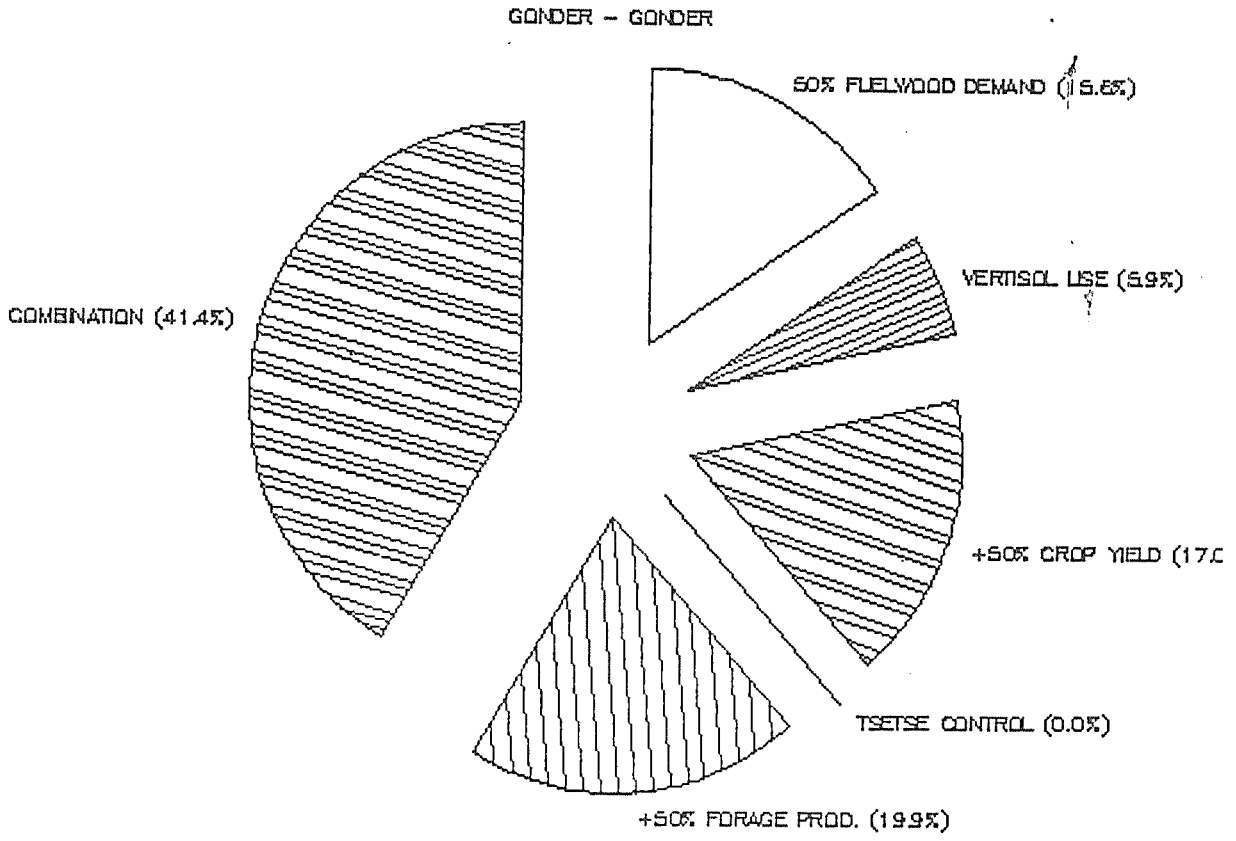
RELATIVE IMPACT OF INTERVENTIONS – 1995

GONDER – DEBRE TABOR



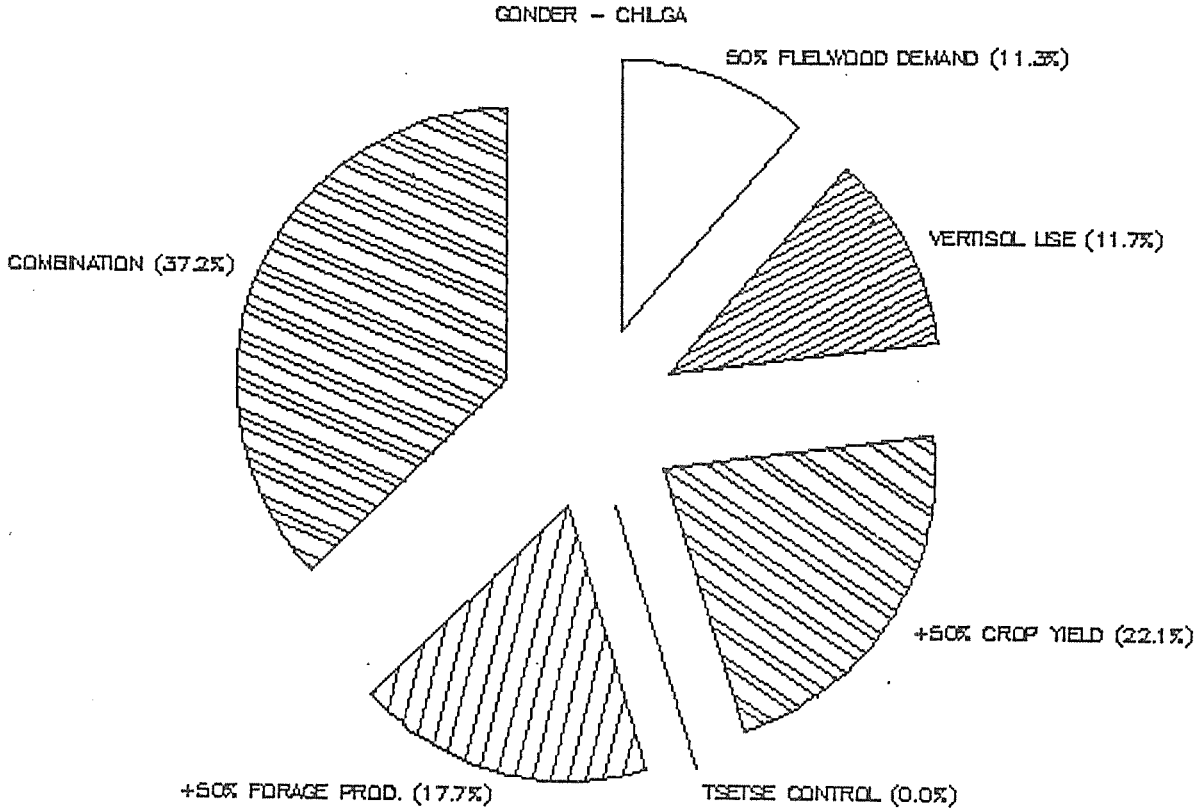
RELATIVE IMPACT OF INTERVENTIONS – 1995

GONDER – GONDER



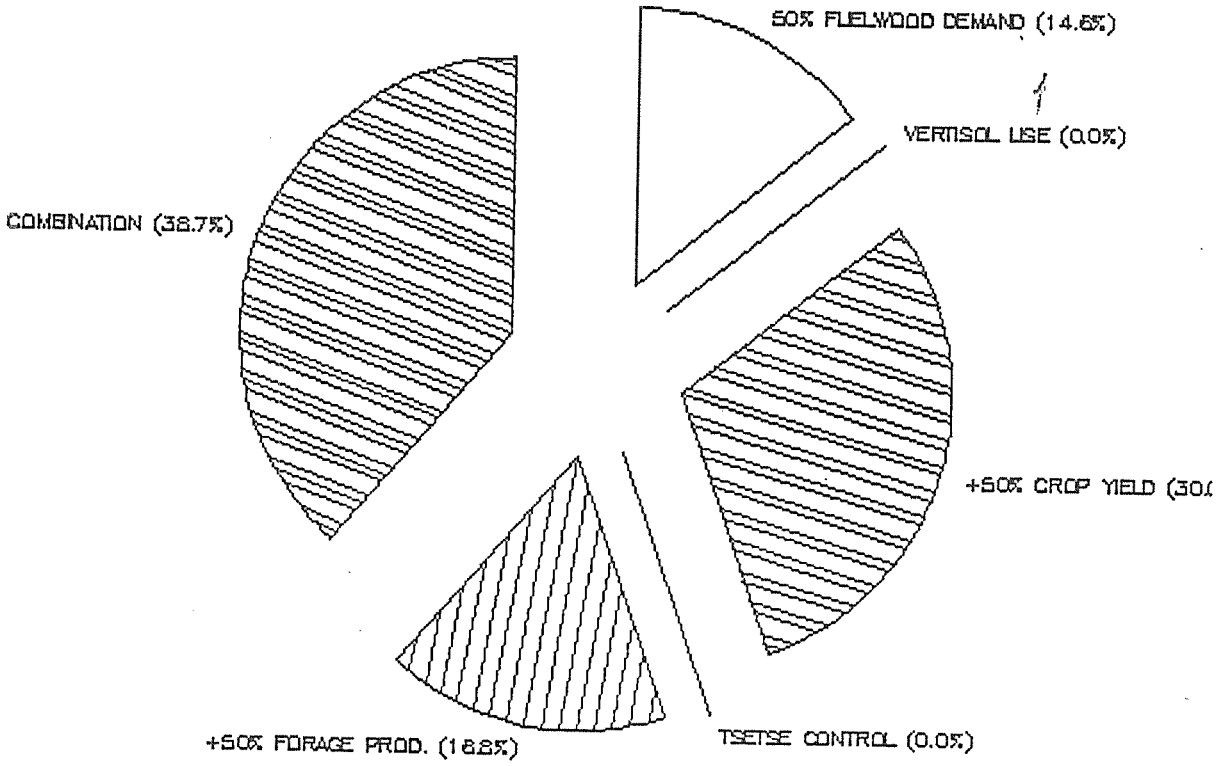
RELATIVE IMPACT OF INTERVENTIONS – 1995

GONDER – CHILGA

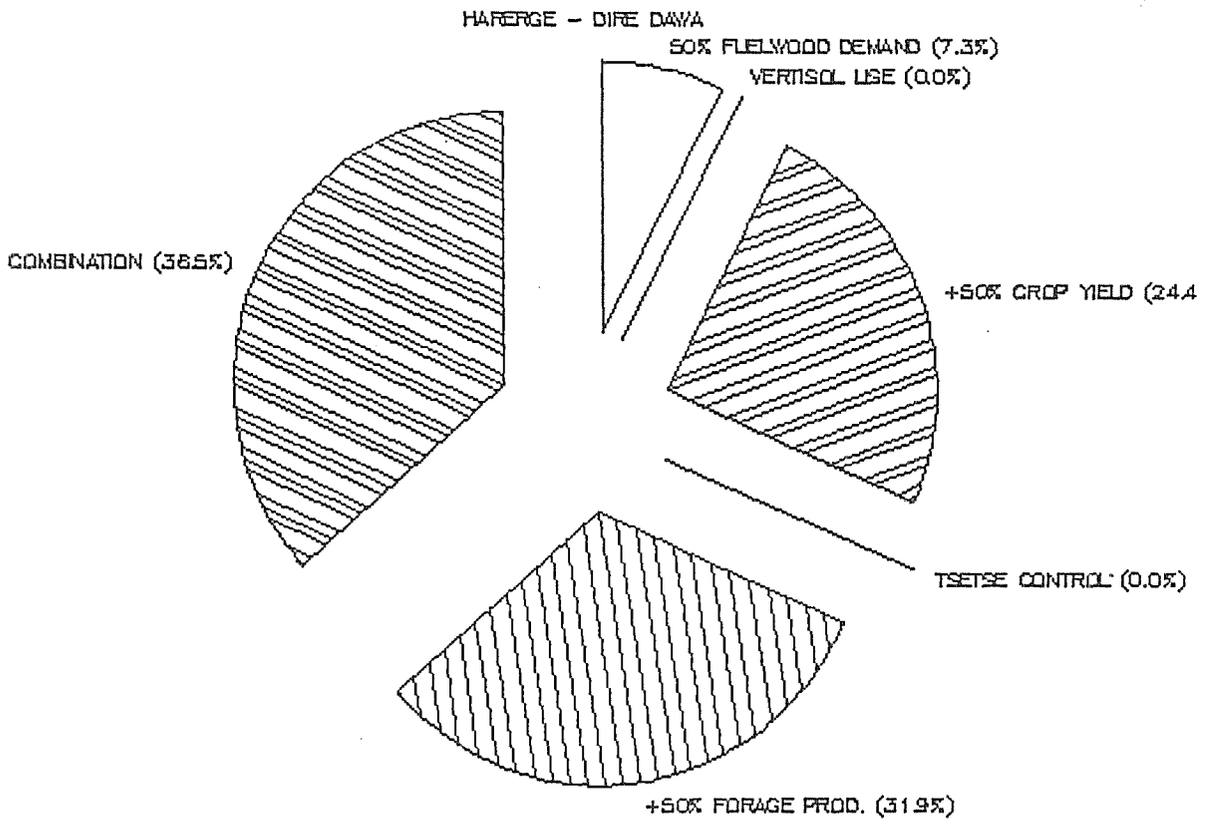


RELATIVE IMPACT OF INTERVENTIONS – 1995

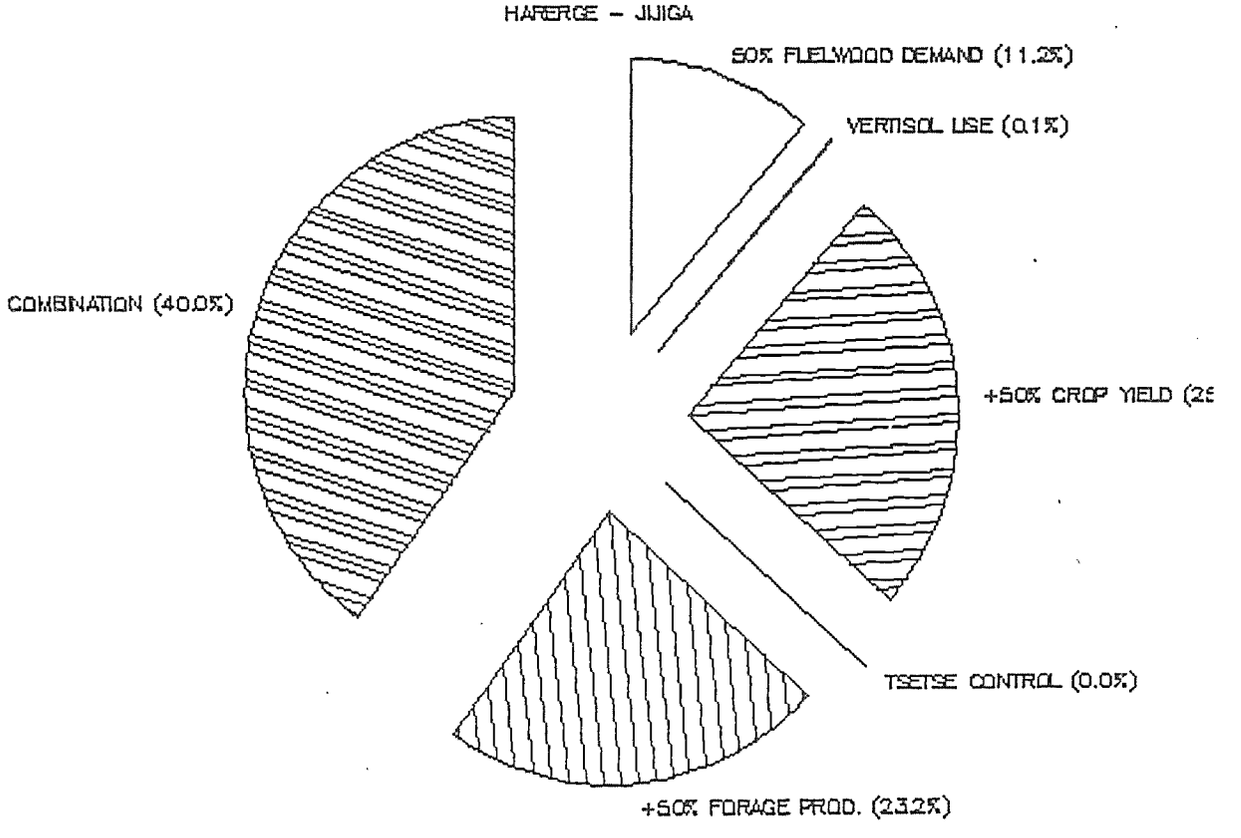
HARERGE – CHERCHER



RELATIVE IMPACT OF INTERVENTIONS – 1995

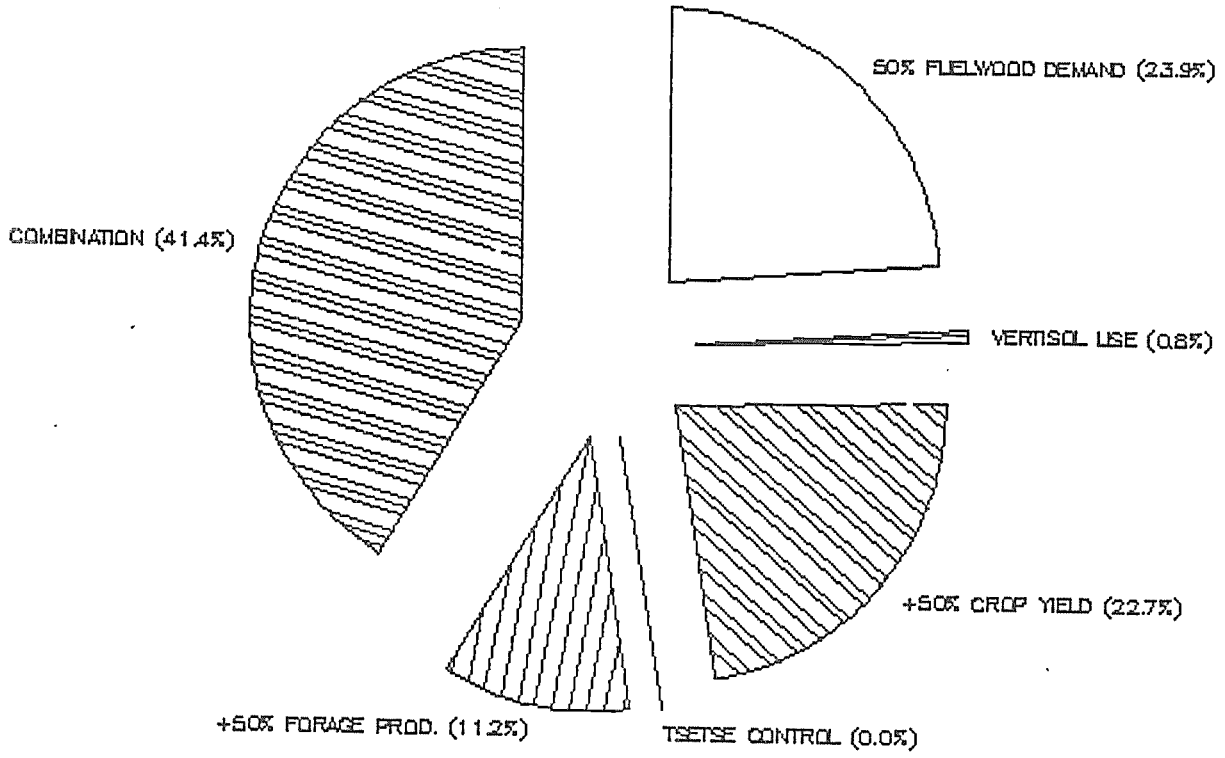


RELATIVE IMPACT OF INTERVENTIONS – 1995



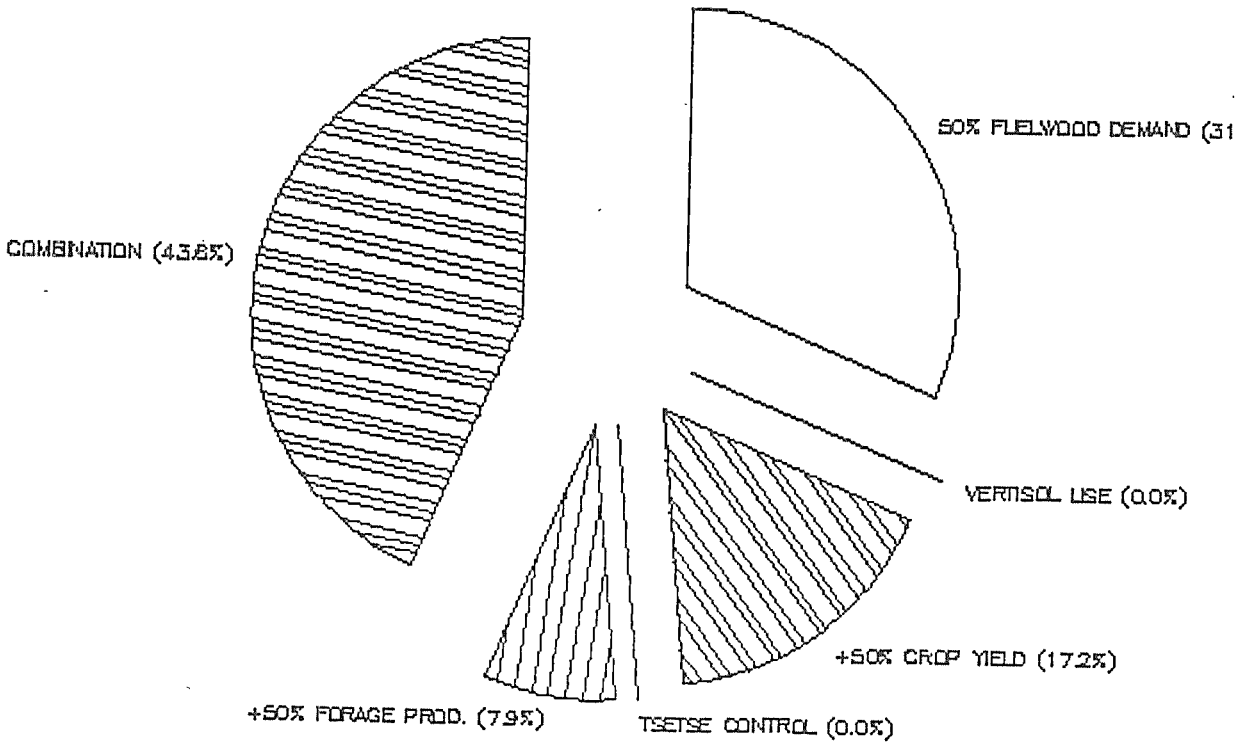
RELATIVE IMPACT OF INTERVENTIONS – 1995

HARERGE – GURSUM



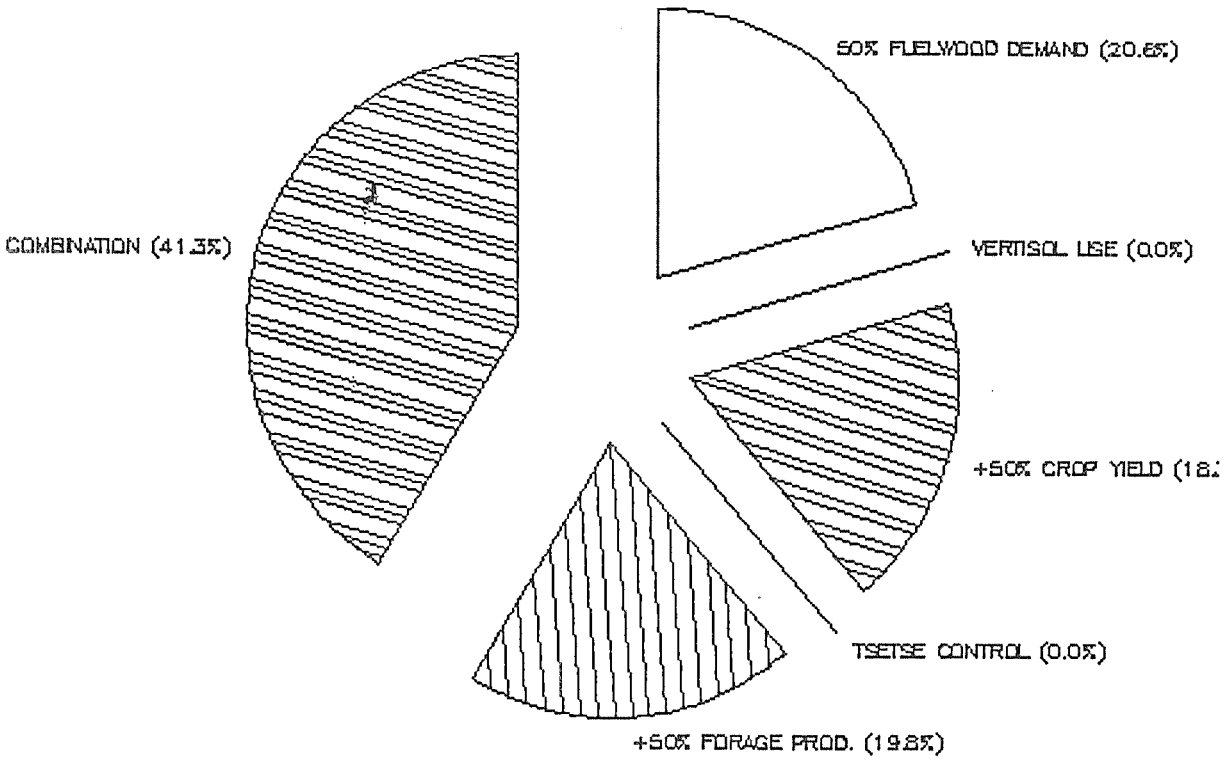
RELATIVE IMPACT OF INTERVENTIONS – 1995

HARERGE – GARA MULETA



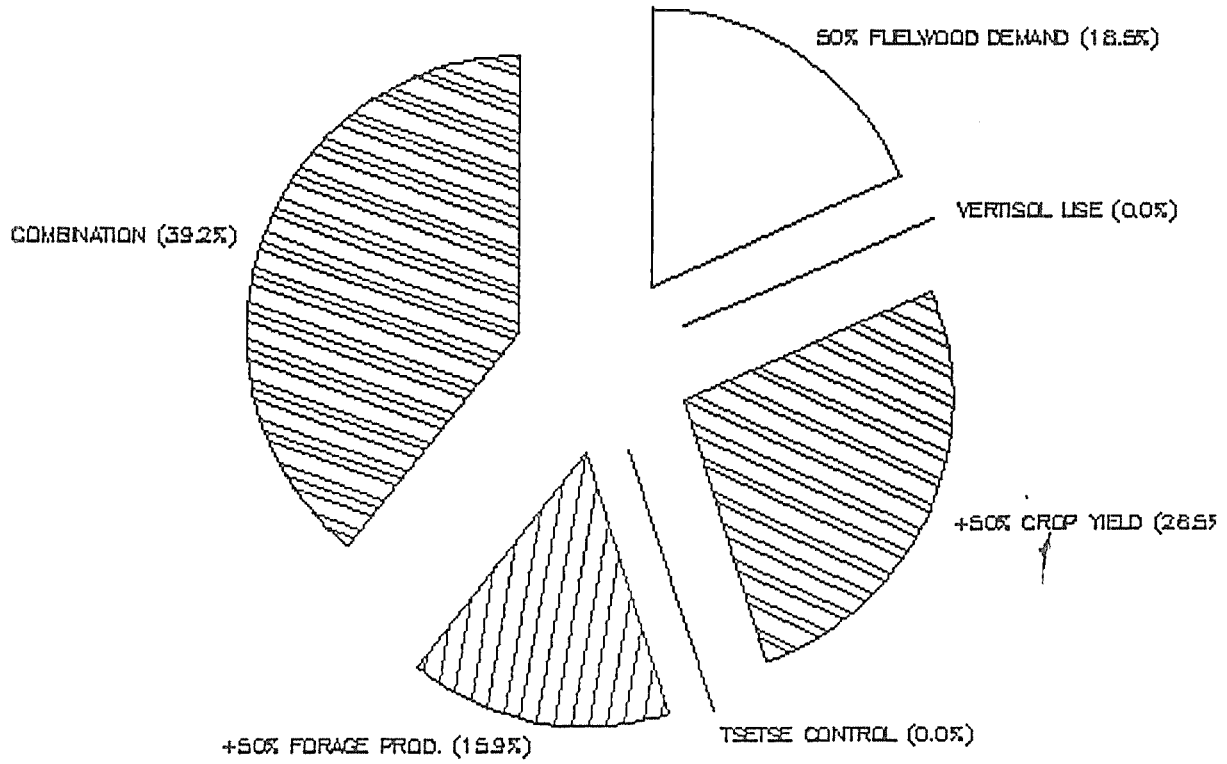
RELATIVE IMPACT OF INTERVENTIONS – 1995

HARERGE – HARER ZURIA



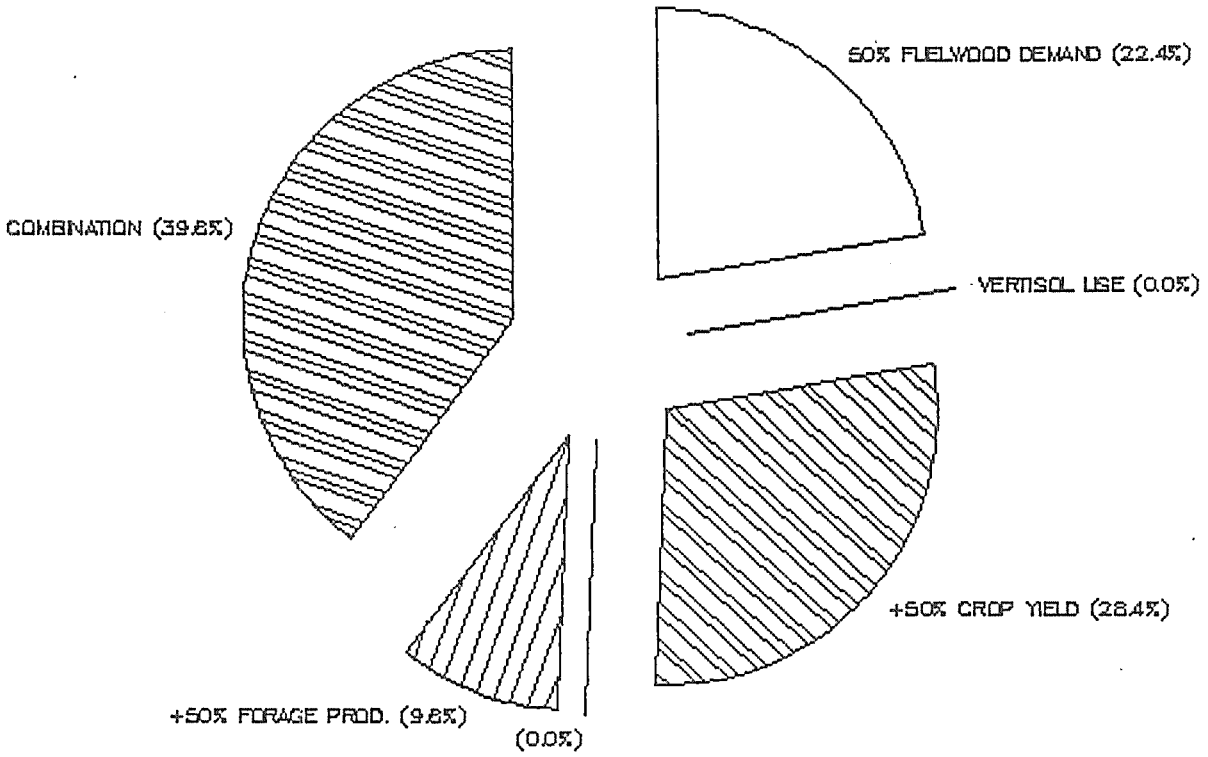
RELATIVE IMPACT OF INTERVENTIONS – 1995

HARERGE – WEBERA



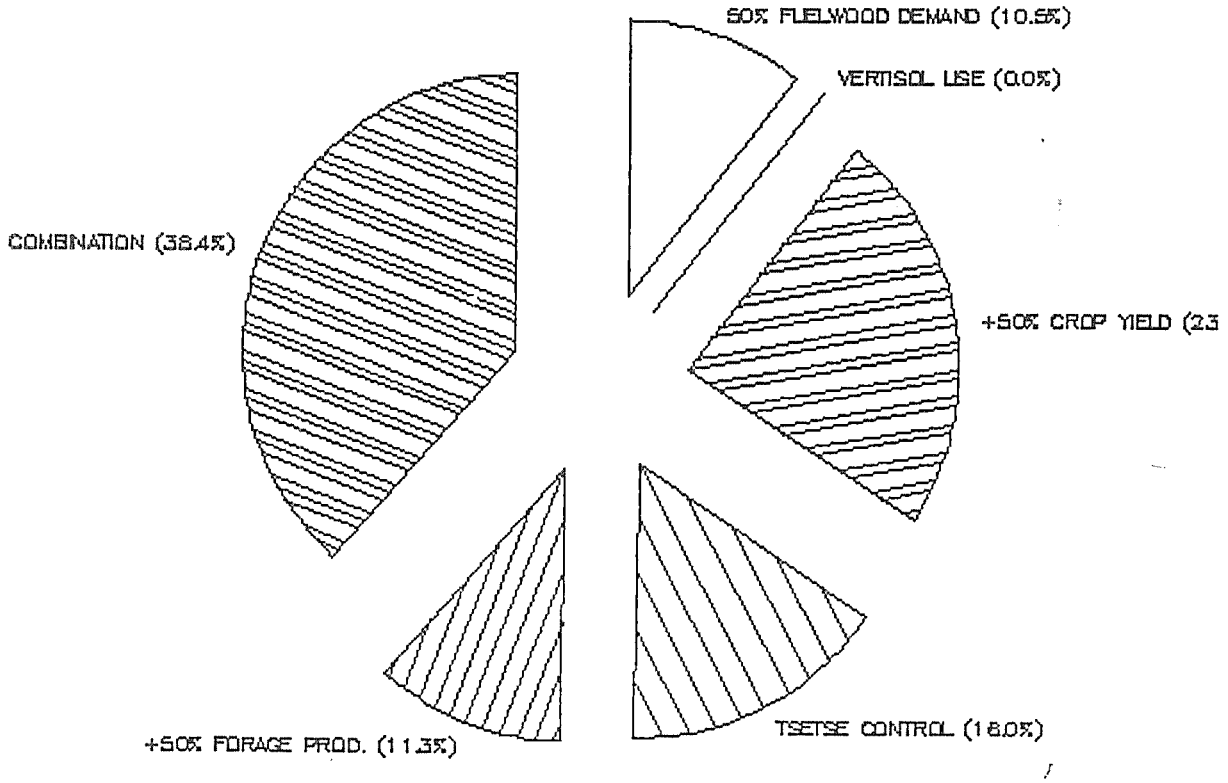
RELATIVE IMPACT OF INTERVENTIONS – 1995

HARERGE – HABRO



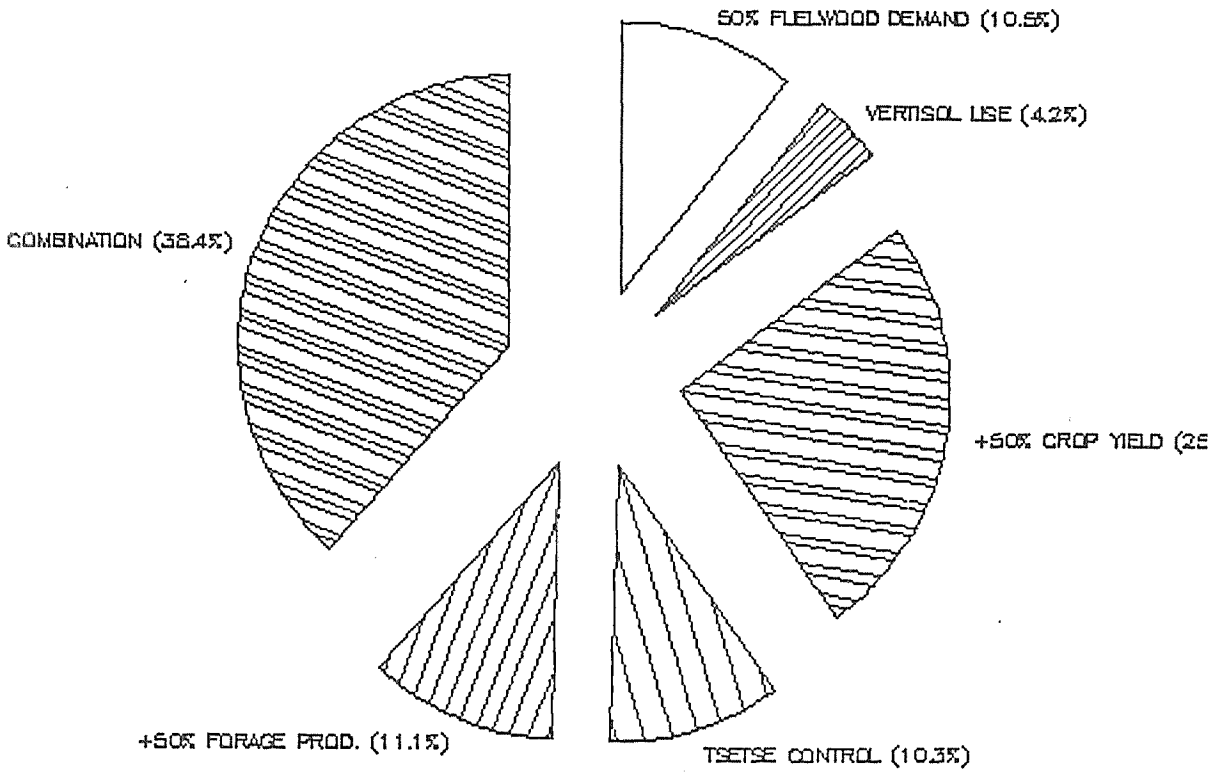
RELATIVE IMPACT OF INTERVENTIONS – 1995

LUBABOR – SOR & GEBA



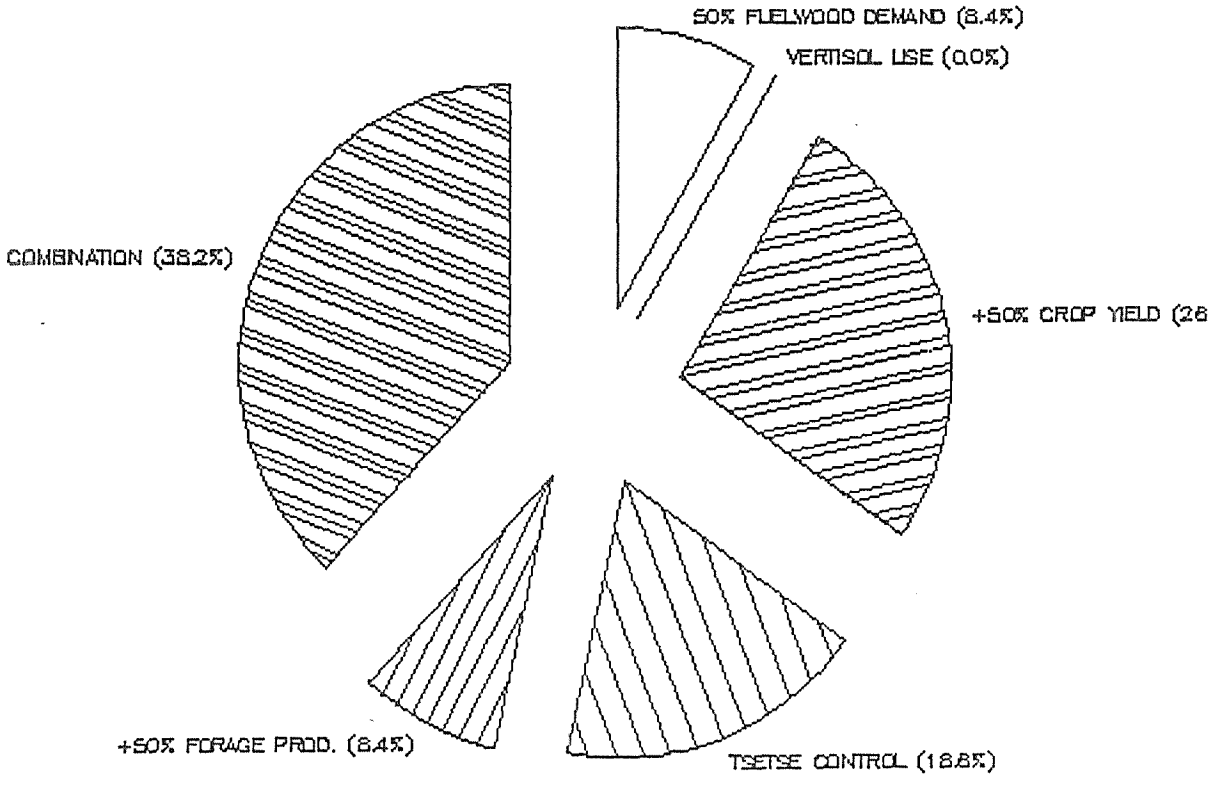
RELATIVE IMPACT OF INTERVENTIONS – 1995

ILUBABOR – BUNO

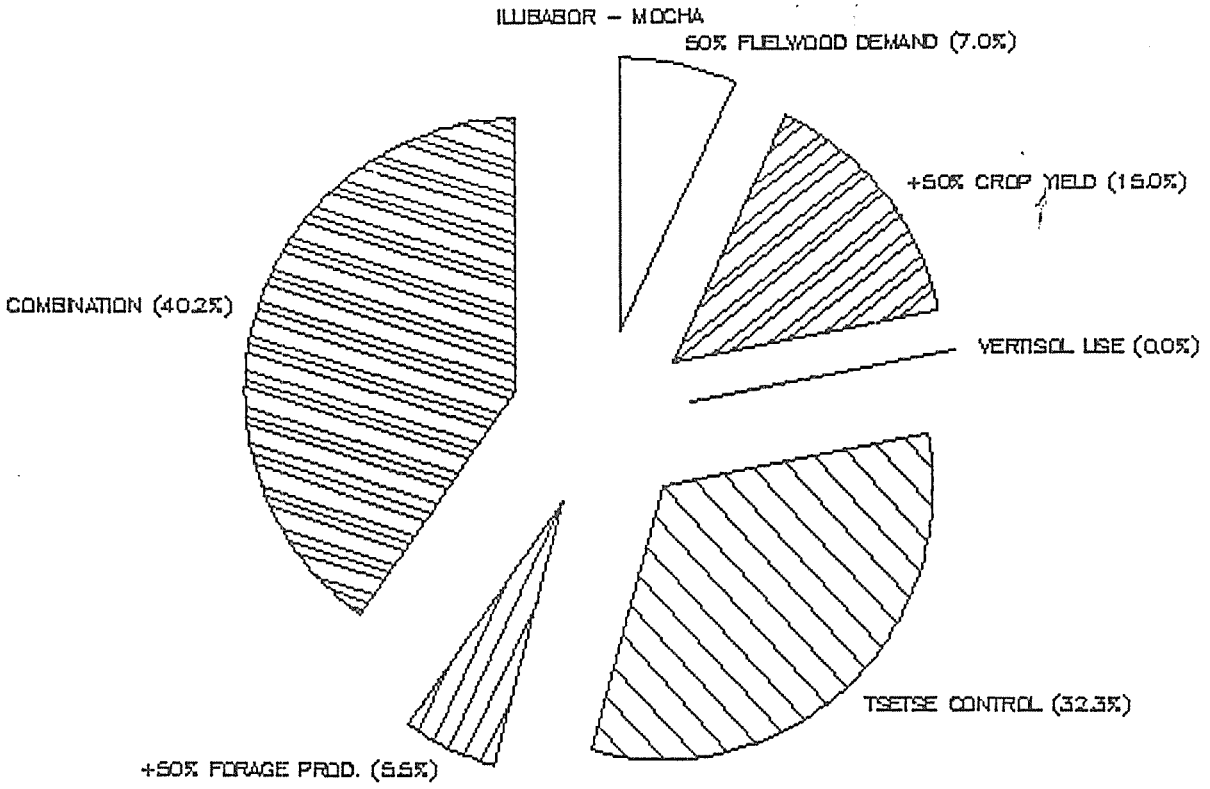


RELATIVE IMPACT OF INTERVENTIONS – 1995

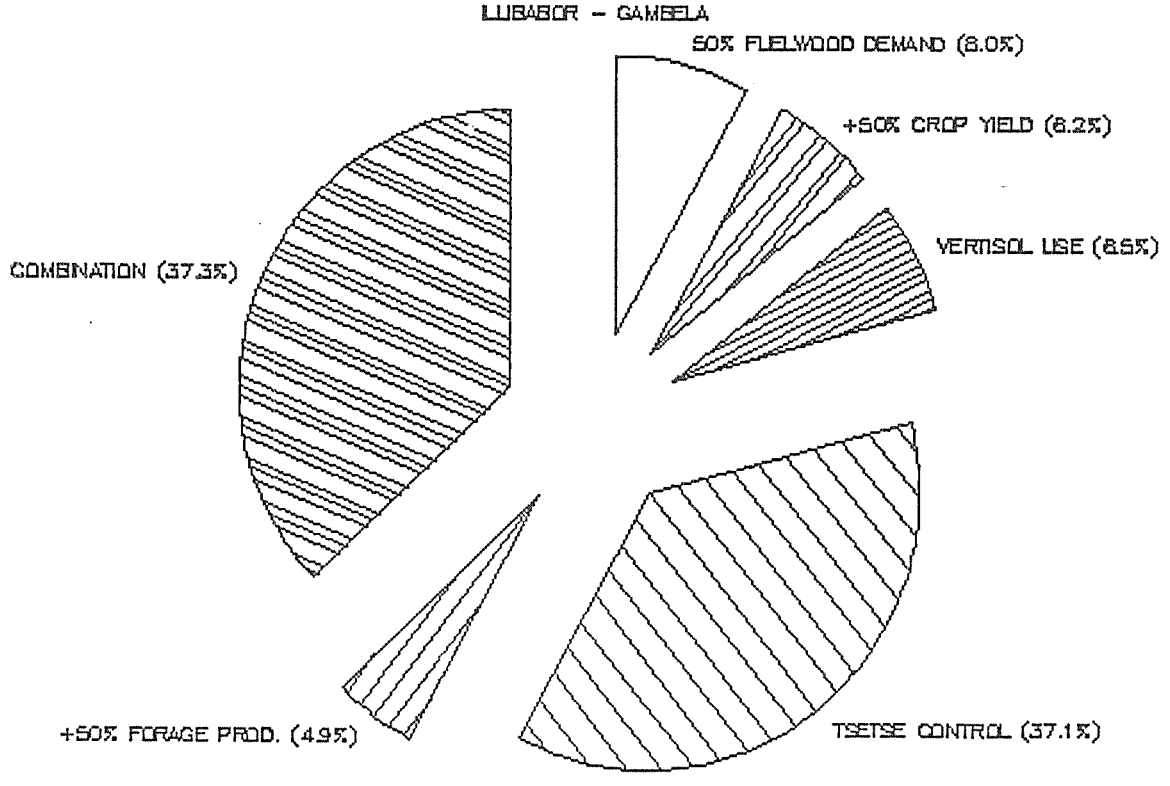
ILUBABOR – GORE



RELATIVE IMPACT OF INTERVENTIONS – 1995

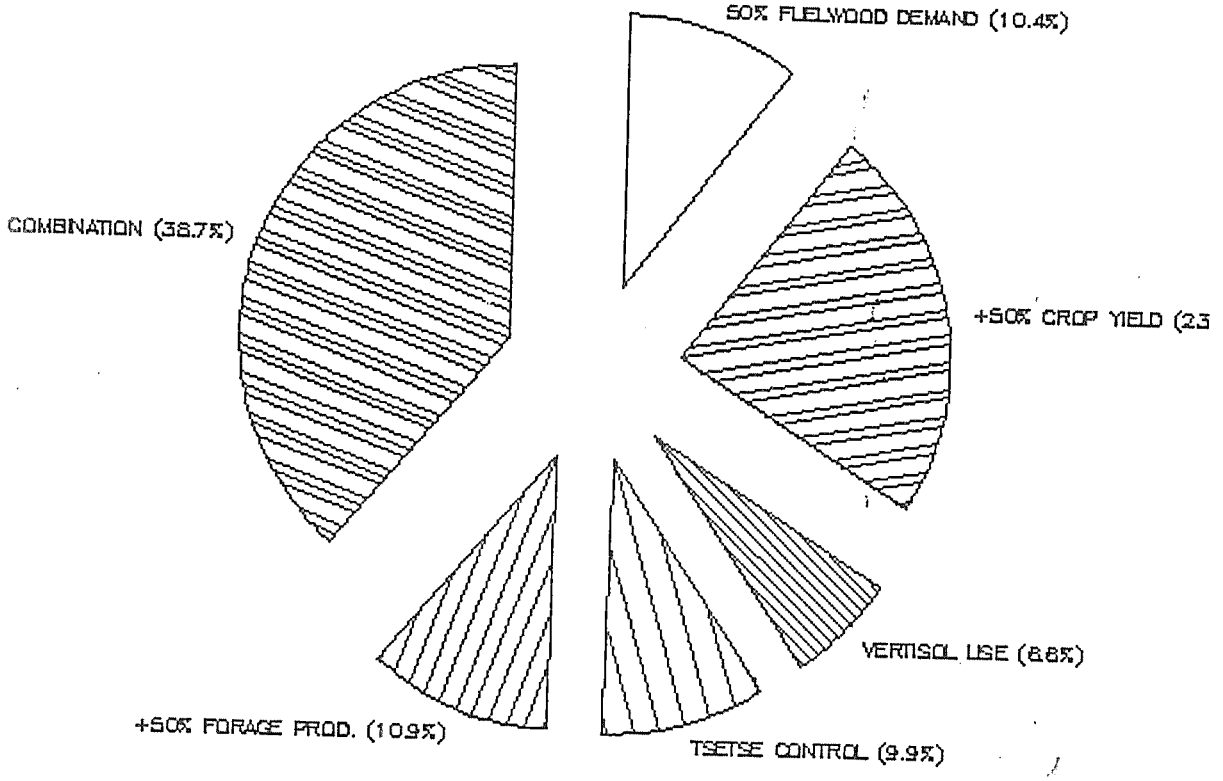


RELATIVE IMPACT OF INTERVENTIONS – 1995



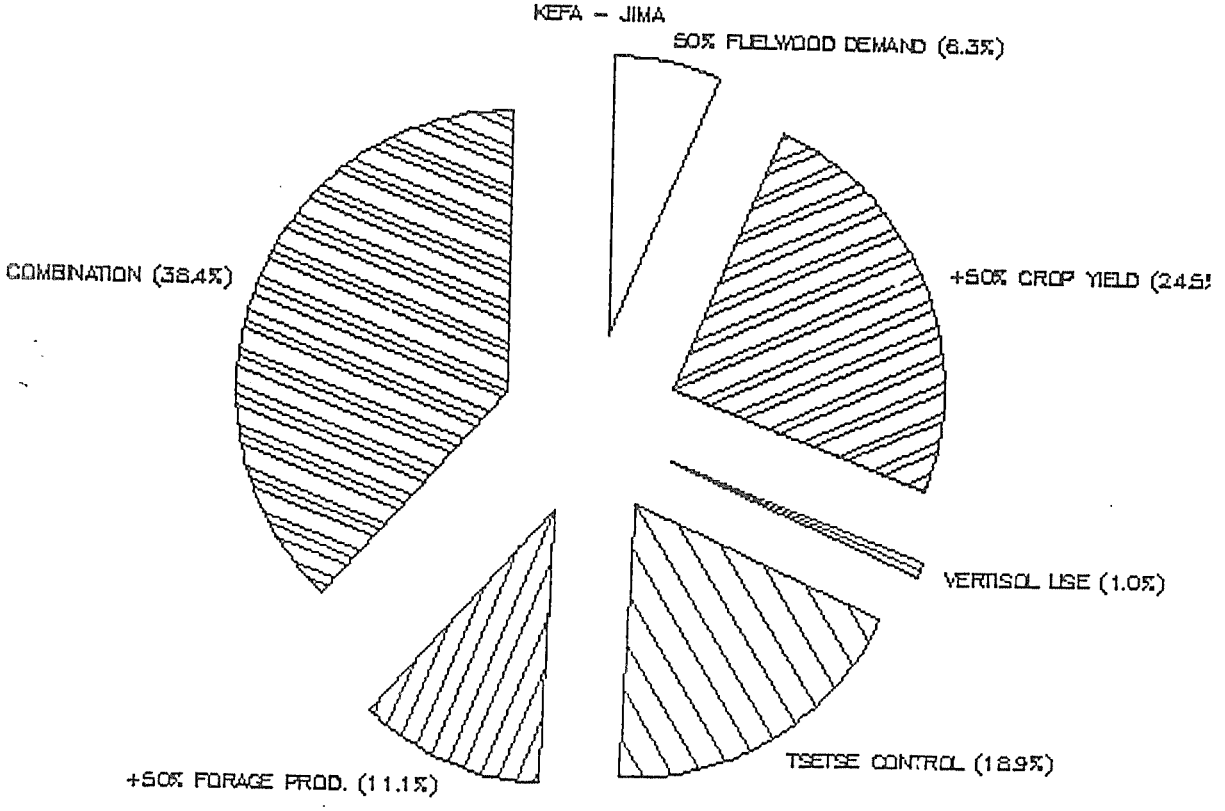
RELATIVE IMPACT OF INTERVENTIONS – 1995

KEFA – LIMU



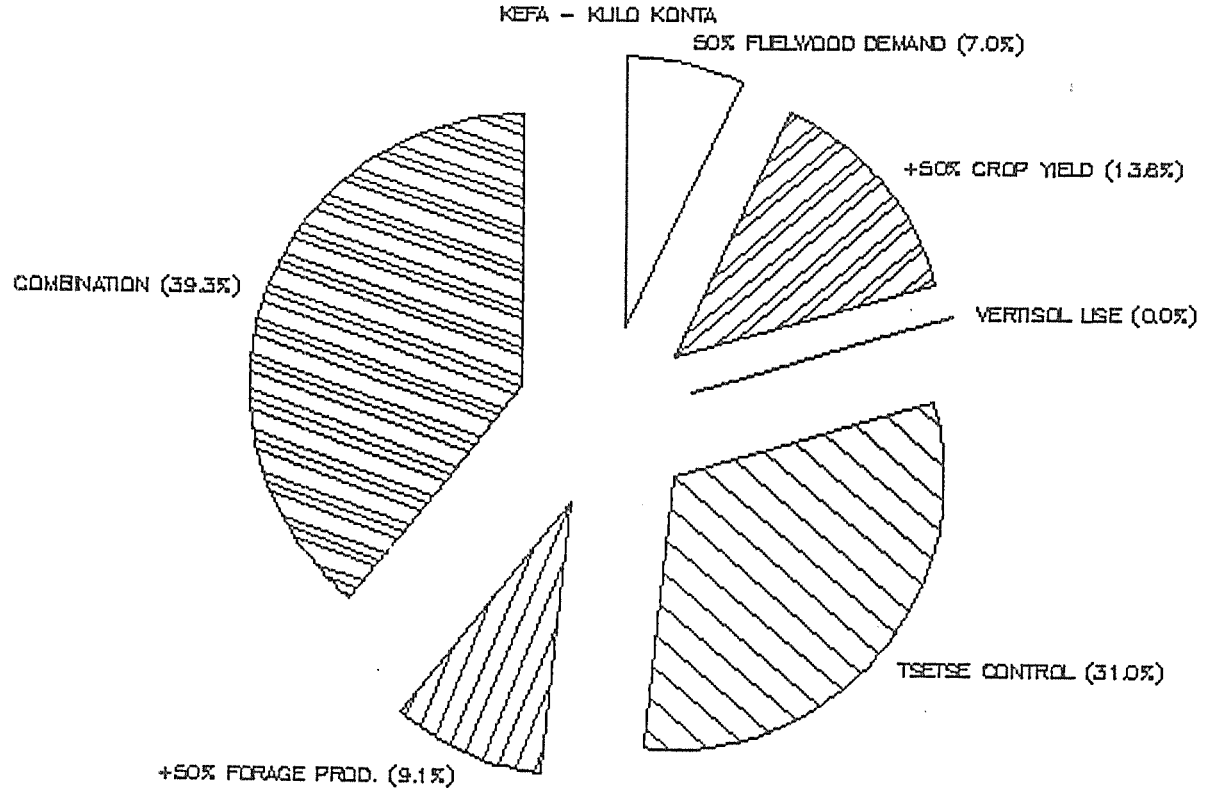
RELATIVE IMPACT OF INTERVENTIONS – 1995

KEFA – JIMA



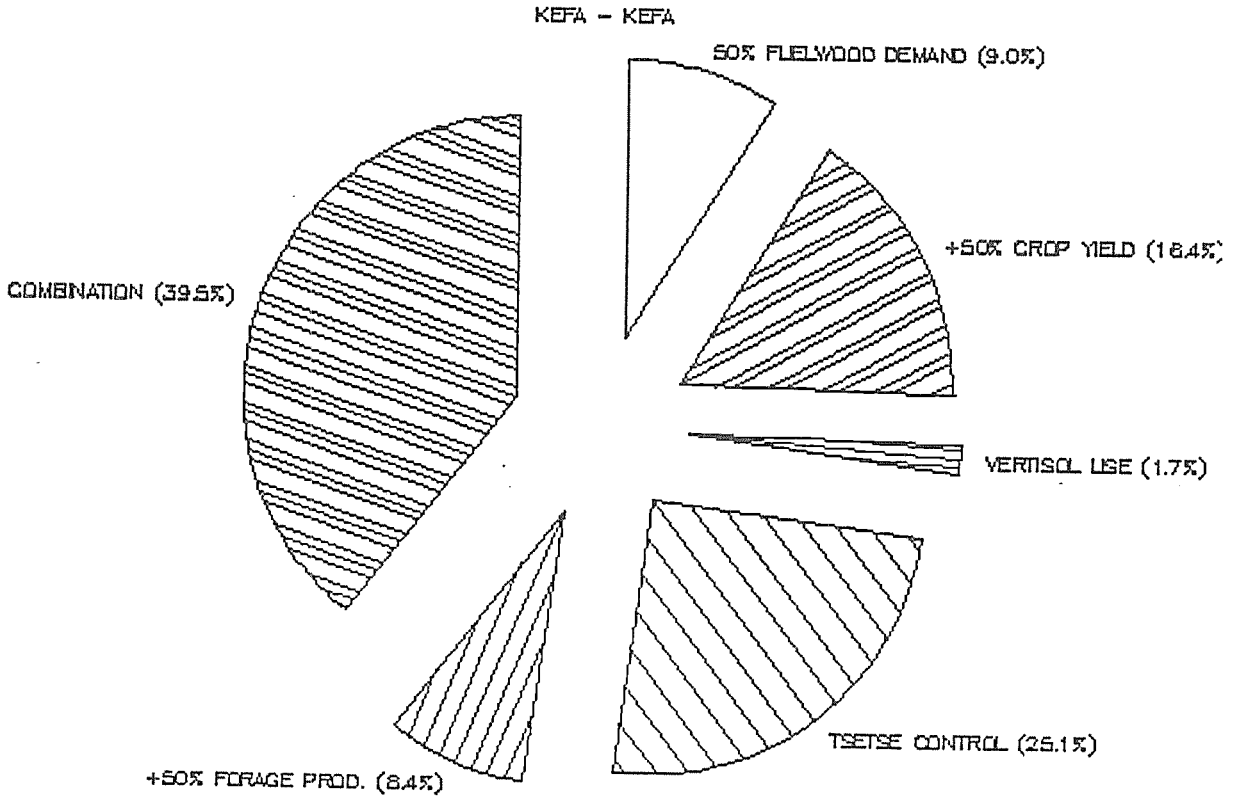
RELATIVE IMPACT OF INTERVENTIONS – 1995

KEFA – KULO KONTA



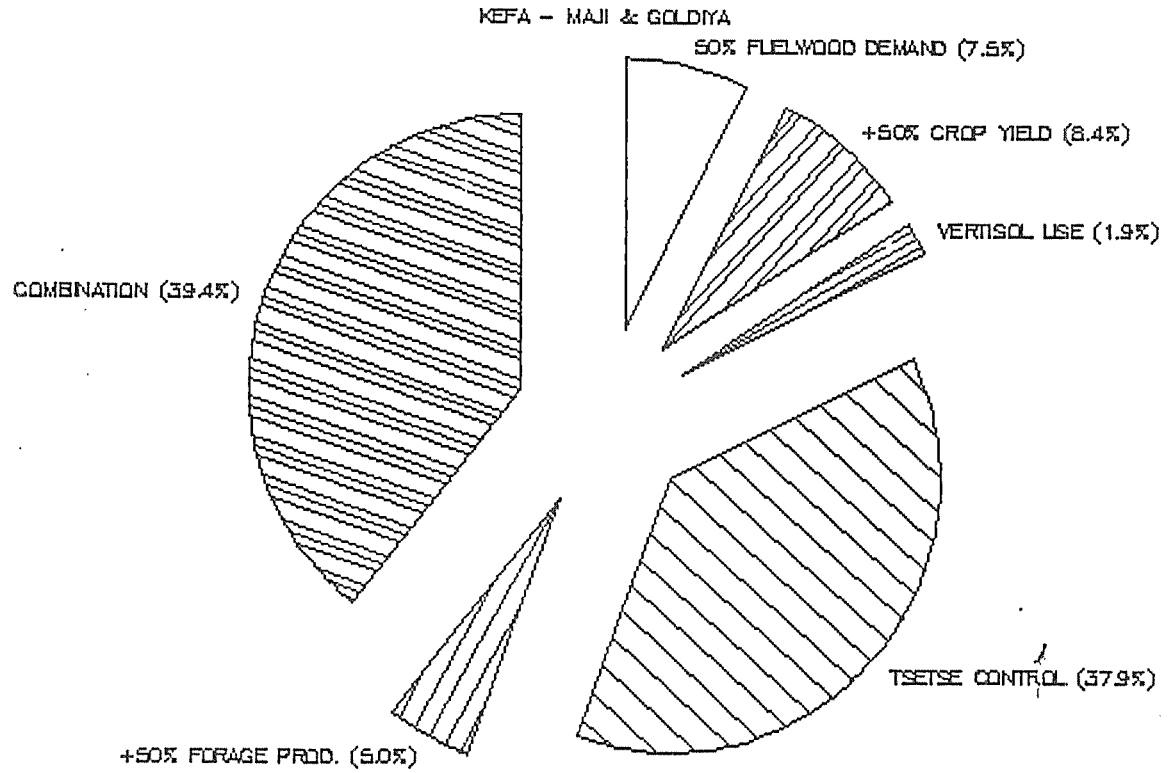
RELATIVE IMPACT OF INTERVENTIONS – 1995

KEFA – KEFA



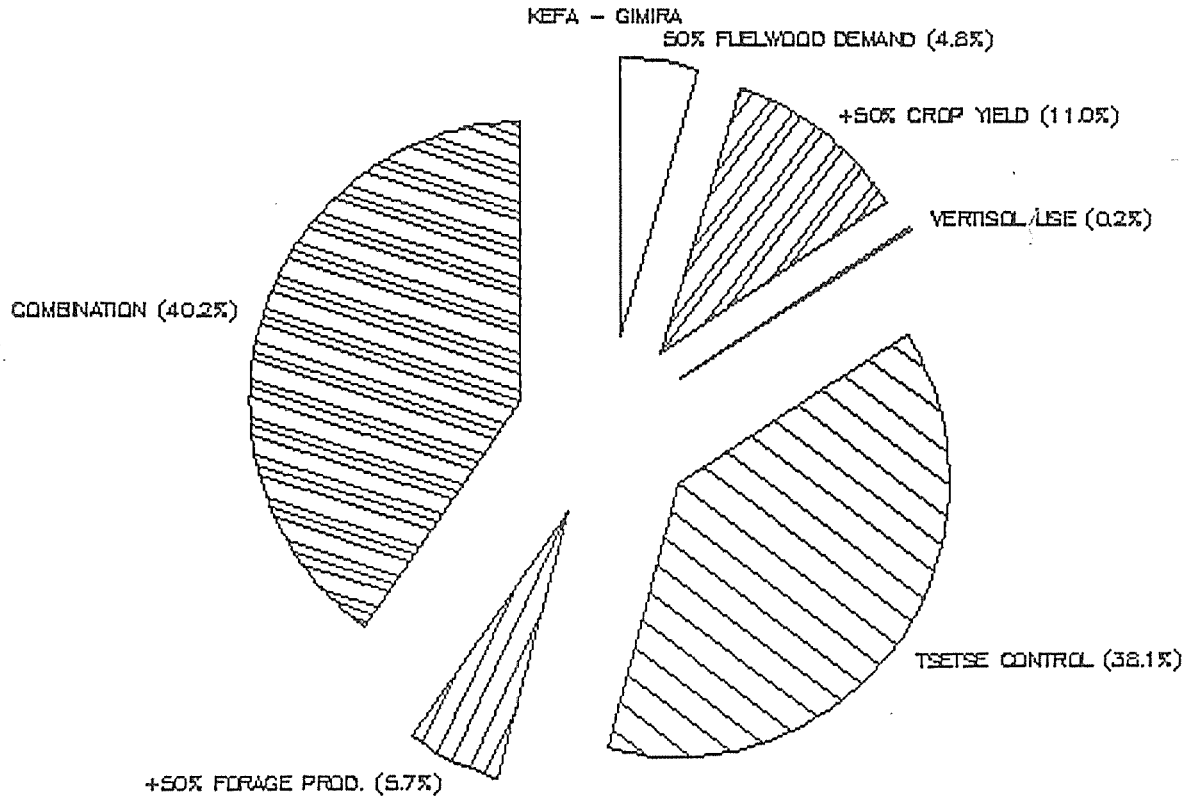
RELATIVE IMPACT OF INTERVENTIONS – 1995

KEFA – MAJI & GOLDIYA



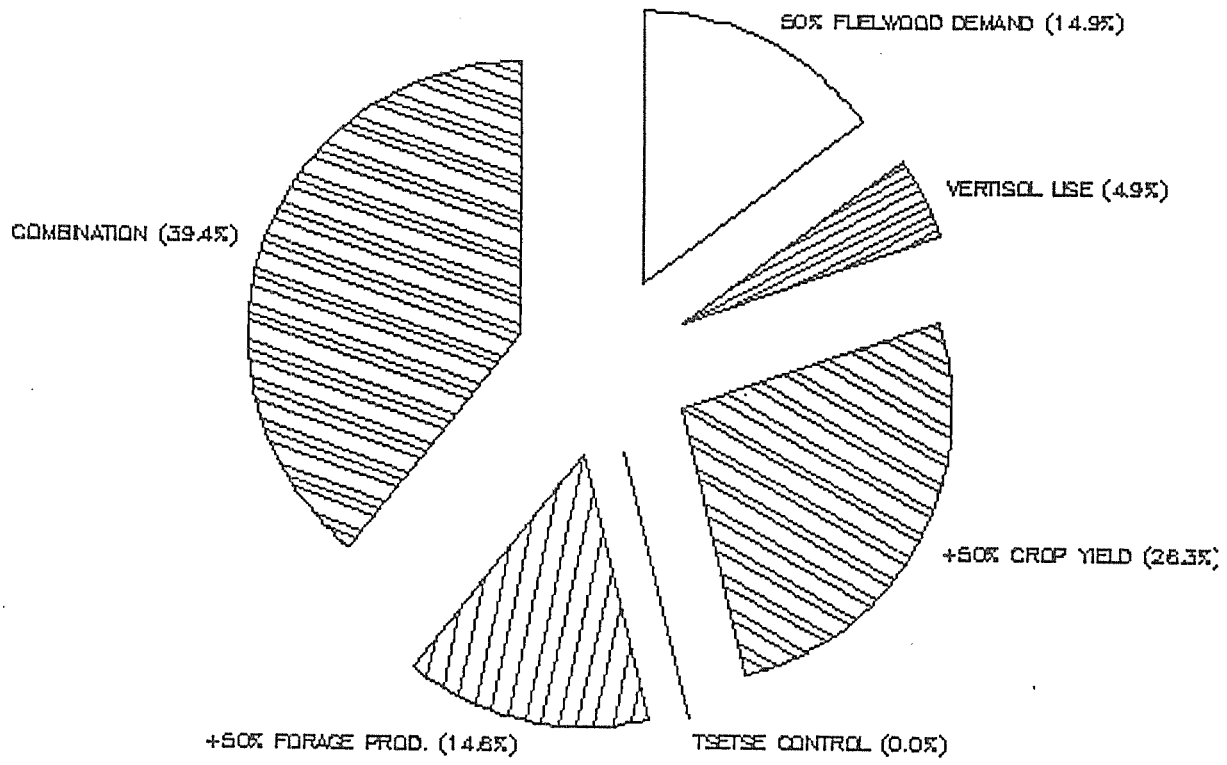
RELATIVE IMPACT OF INTERVENTIONS – 1995

KEFA – GIMIRA



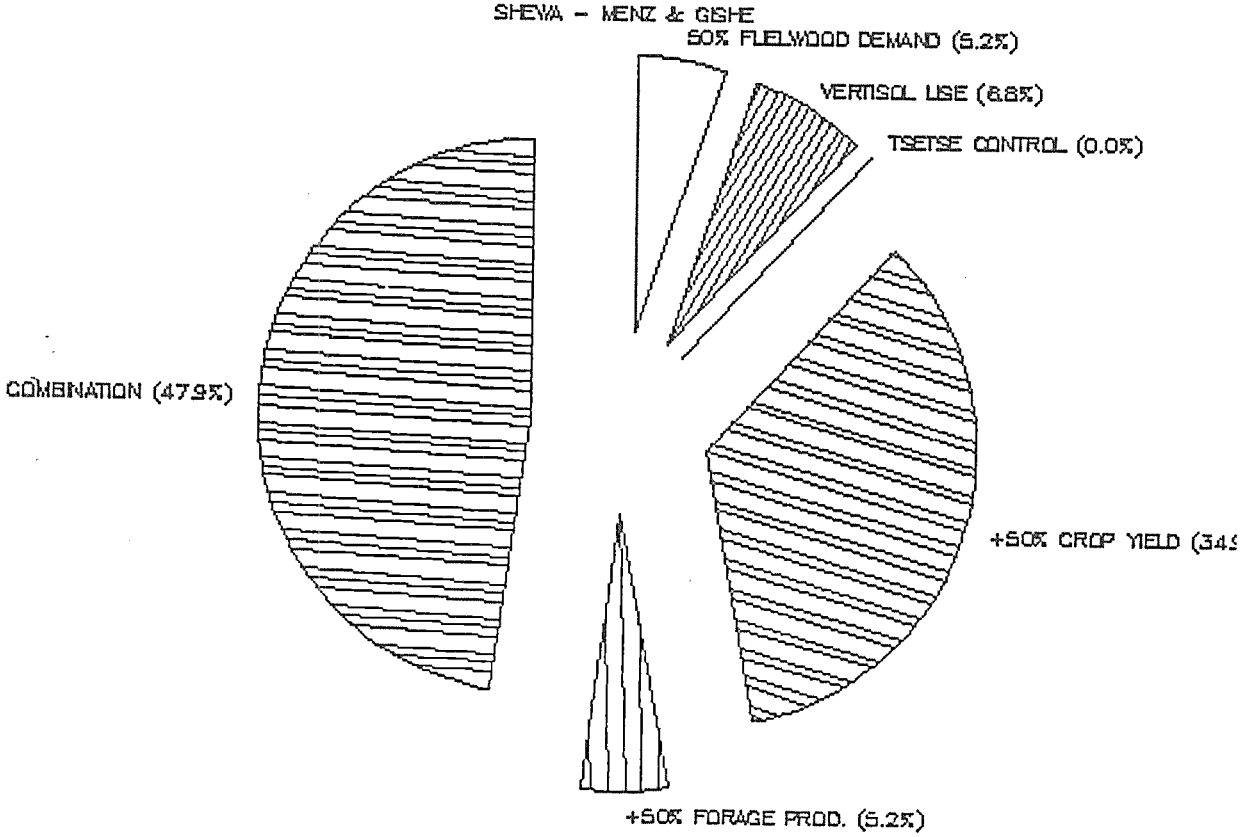
RELATIVE IMPACT OF INTERVENTIONS – 1995

SHEWA – MERHABETE



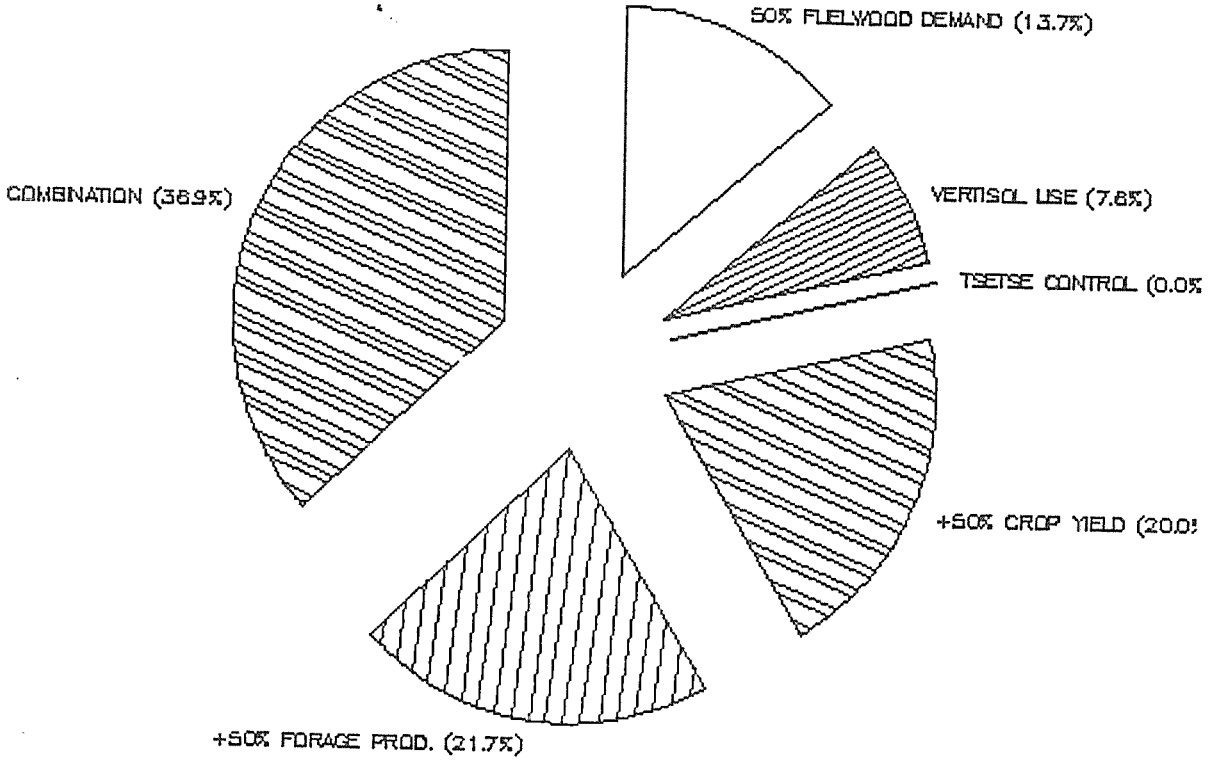
RELATIVE IMPACT OF INTERVENTIONS – 1995

SHEWA – MENZ & GISHE



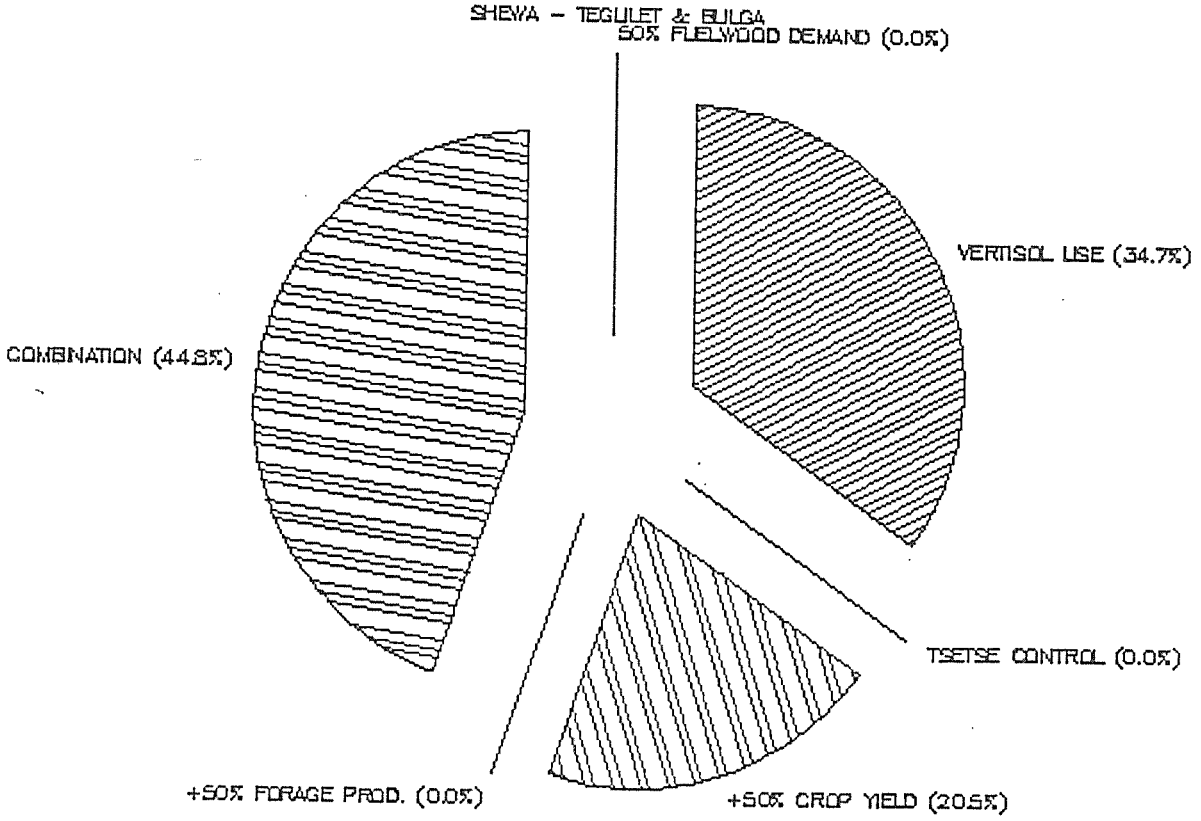
RELATIVE IMPACT OF INTERVENTIONS – 1995

SHEWA – YFAT



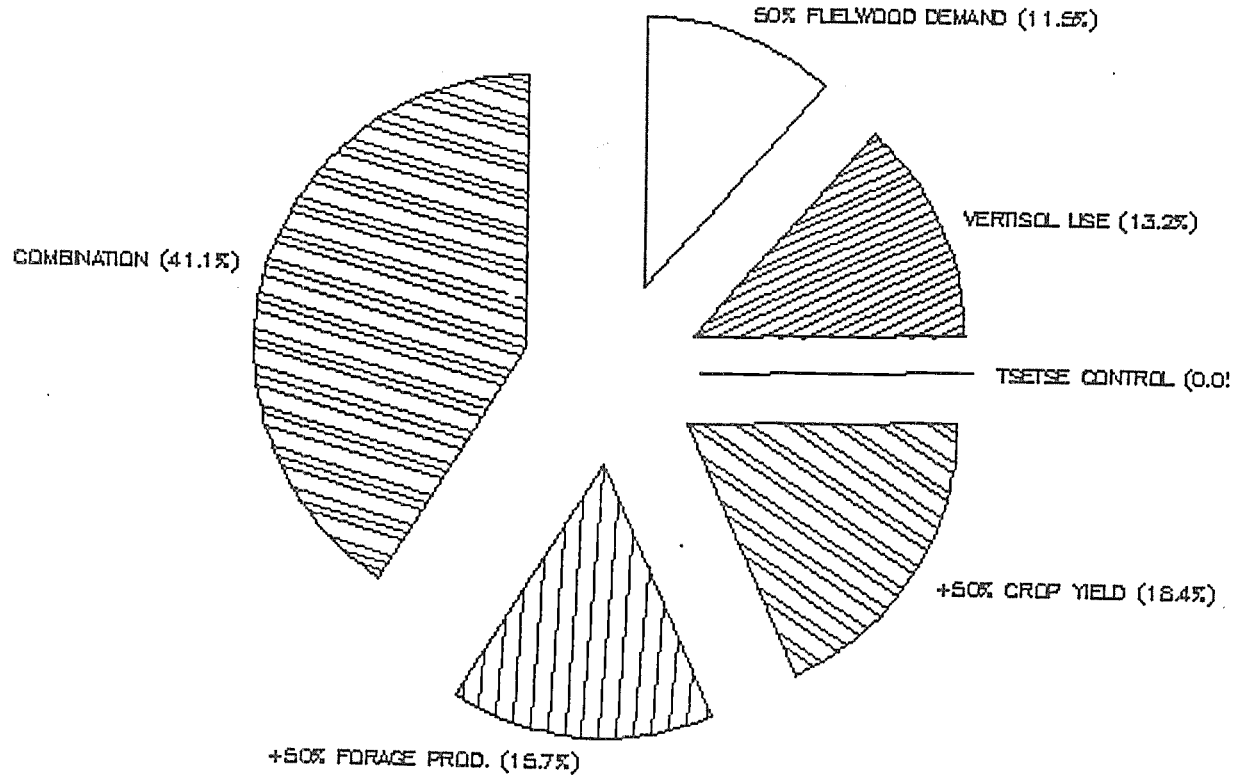
RELATIVE IMPACT OF INTERVENTIONS – 1995

SHEWA – TEGULET & BULGA



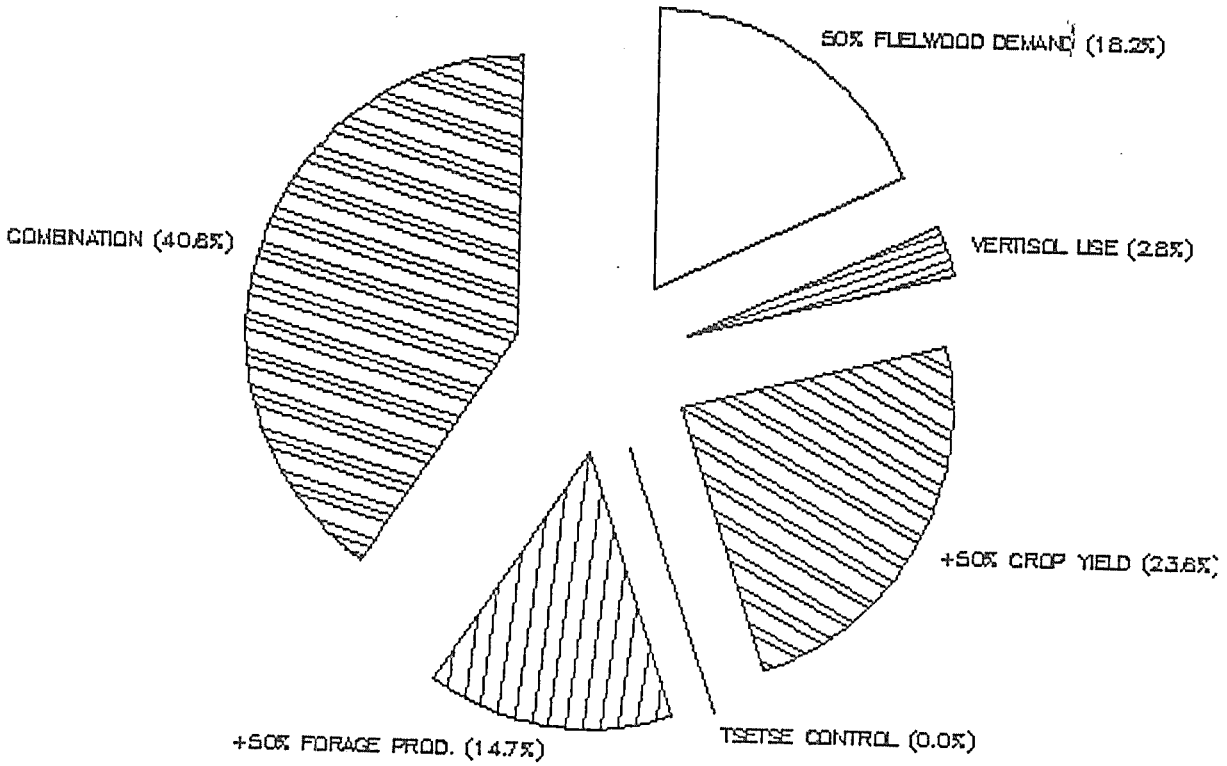
RELATIVE IMPACT OF INTERVENTIONS – 1995

SHEWA – YERER & KEREYU



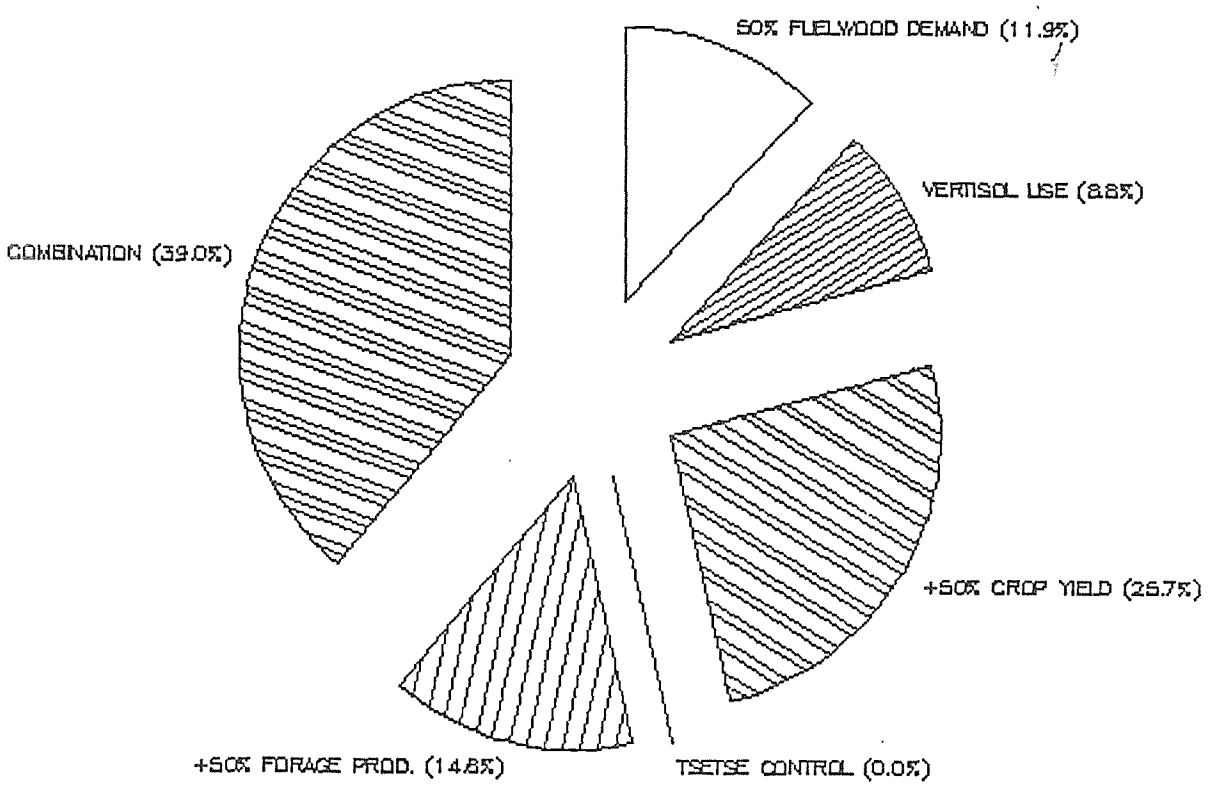
RELATIVE IMPACT OF INTERVENTIONS – 1995

SHEWA – HAIKOTCH & BUTAJIRA



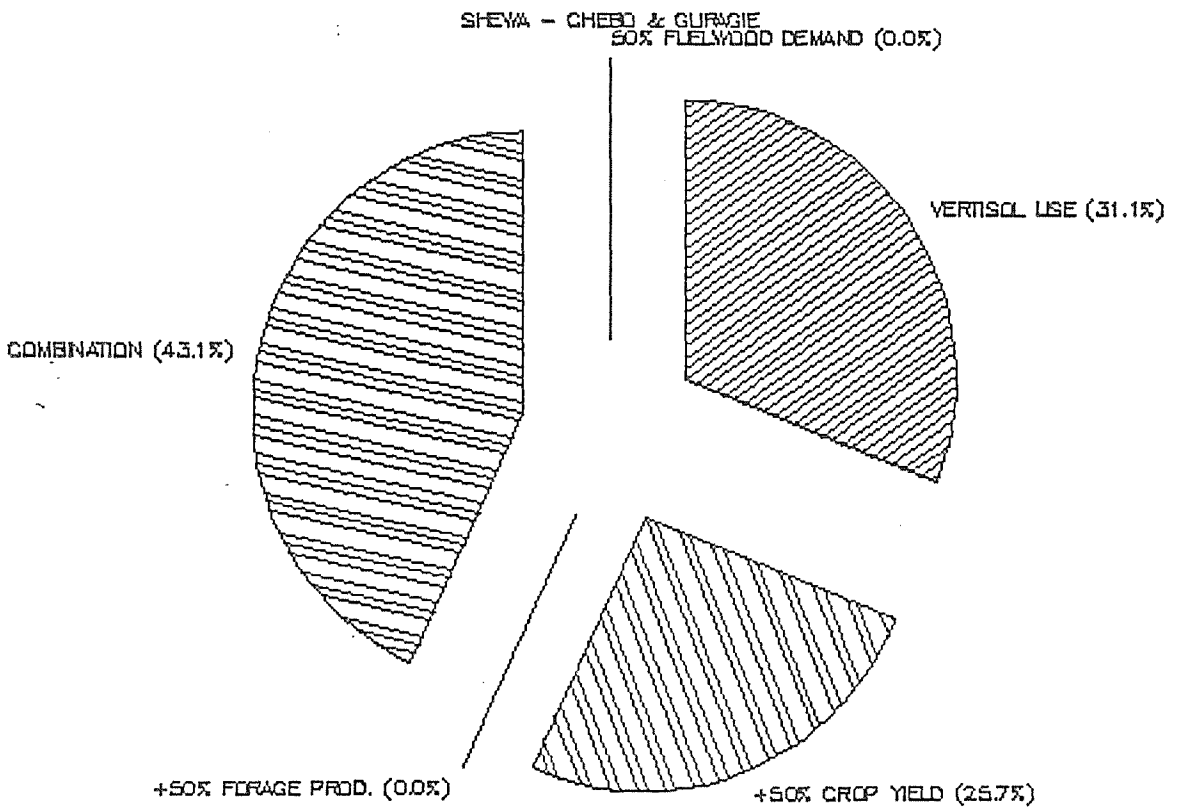
RELATIVE IMPACT OF INTERVENTIONS – 1995

SHEWA – KEMBATA & HADIA

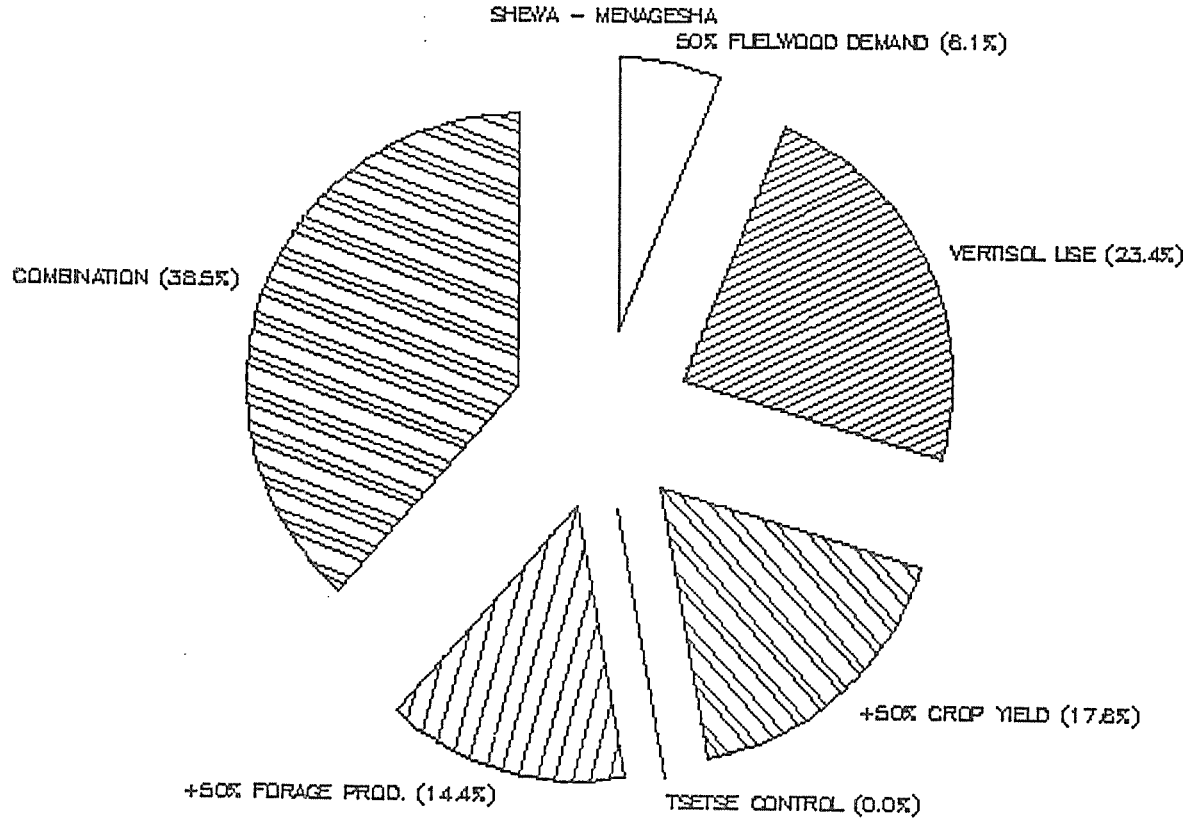


RELATIVE IMPACT OF INTERVENTIONS – 1995

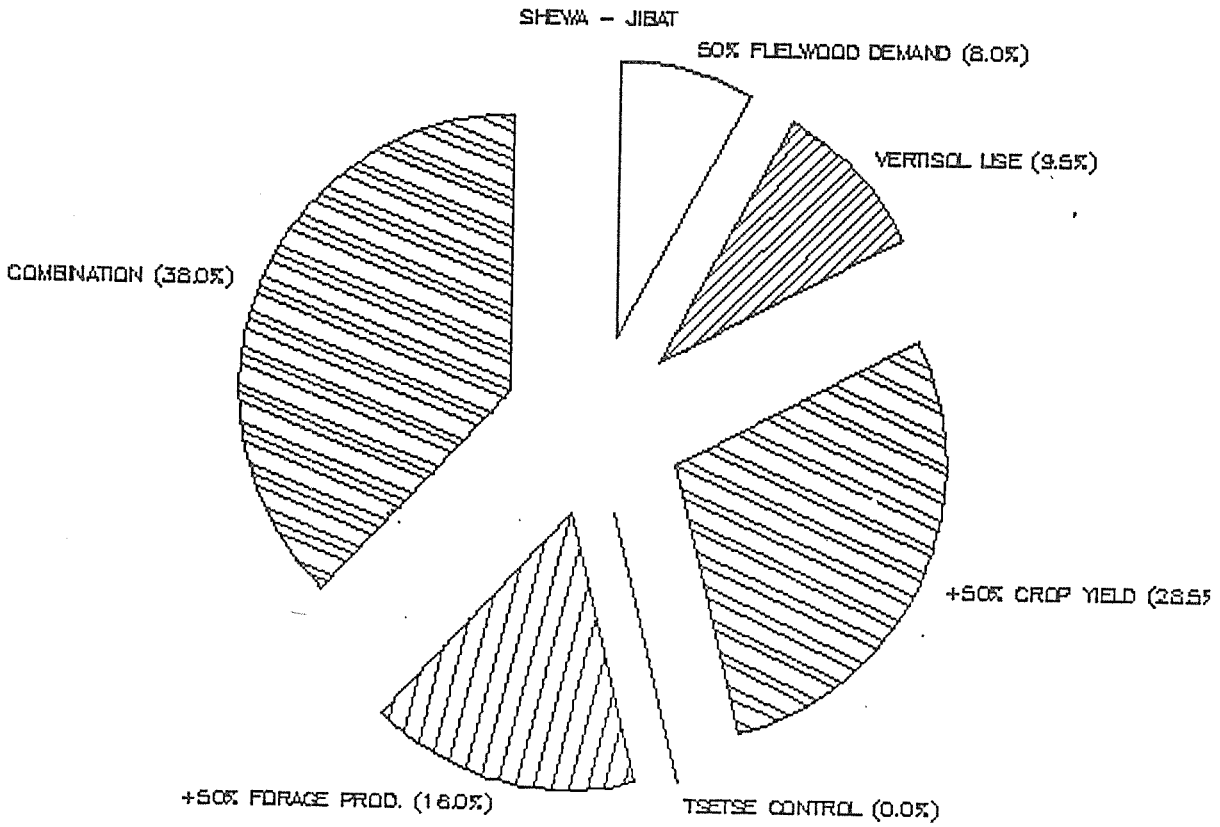
SHEWA – CHEBO & GURAGIE

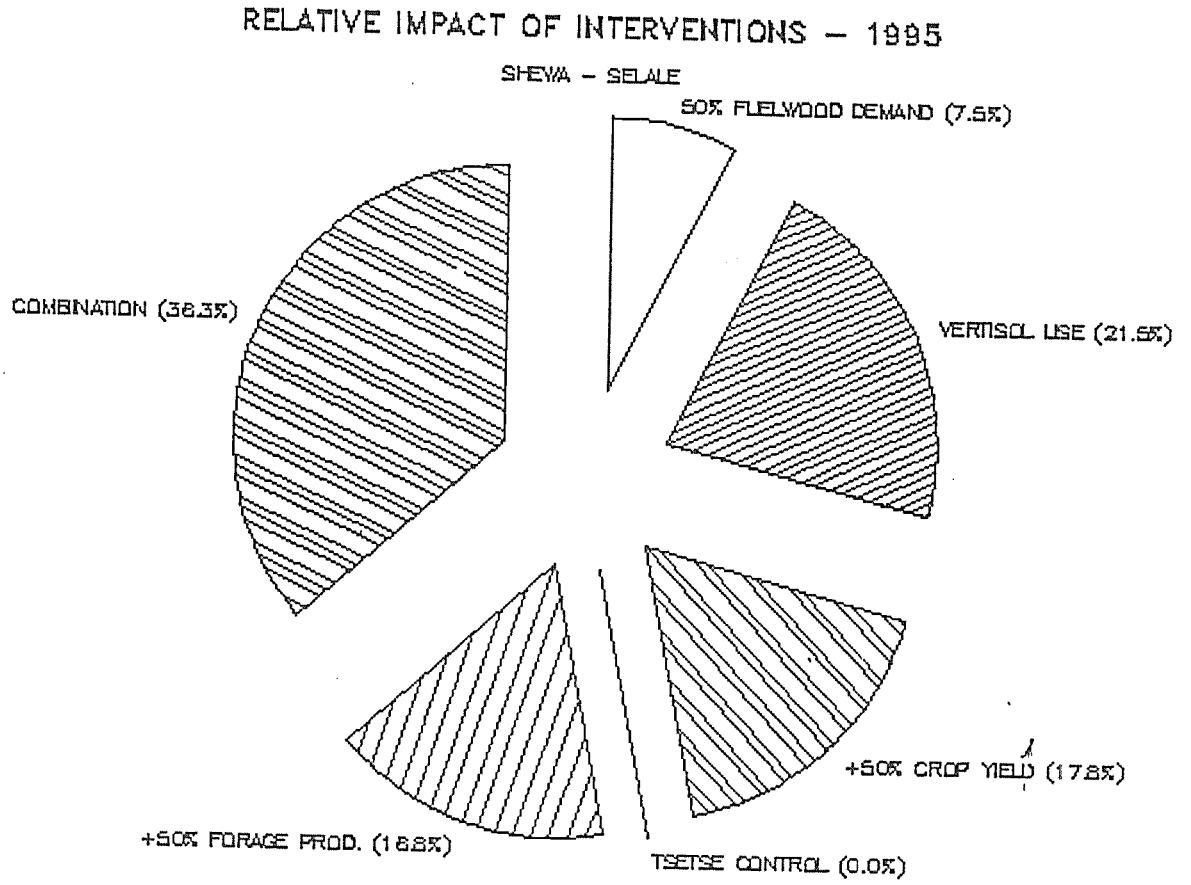


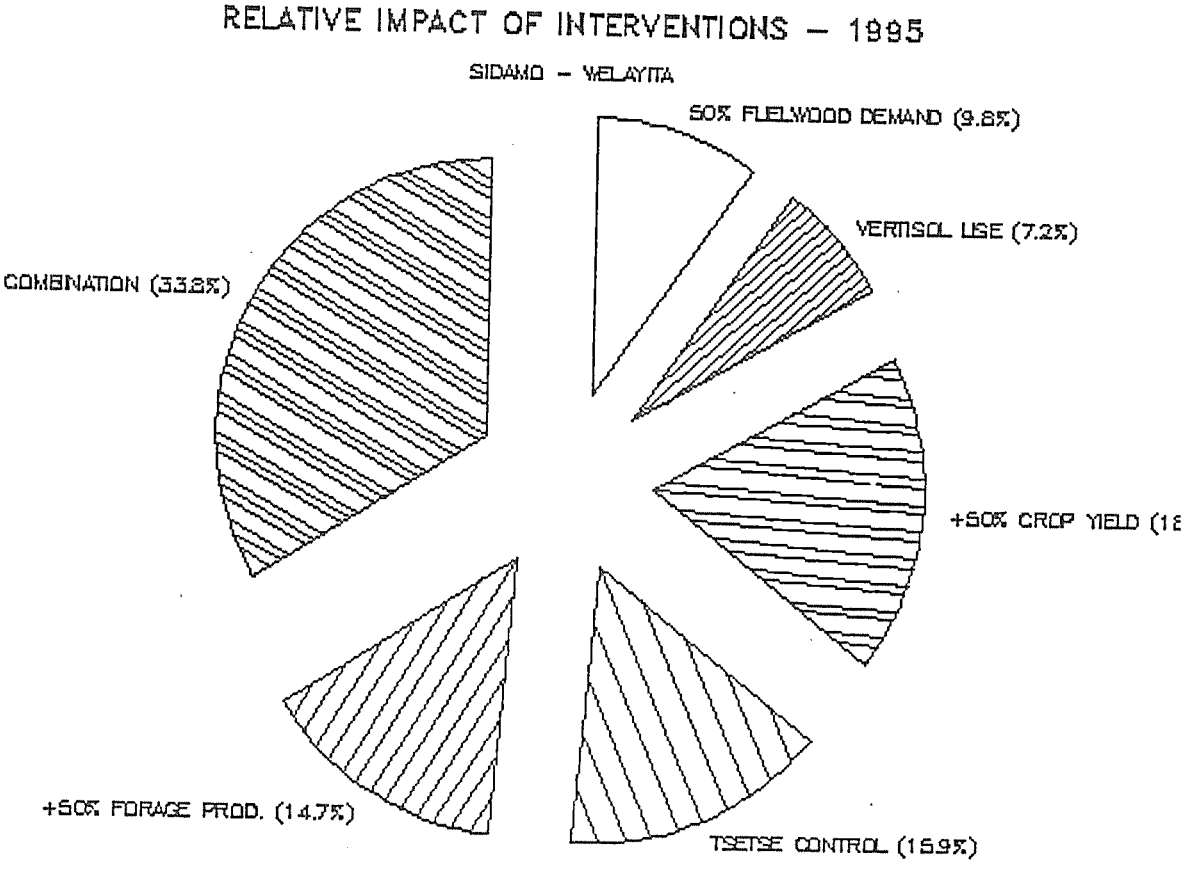
RELATIVE IMPACT OF INTERVENTIONS – 1995



RELATIVE IMPACT OF INTERVENTIONS – 1995

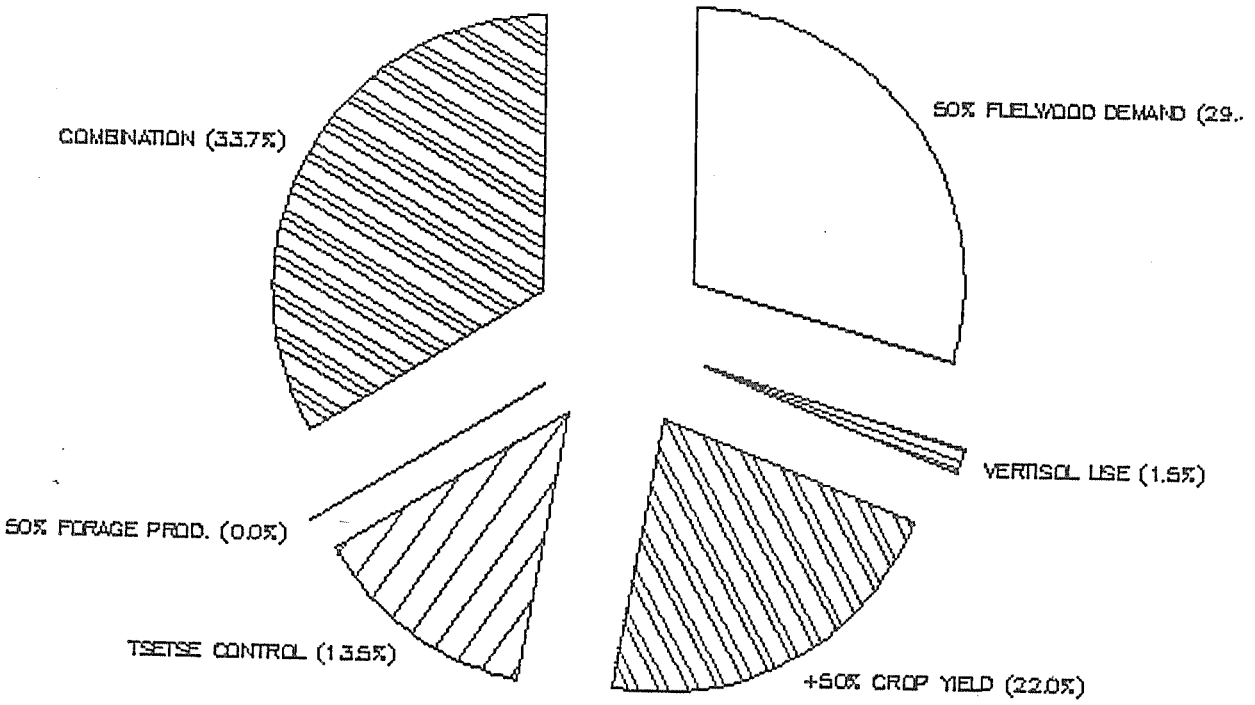



RELATIVE IMPACT OF INTERVENTIONS – 1995
SHEWA – SELALE
50% FUELWOOD DEMAND (7.5%)
VERTISOL USE (21.5%)
+50% CROP YIELD (17.8%)
TSETSE CONTROL (0.0%)
+50% FORAGE PROD. (16.8%)
COMBINATION (36.3%)


RELATIVE IMPACT OF INTERVENTIONS – 1995
SIDAMO – WELAYITA
50% FUELWOOD DEMAND (9.8%)
VERTISOL USE (7.2%)
+50% CROP YIELD (1
TSETSE CONTROL (15.9%)
+50% FORAGE PROD. (14.7%)
COMBINATION (33.8%)

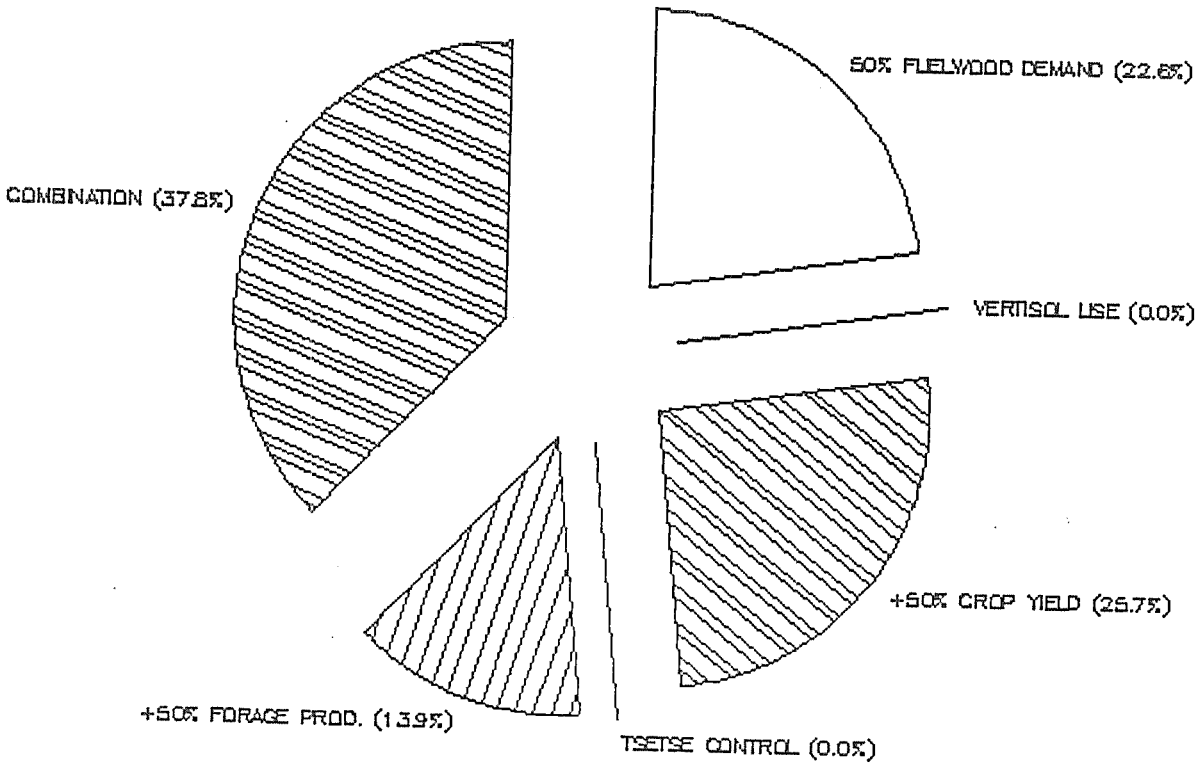
RELATIVE IMPACT OF INTERVENTIONS – 1995

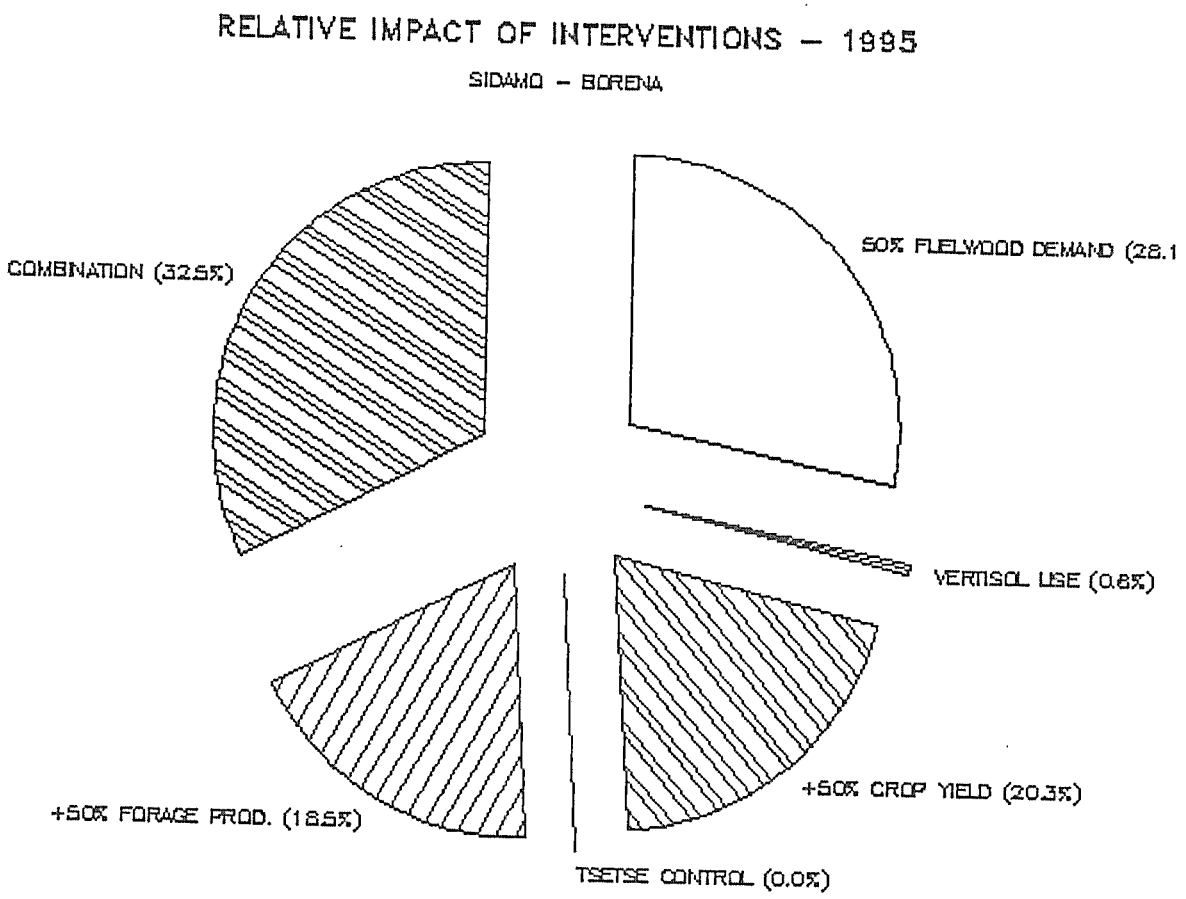
SIDAMO – SIDAMA

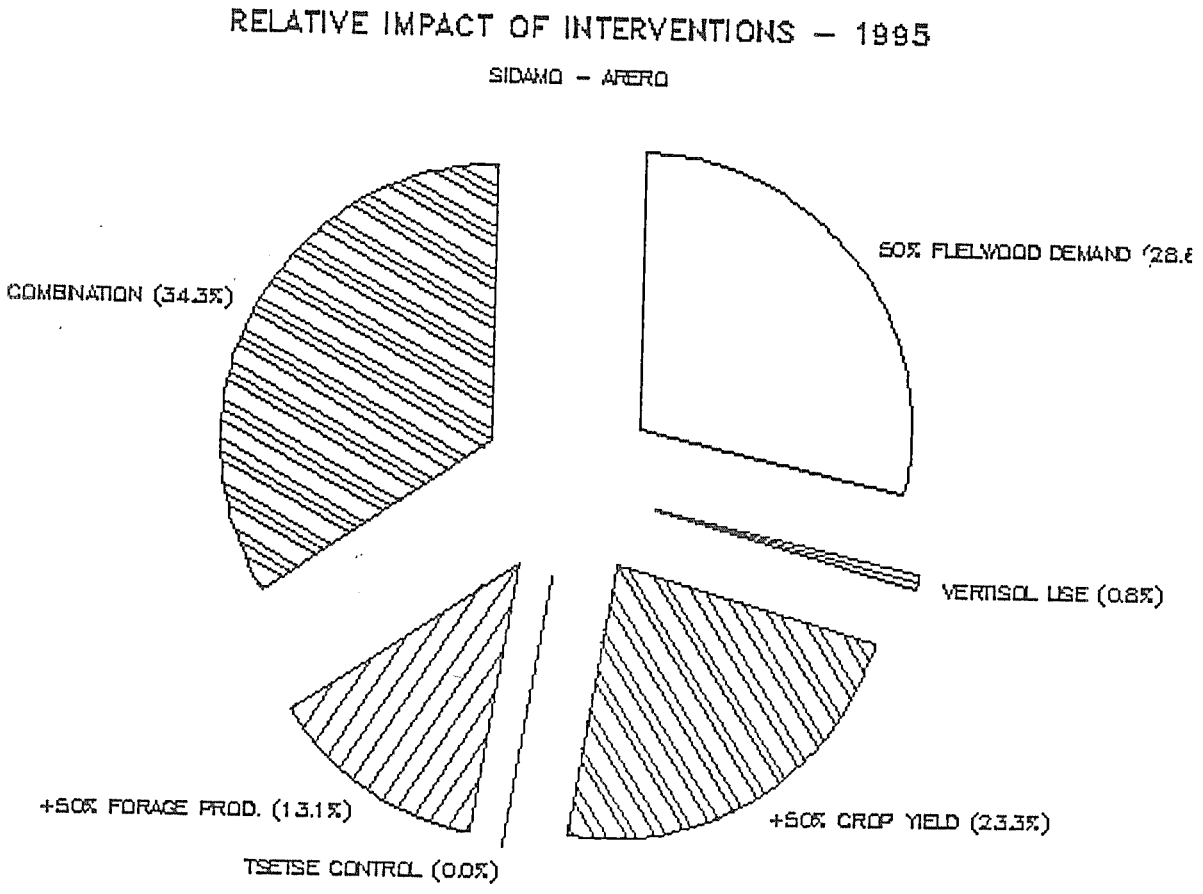


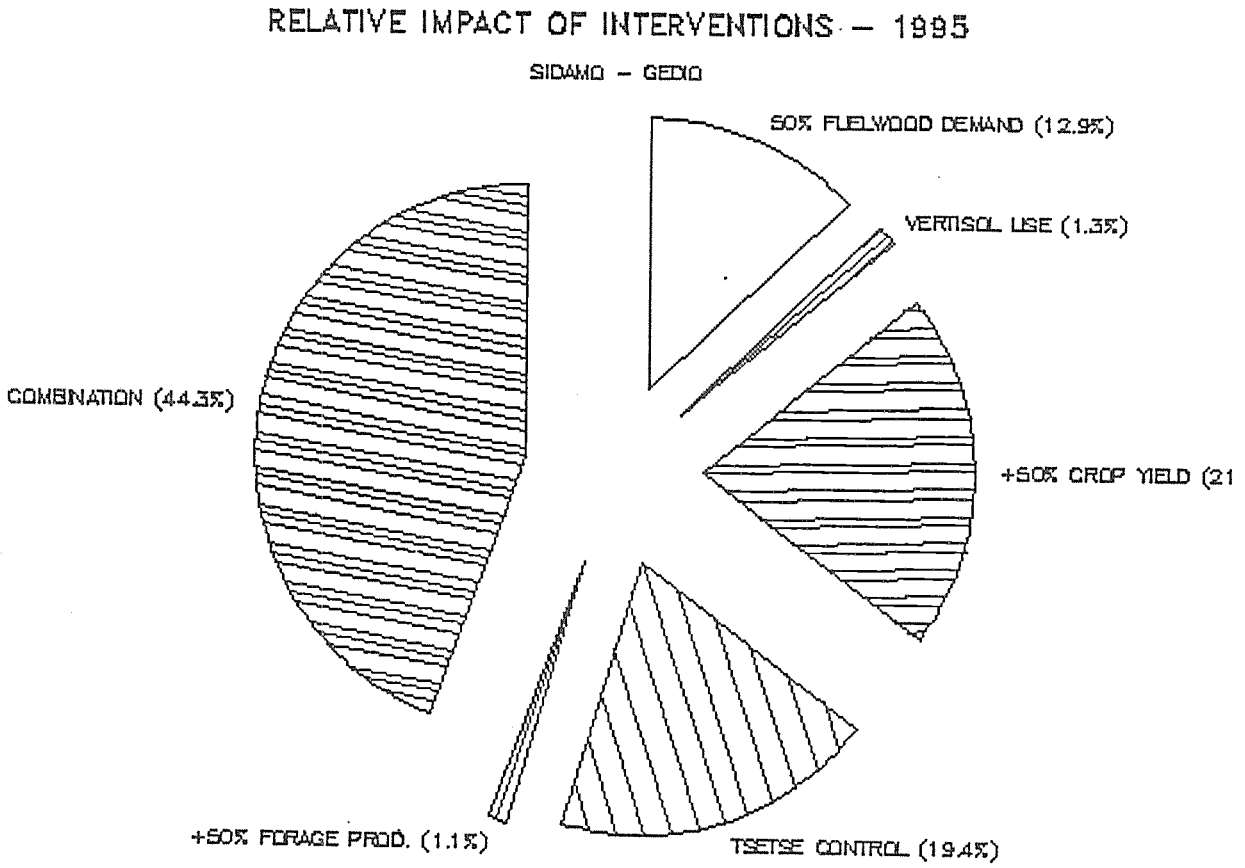
RELATIVE IMPACT OF INTERVENTIONS – 1995

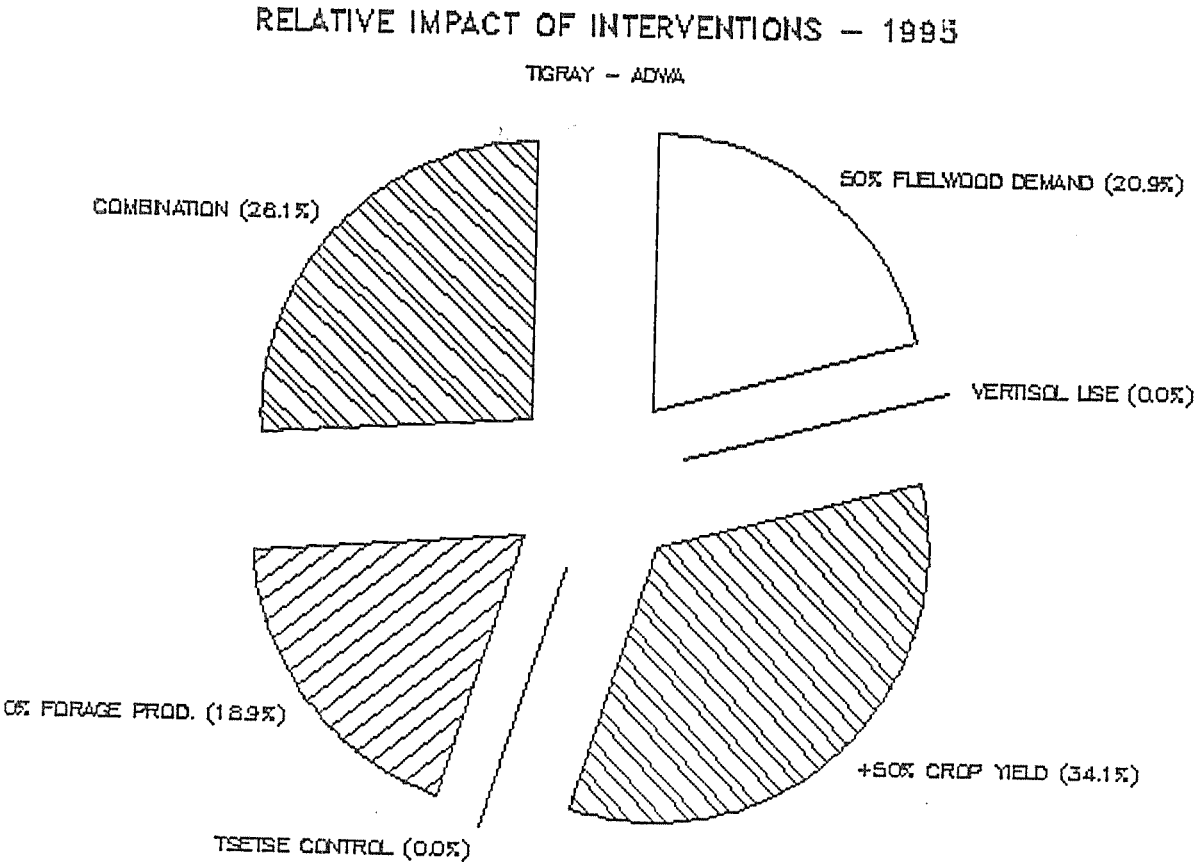
SIDAMO – JEM JEM




RELATIVE IMPACT OF INTERVENTIONS – 1995
SIDAMO – BORENA
COMBINATION (32.5%)
50% FUELWOOD DEMAND (28.1
VERTISOL USE (0.8%)
+50% CROP YIELD (20.3%)
+50% FORAGE PROD. (18.5%)
TSETSE CONTROL (0.0%)

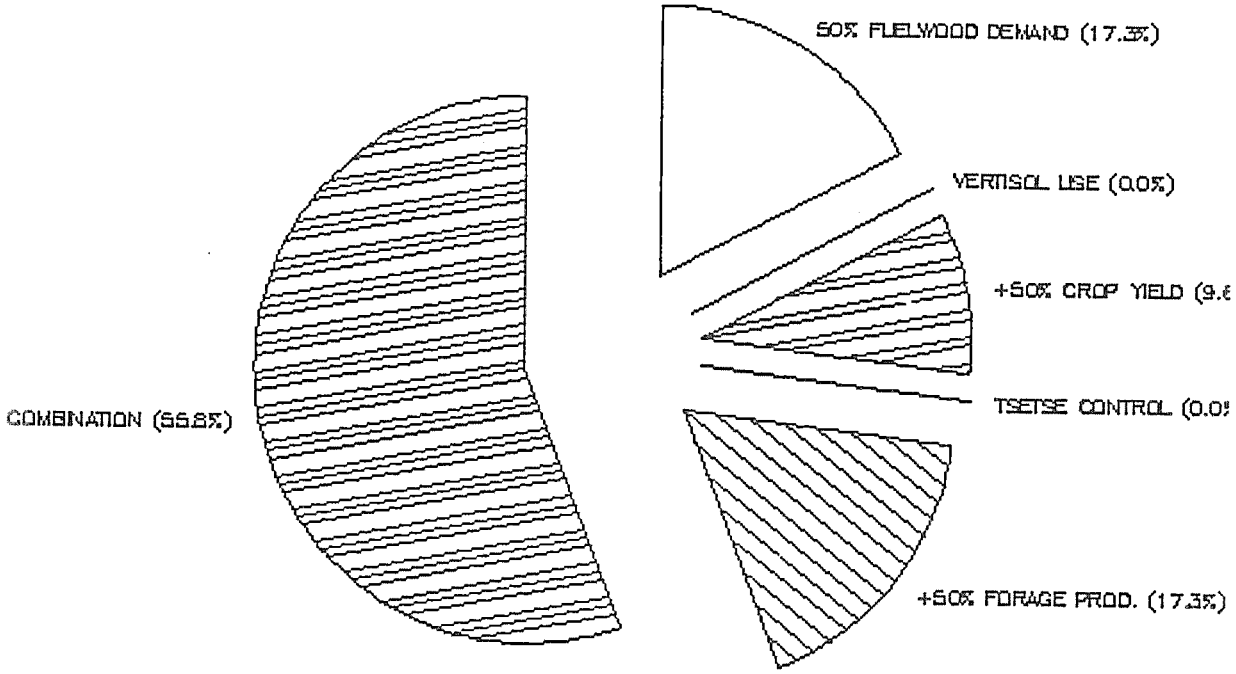

RELATIVE IMPACT OF INTERVENTIONS – 1995
SIDAMO – ARERO
COMBINATION (34.3%)
50% FUELWOOD DEMAND (28.6
VERTISOL USE (0.8%)
+50% CROP YIELD (23.3%)
+50% FORAGE PROD. (13.1%)
TSETSE CONTROL (0.0%)


RELATIVE IMPACT OF INTERVENTIONS – 1995
SIDAMO – GEDIO
50% FUELWOOD DEMAND (12.9%)
VERTISOL USE (1.3%)
COMBINATION (44.3%)
+50% CROP YIELD (21
+50% FORAGE PROD. (1.1%)
TSETSE CONTROL (19.4%)


RELATIVE IMPACT OF INTERVENTIONS – 1995
TIGRAY – ADWA
COMBINATION (26.1%)
50% FUELWOOD DEMAND (20.9%)
VERTISOL USE (0.0%)
0% FORAGE PROD. (18.9%)
+50% CROP YIELD (34.1%)
TSETSE CONTROL (0.0%)

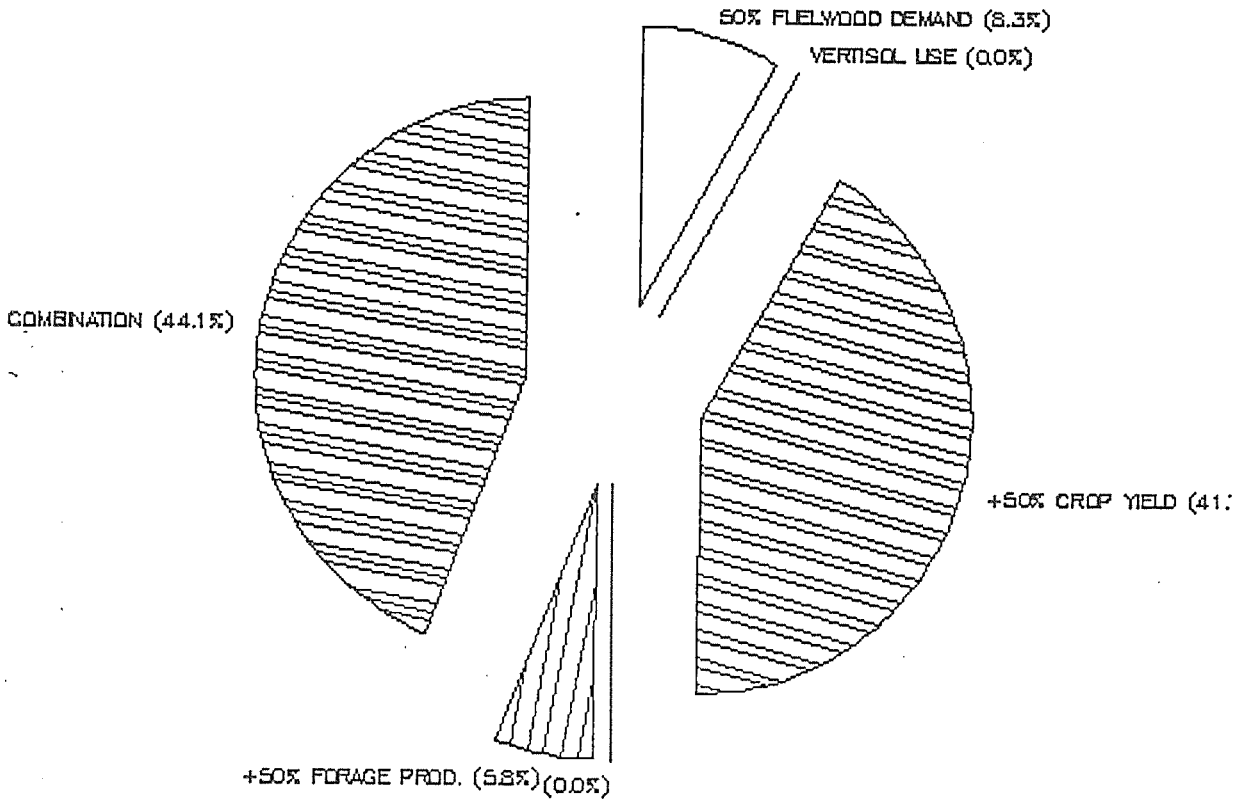
RELATIVE IMPACT OF INTERVENTIONS – 1995

TIGRAY – AGAME



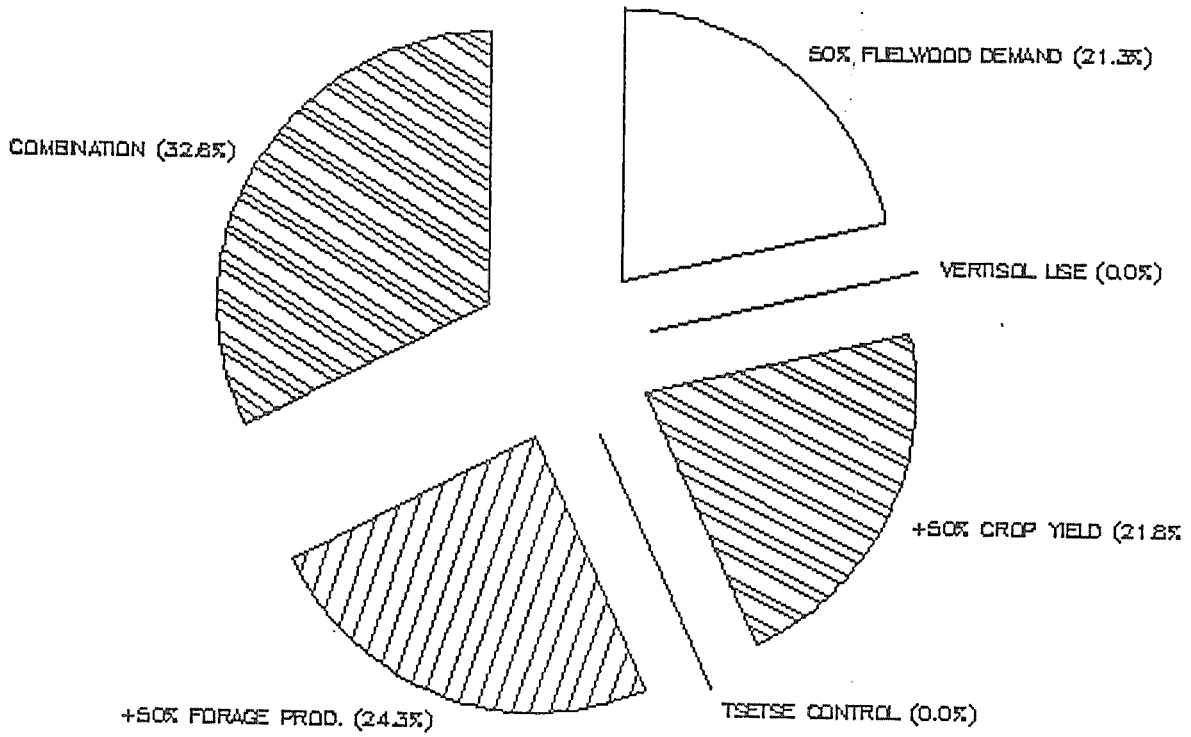
RELATIVE IMPACT OF INTERVENTIONS – 1995

TIGRAY – HILLET AWLALO



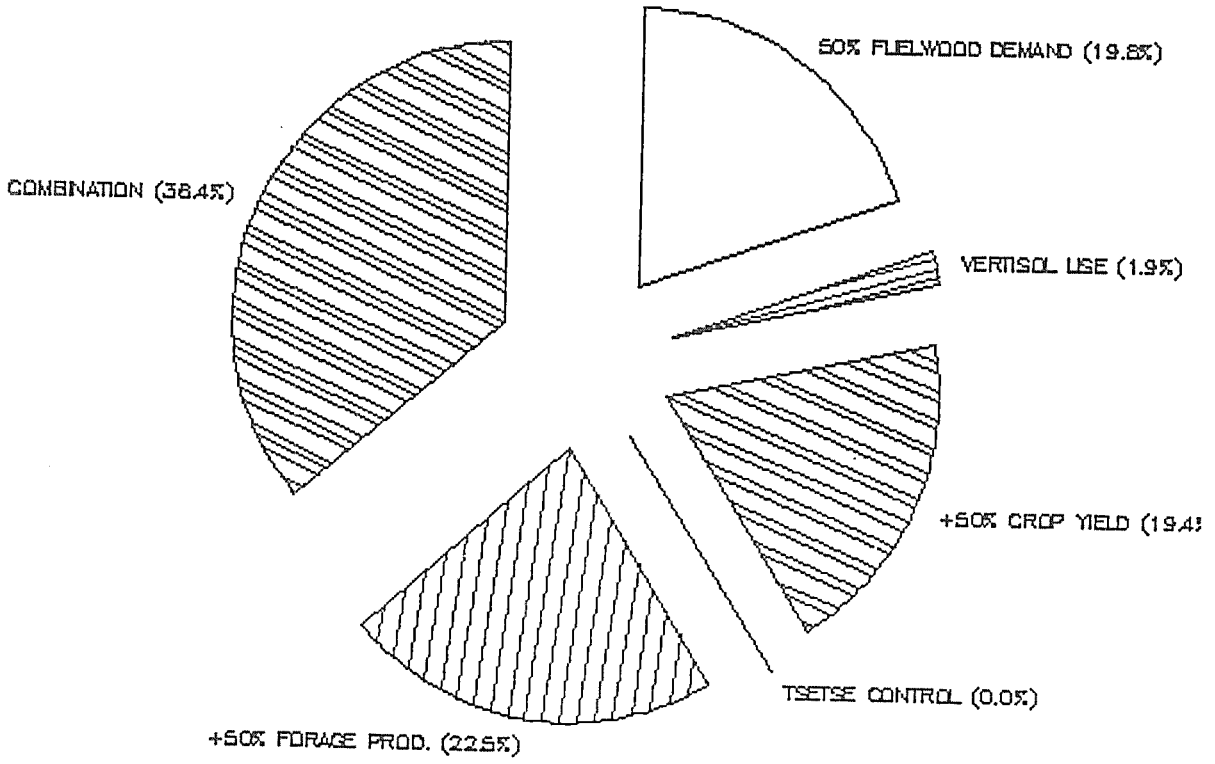
RELATIVE IMPACT OF INTERVENTIONS – 1995

TIGRAY – ENDERTA



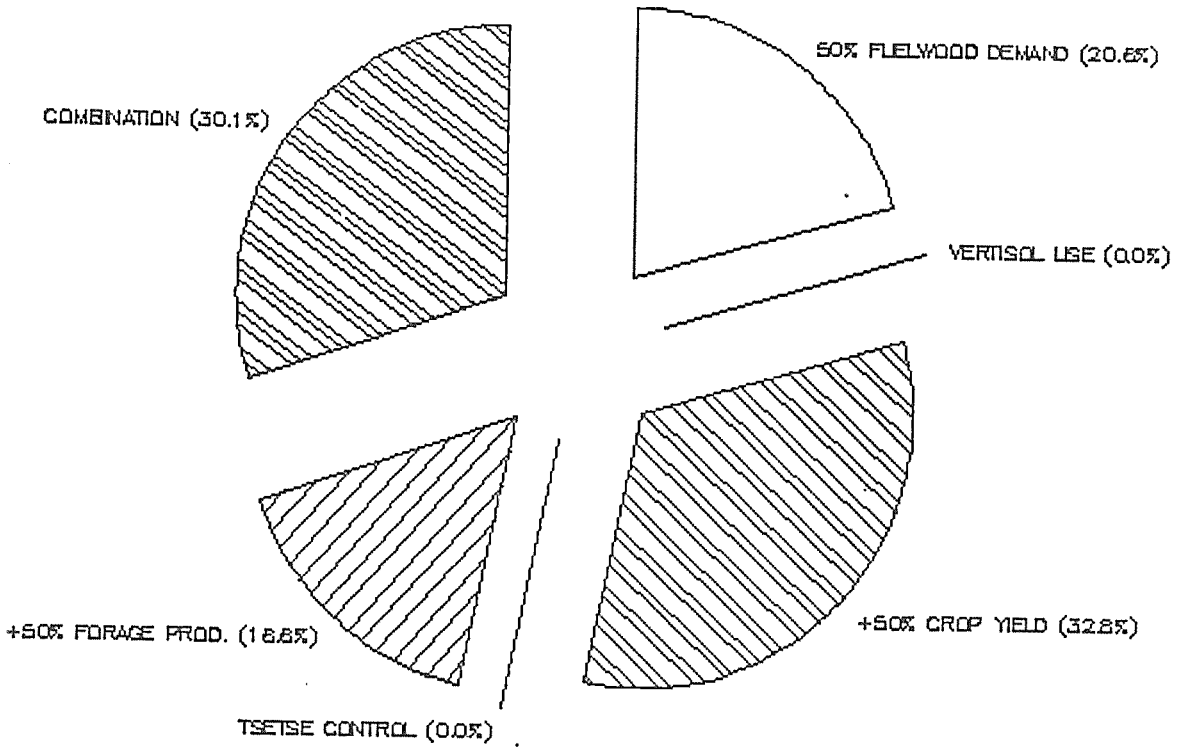
RELATIVE IMPACT OF INTERVENTIONS – 1995

TIGRAY – RAYA & AZEBO



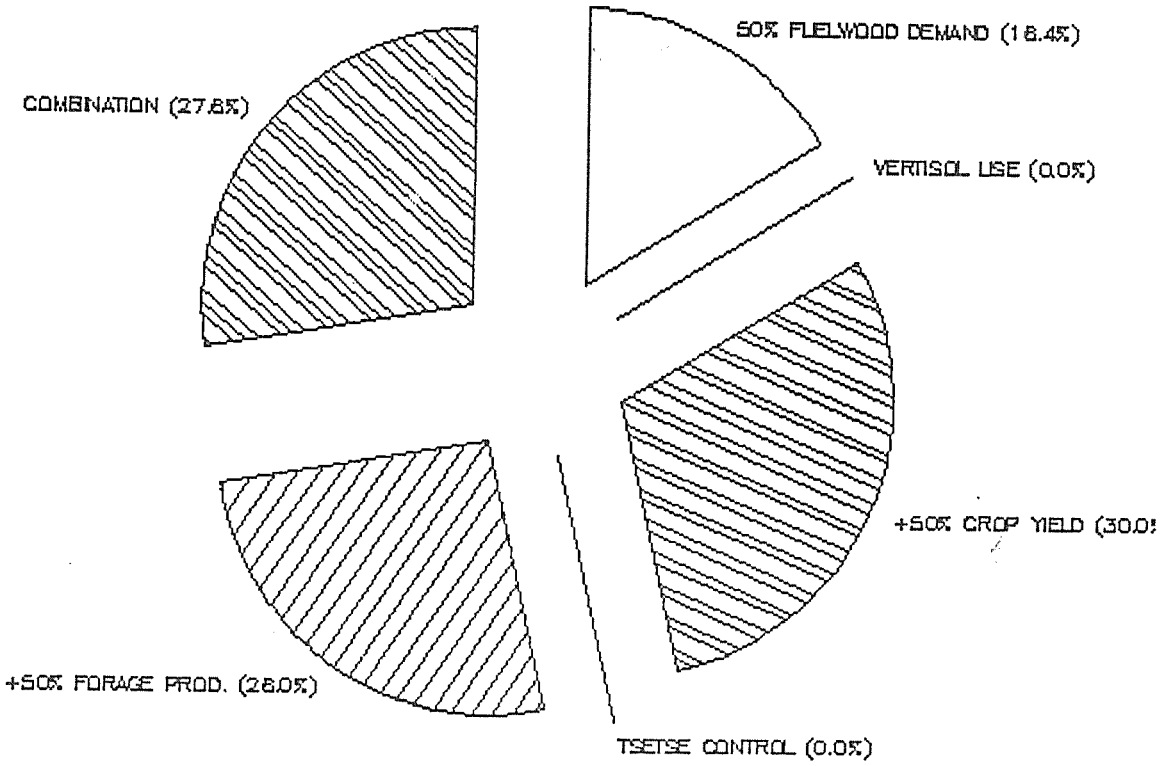
RELATIVE IMPACT OF INTERVENTIONS – 1995

TIGRAY – TEMBIEN



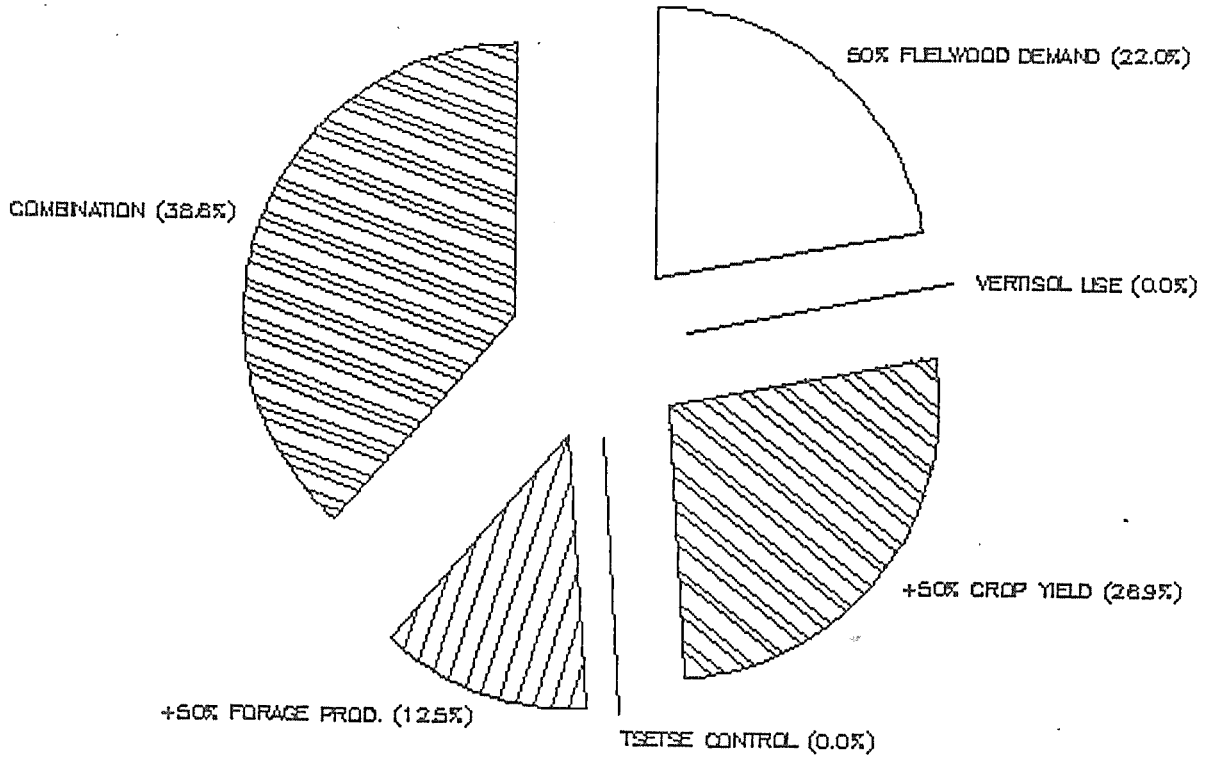
RELATIVE IMPACT OF INTERVENTIONS – 1995

TIGRAY – AXUM



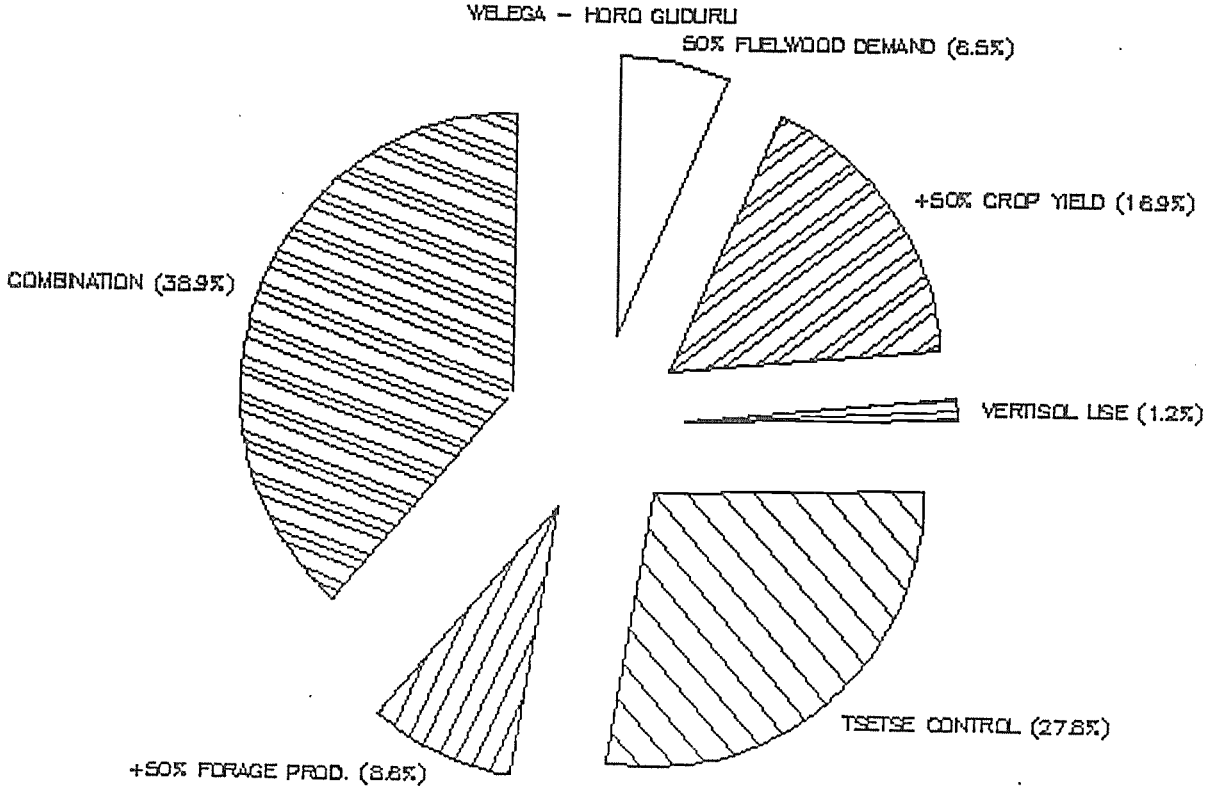
RELATIVE IMPACT OF INTERVENTIONS – 1995

TIGRAY – SHIRE

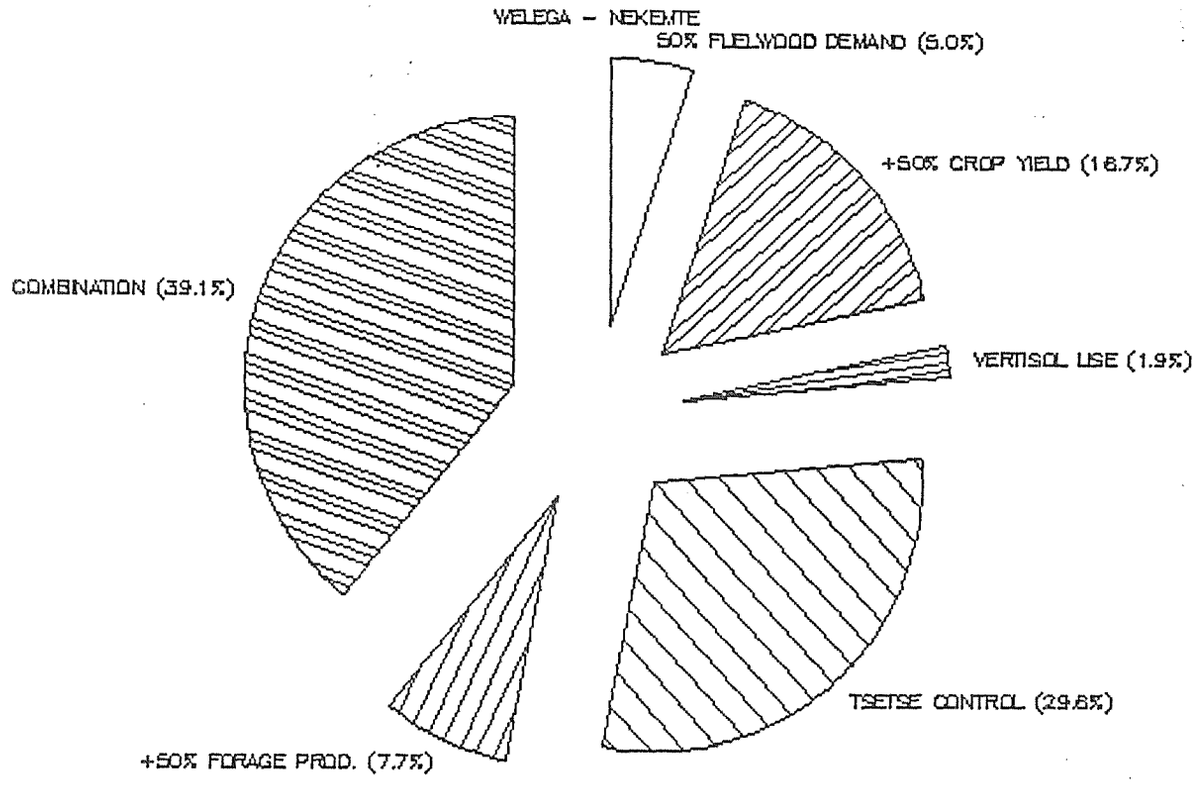


RELATIVE IMPACT OF INTERVENTIONS – 1995

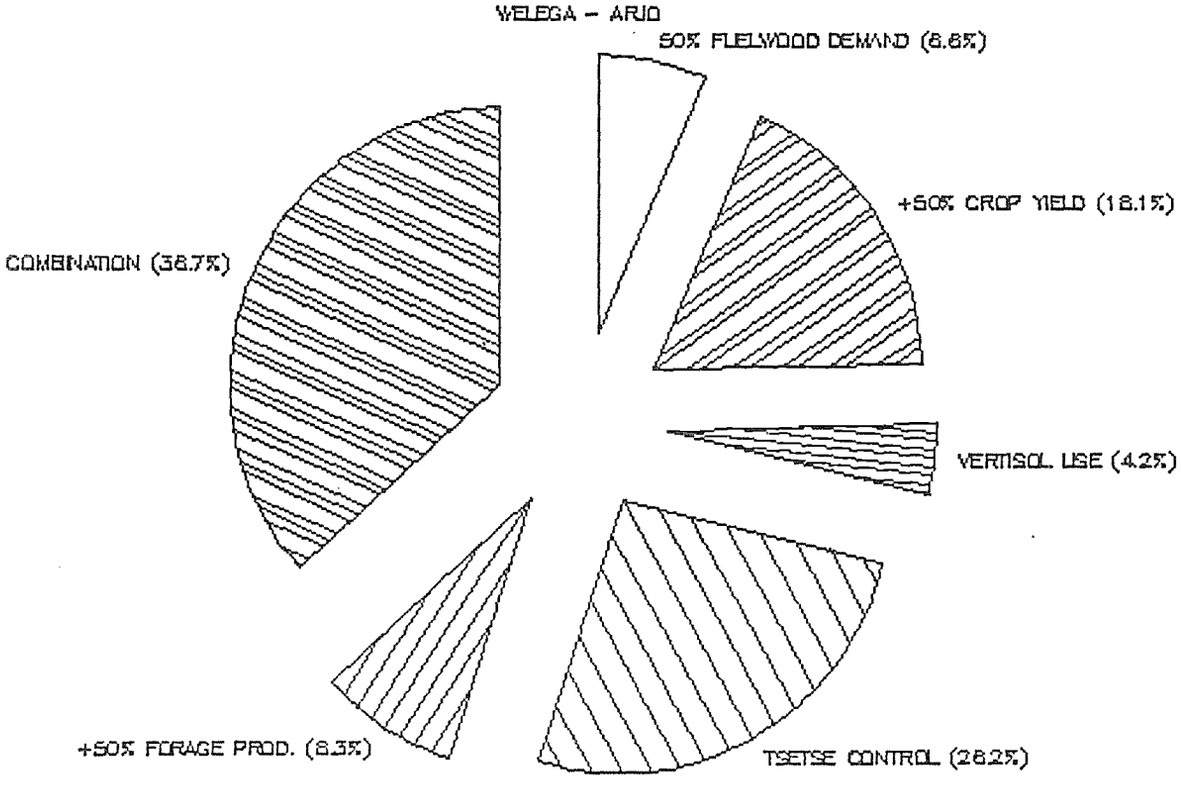
WELEGA – HORO GUDURU



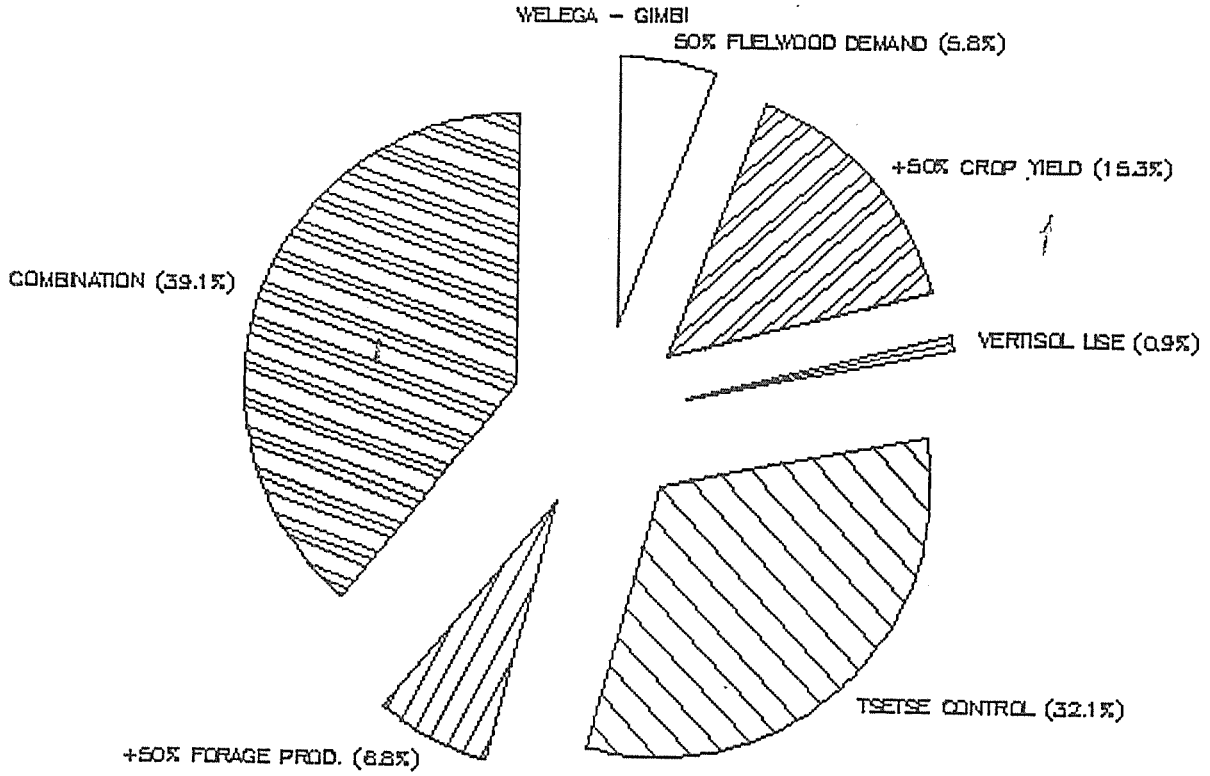
RELATIVE IMPACT OF INTERVENTIONS – 1995



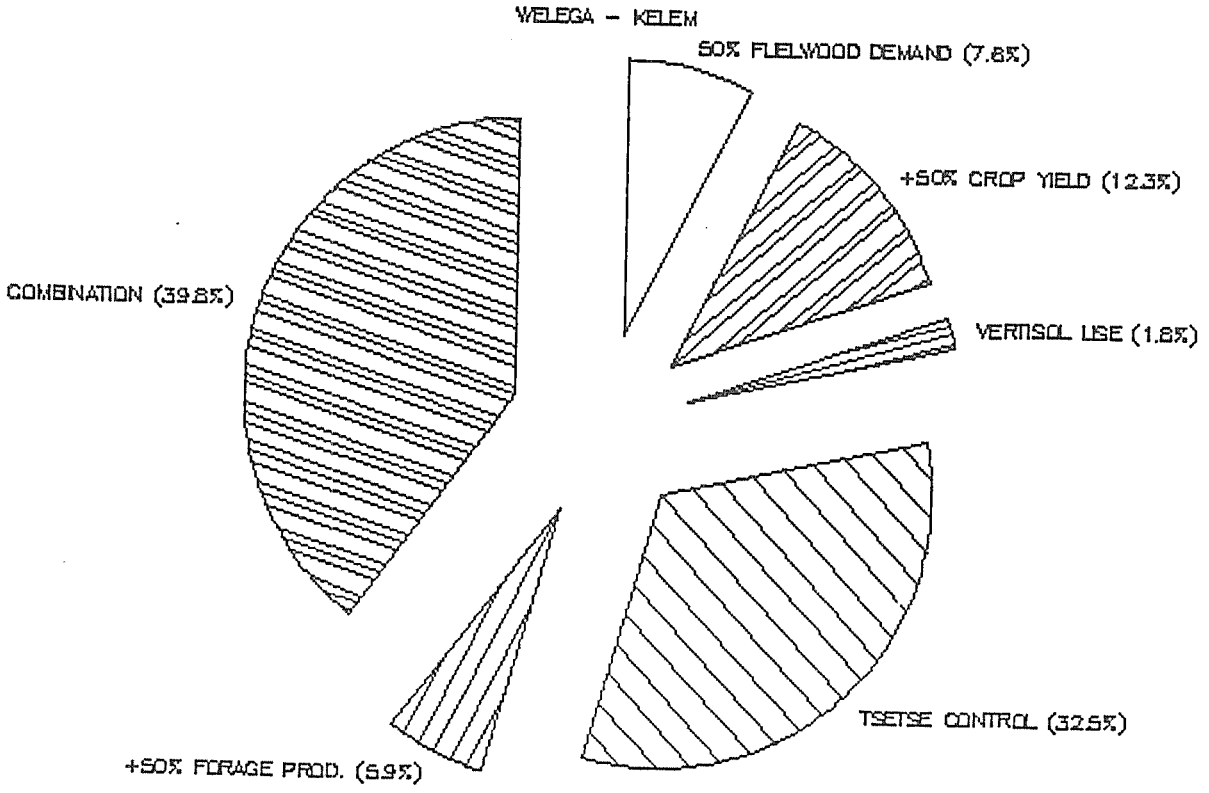
RELATIVE IMPACT OF INTERVENTIONS – 1995



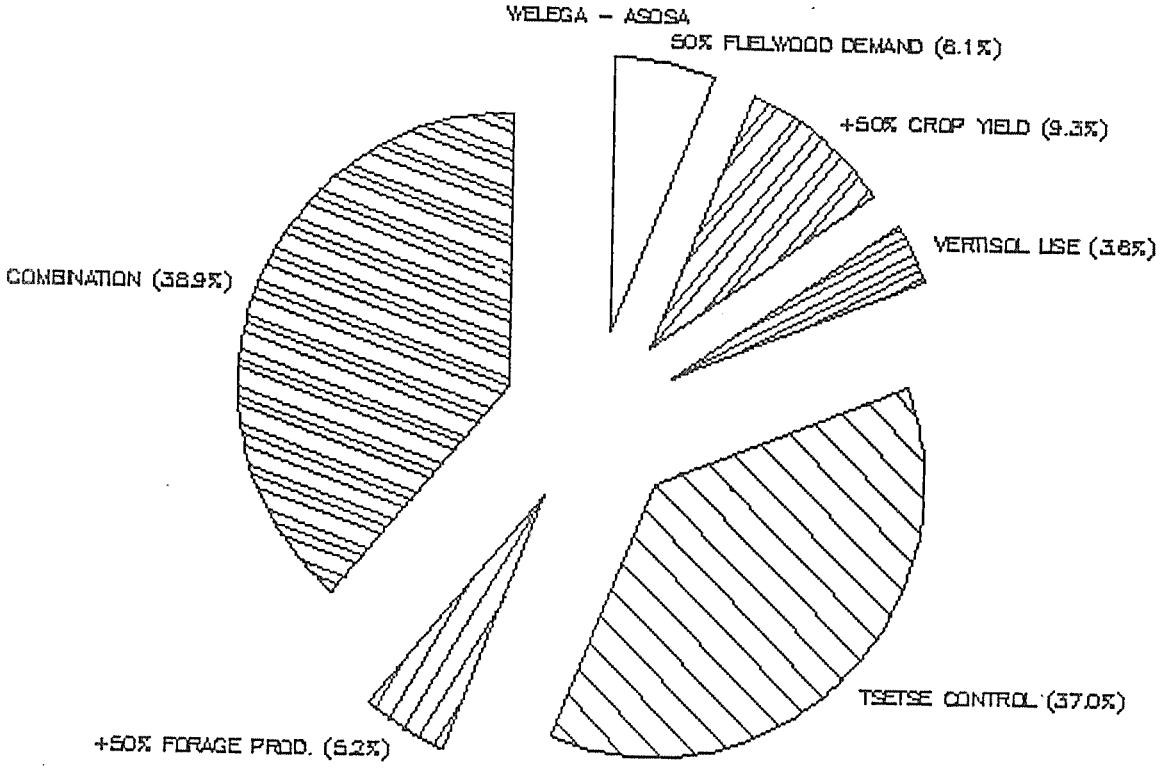
RELATIVE IMPACT OF INTERVENTIONS – 1995



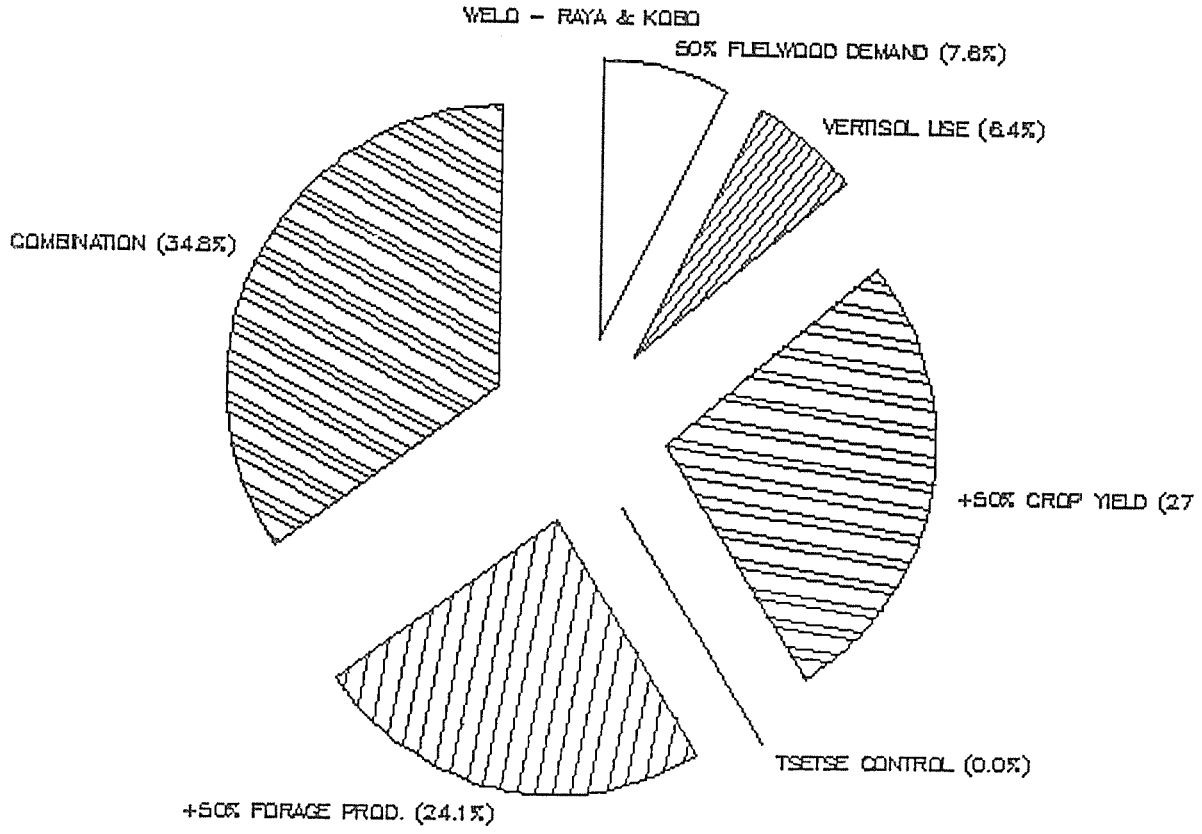
RELATIVE IMPACT OF INTERVENTIONS – 1995



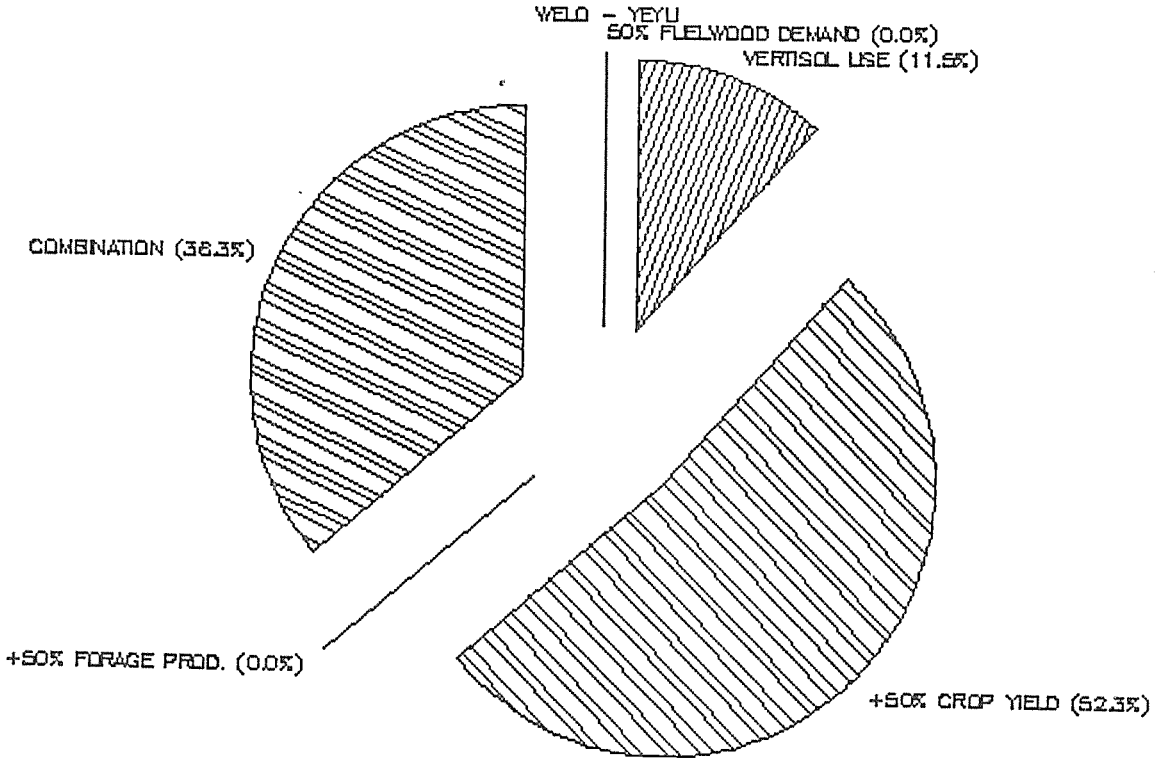
RELATIVE IMPACT OF INTERVENTIONS – 1995



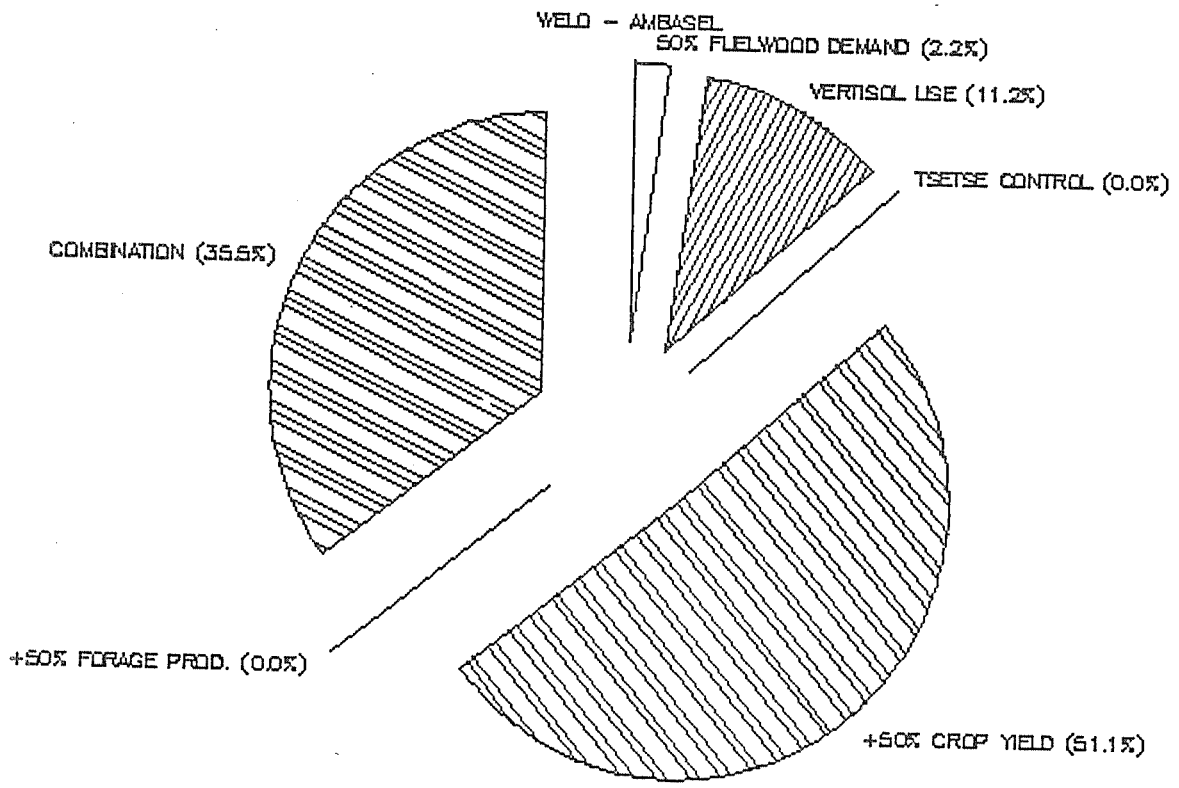
RELATIVE IMPACT OF INTERVENTIONS – 1995



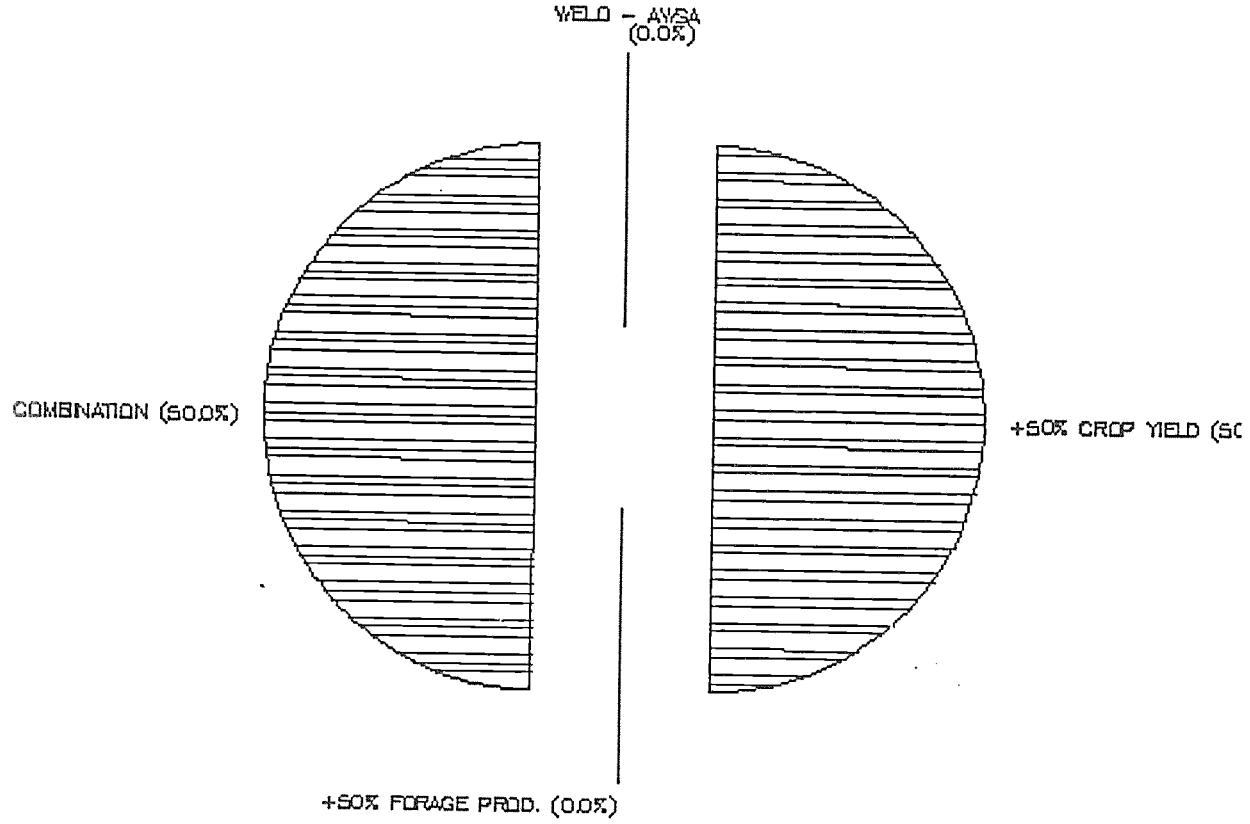
RELATIVE IMPACT OF INTERVENTIONS – 1995



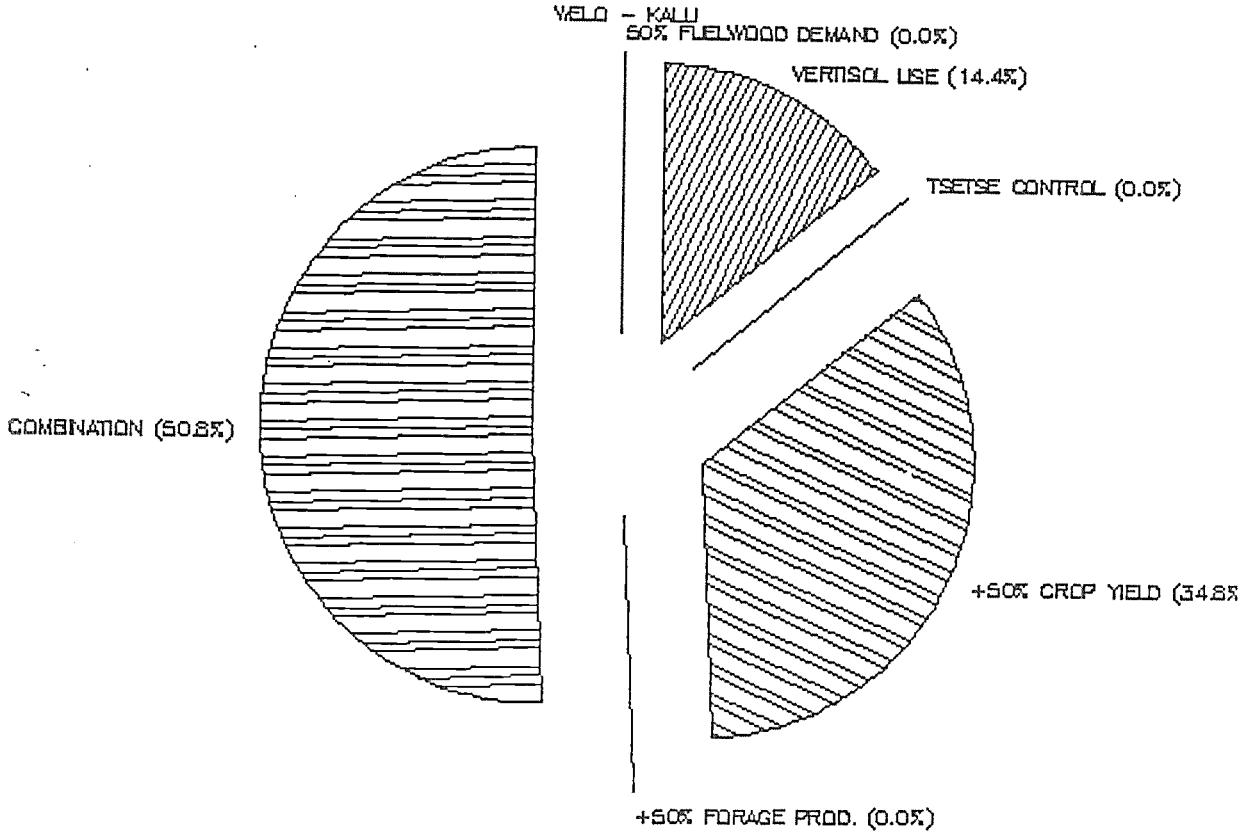
RELATIVE IMPACT OF INTERVENTIONS – 1995



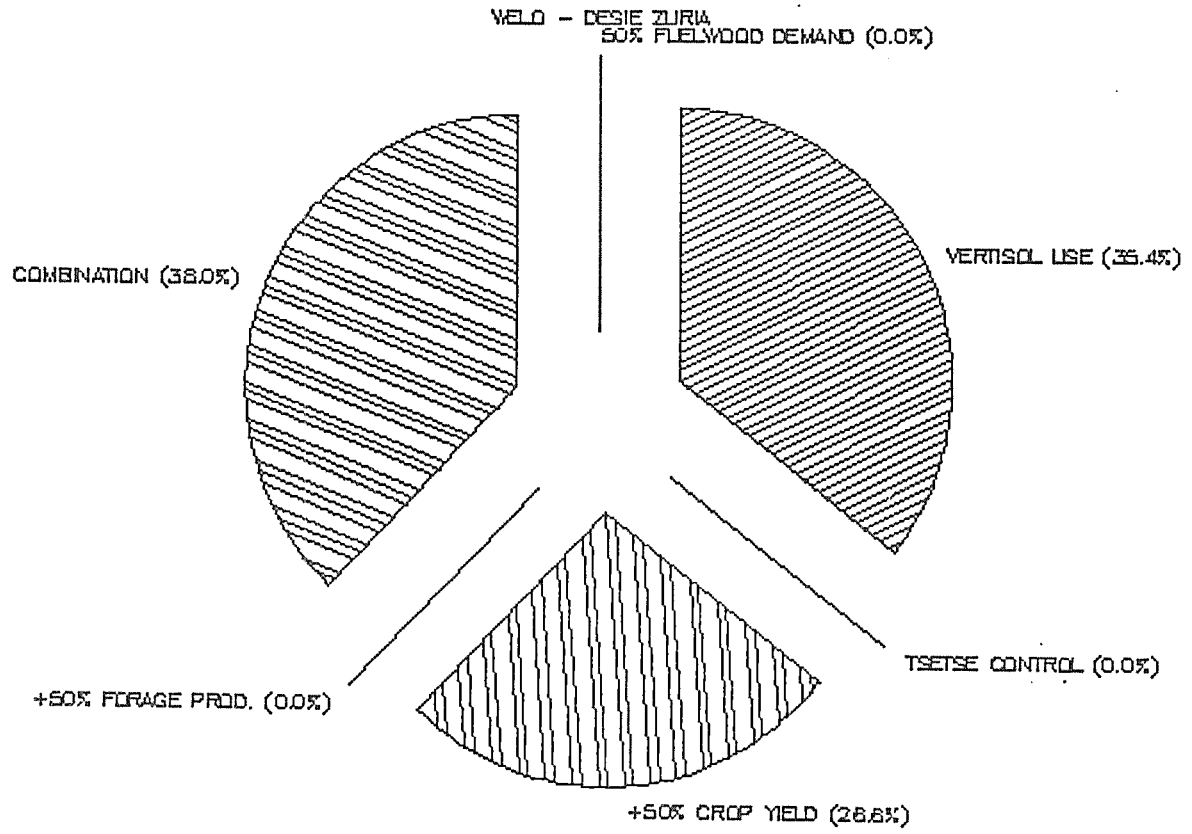
RELATIVE IMPACT OF INTERVENTIONS – 1995



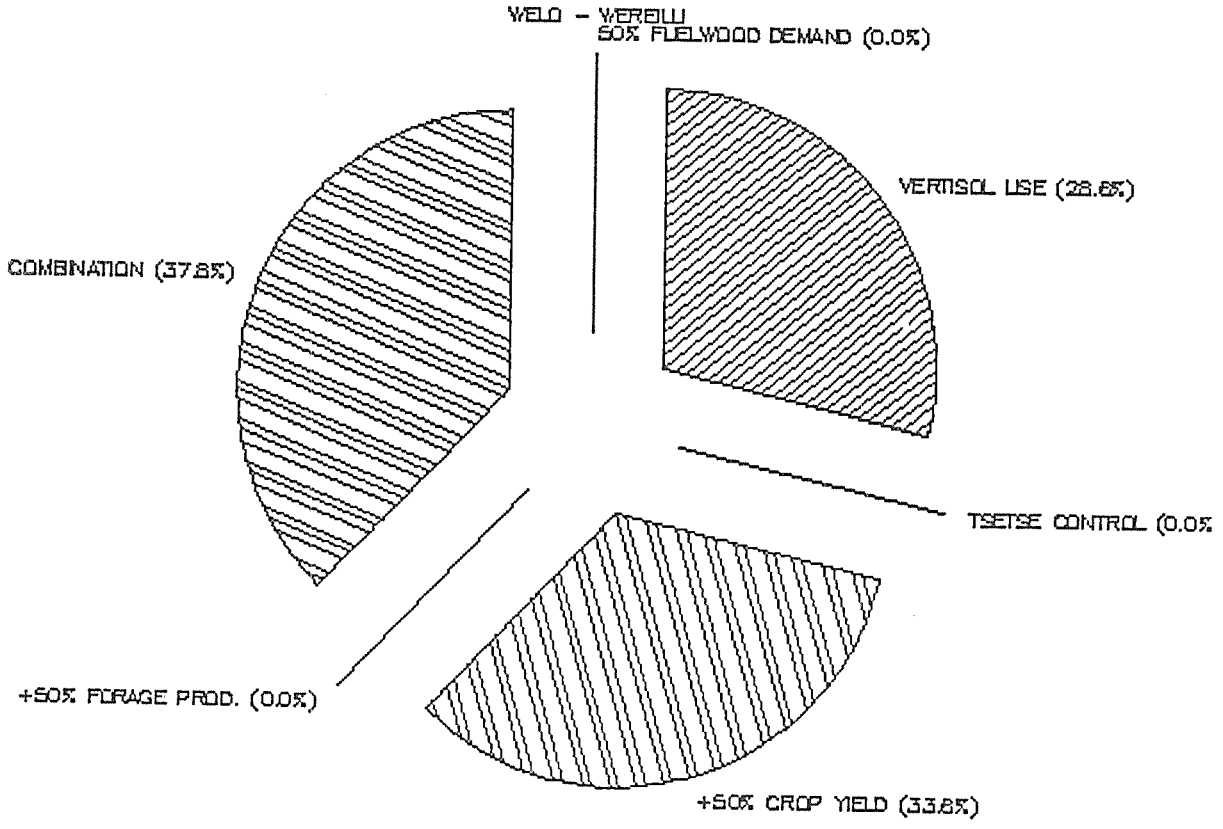
RELATIVE IMPACT OF INTERVENTIONS – 1995

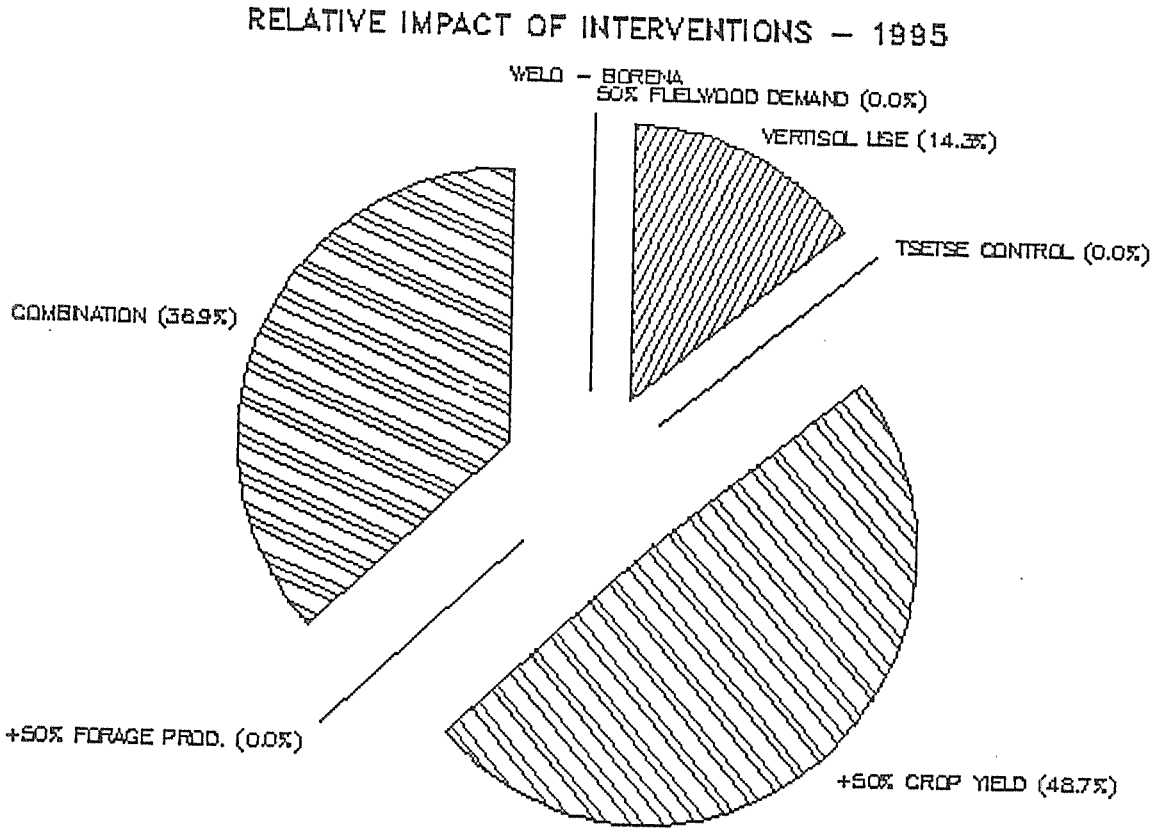


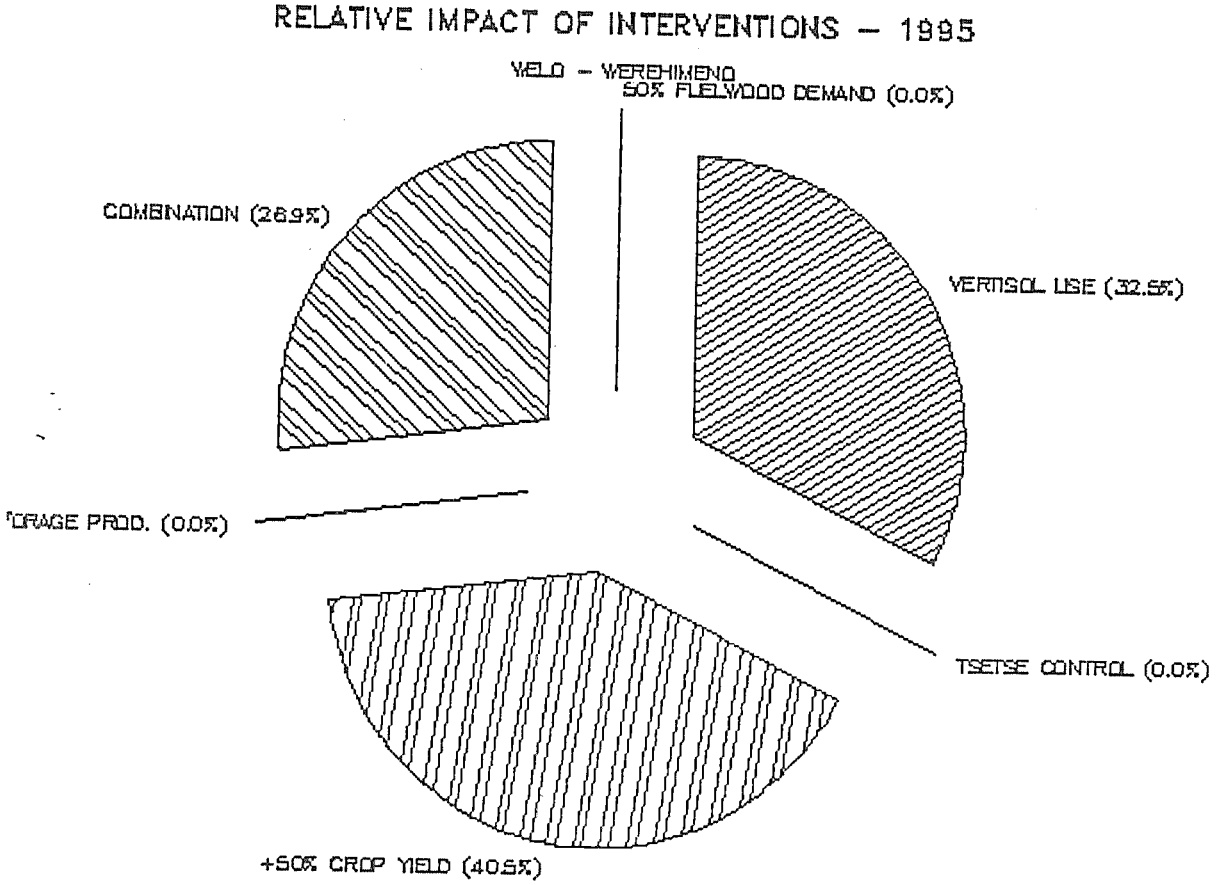
RELATIVE IMPACT OF INTERVENTIONS – 1995



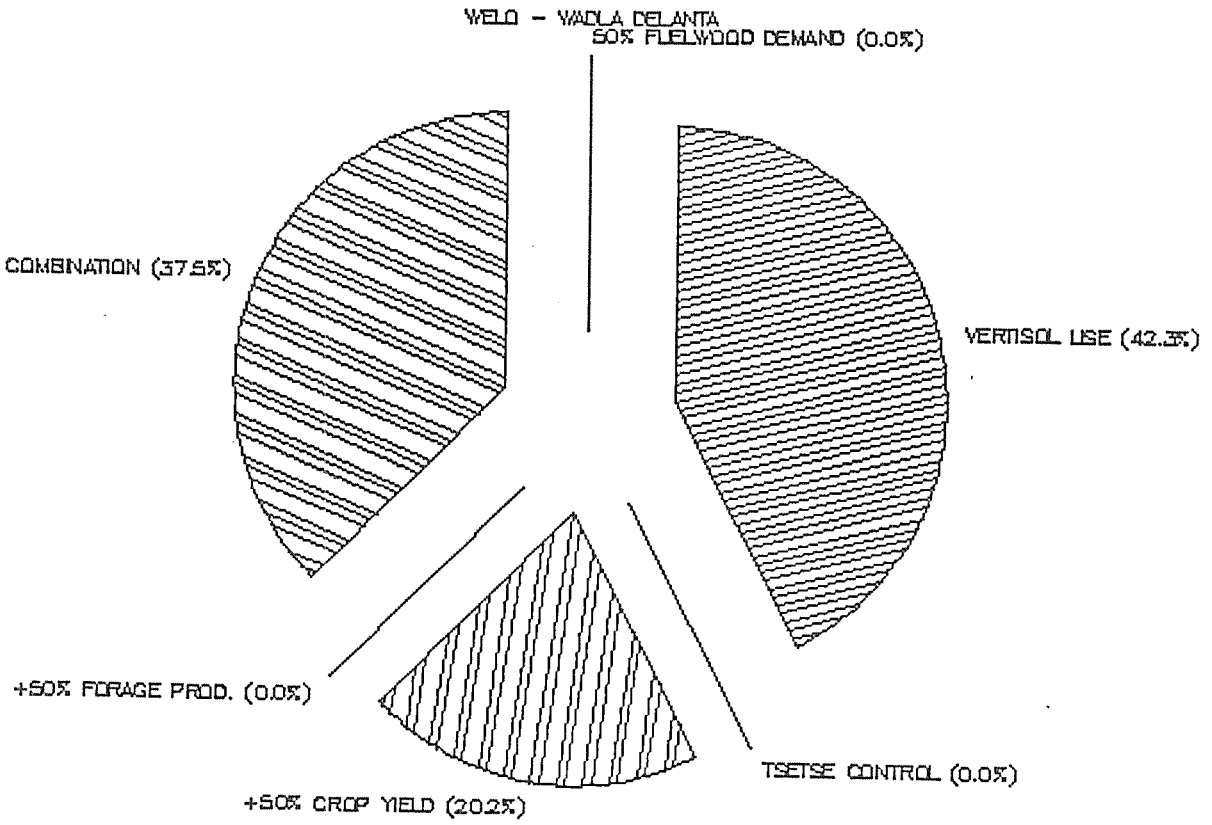
RELATIVE IMPACT OF INTERVENTIONS – 1995



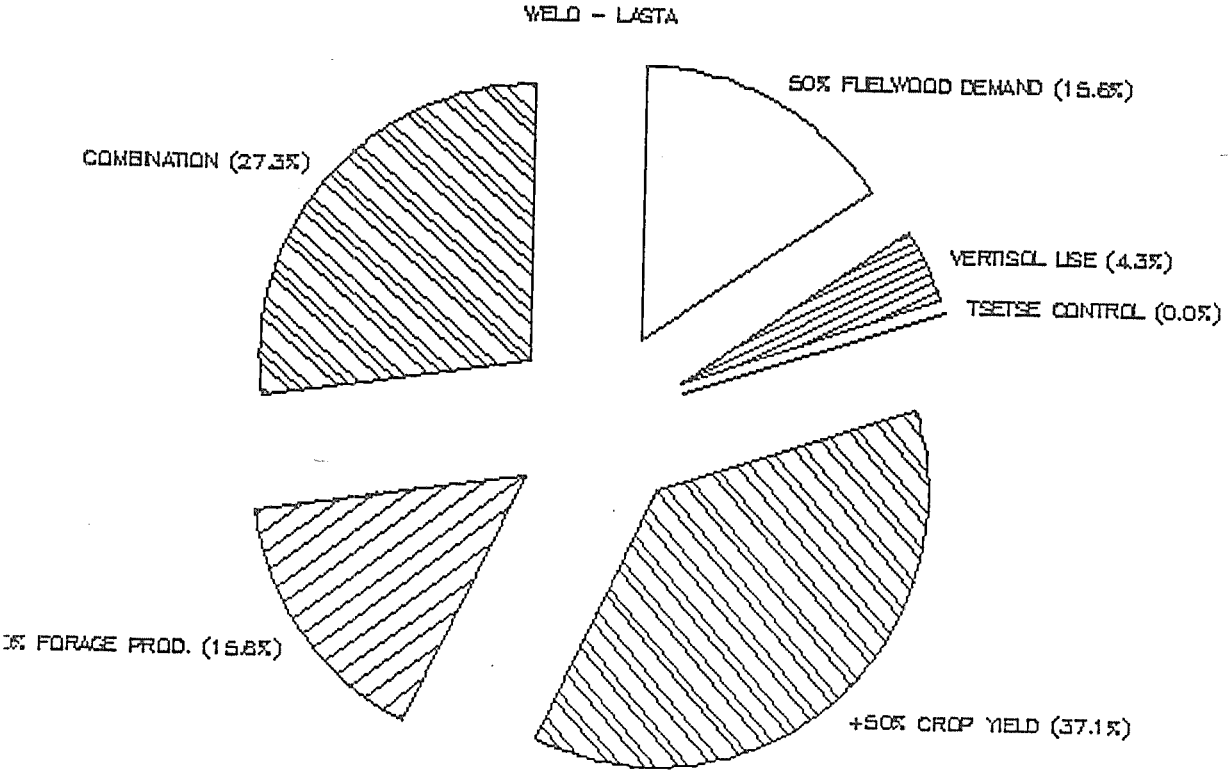

RELATIVE IMPACT OF INTERVENTIONS – 1995
WELO – BORENA
50% FUELWOOD DEMAND (0.0%)
VERTISOL USE (14.3%)
TSETSE CONTROL (0.0%)
COMBINATION (38.9%)
+50% FORAGE PROD. (0.0%)
+50% CROP YIELD (48.7%)

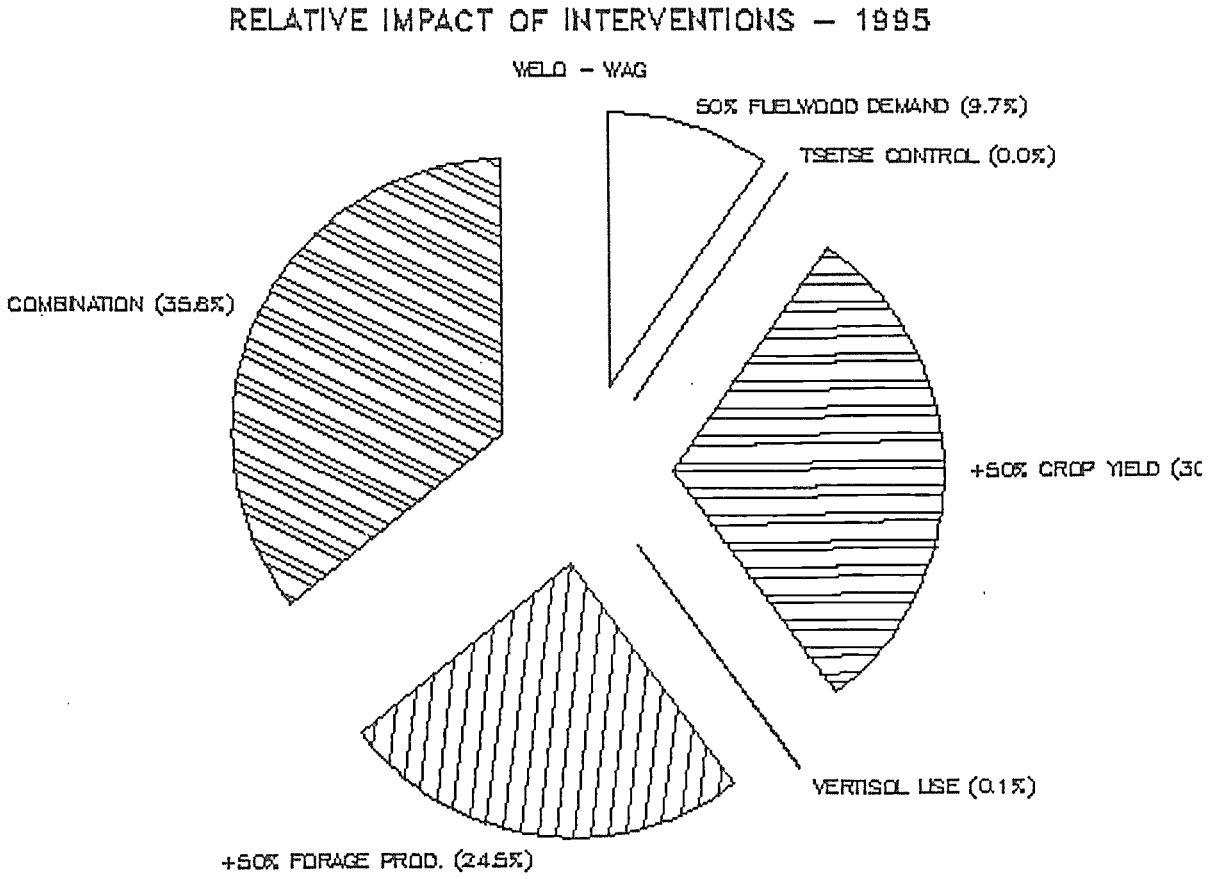

RELATIVE IMPACT OF INTERVENTIONS – 1995
WELO – WEREHIMENO
50% FUELWOOD DEMAND (0.0%)
COMBINATION (26.9%)
VERTISOL USE (32.5%)
FORAGE PROD. (0.0%)
TSETSE CONTROL (0.0%)
+50% CROP YIELD (40.5%)

RELATIVE IMPACT OF INTERVENTIONS – 1995



RELATIVE IMPACT OF INTERVENTIONS – 1995




RELATIVE IMPACT OF INTERVENTIONS – 1995
WELO – WAG
50% FUELWOOD DEMAND (9.7%)
TSETSE CONTROL (0.0%)
COMBINATION (35.8%)
+50% CROP YIELD (3C
VERTISOL USE (0.1%)
+50% FORAGE PROD. (24.5%)