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DEPARTMENT OF AGRICULTURAL ECONOMICS

AN ASSESSMENT OF FACTORS INFLUENCING PYRETHRUM PRODUCTION IN NYANDARUA COUNTY

BY

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SUBMMITED TO: MR KENNEDY PAMBO

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LIST OF ACRONYMS

PBK  -Pyrethrum board of Kenya

AGRITERRA-An organization for international cooperation that was founded by civil society organizations in rural areas and the agricultural private sector.

PGA  -Pyrethrum growers association

GOK-Government of Kenya

KAPI-Kenya Association of the Pharmaceutical Industry.
1.0 INTRODUCTION

1.1 Background Information

Pyrethrum is an important cash crop due to its pyrethrins content used to make insecticides (Ramirez, 2013). The insecticide from pyrethrum is proven to have long record of safety towards human beings and warm blooded animals and at the same time has a complex molecular structure that makes it an effective pesticide with no insect resistance since it attacks the nervous system of insects (KAPI, 2011). Pyrethrins quickly breaks down in sunlight, leaving no residues hence solving the problem of environmental pollution caused by synthetic insecticides. Insecticides from pyrethrum hence stand out to be the best natural insecticides that are environmentally friendly and effective. (Ramirez, 2013)

In the 90s, Kenya was the leading pyrethrum producer worldwide contributing to 67-80% of the world’s pyrethrum (Waceke et al., 2001). The sector later faced a slow decline in production and collapse in 2000 after the collapse of the Pyrethrum board of Kenya (PBK), the parastatal that was given the role of processing and marketing the produce due to poor management and corruption (Ngugi, 1991). The decline has moved from the initial export of 18,000 tonnes in 1980-82 to as low as less than 10 tonnes per year (Mureithi, 2011).

The collapse of the pyrethrum production sector in Kenya has led to a change in demand from Kenya to Australia, Belgium, Indonesia, Malaysia, Netherlands and South Africa reducing the earnings from the sector from sh2billion per annum to less than 40 million per annum (Mureithi, 2011). Australia is currently the largest producer of pyrethrum giving up 60% of the world’s pyrethrum supply which rose as a result of growing demand for natural insecticide after production collapsed in Kenya following a world glut in 2005. (Barlow, 2010)

The major cause of the collapse of the pyrethrum production sector according to Mudoga (2013), is embezzlement of funds and corruption of the PBK which did both processing and marketing of the cash crop. He focuses on the collapse of the pyrethrum market where the sole buyer and licensed producer PBK was unable to pay farmers for crop deliveries for years discouraging more production of pyrethrum. The collapse of the sector has led to proposition of liberalization
of the sector to allow the private sector take over the buying and marketing of pyrethrum. (Agriterra, 2011)

Diseases such as pyrethrum wilt and fungal diseases have also been a major cause of the decline of production in the sector (Kimani et al., 2001). Example, Root-rot complex of pyrethrum caused by nematodes accounts for 20-30% of pyrethrum yield losses since it causes decrease in flower size and decrease in pyrethrin content. (Mutitu, 2008; Warui et al., 1991).

The collapse of the Pyrethrum board of Kenya (PBK) slowly led to the decline in pyrethrum production pushing farmers to uprooting the cash crop and replacing it with other crops such as maize, potatoes and beans. The collapse left most farmers stranded since they had not been paid for several years. (Francis et al, 2005)

There have been plans to revive the sector which includes meetings by Pyrethrum Growers Association (PGA) in coming up with possible remedies for the collapse of the sector. (PGA, 2010). In the Economic Recovery strategy for wealth and employment creation, the government focuses to removing constrains in the subsector through liberalizing the sector. A pyrethrum amendment bill has been tabled in parliament and it focuses on amendment of Pyrethrum act (CAP 340) which gives the PBK sole monopoly power of buying, processing and marketing of pyrethrum extracts.

It is therefore clear that there are a number of underlying causes of failure in the sector and this varies from one region to another. In overall as a nation, collapse of the PBK is the major focus which calls for the privatization of the sector. Several research conducted in various areas however cite other underlying factors that were crippling the sector before its decline. (Gachimbi et al., 2003) No research has been done in Nyandarua County to expose any underlying causes of the steady decline leading to a near collapse of the sector since year 2000.
1.2 Problem statement
The economic research problem in this study is to study major factors affecting pyrethrum production sector in Nyandarua County that will assist in developing possible remedies that if implemented correctly, then the sector will become economically viable again.

Pyrethrum production has been on the decline since the early 1980s with a decline in average production from 639MT per year from 1979-1989 to 3MT per year in the period 1994-2001 in Kiambu district (Gachimbi et al. 2003). The trend in Kiambu County is a representation of the overall pyrethrum trend in Kenya and in different Counties. The decline is attributed to poor crop husbandry and low returns as a result of low prices.

In an overview of pyrethrum production in Kenya, regulatory framework is attributed to be the major cause of collapse the sector where the industry has allowed corruption, inefficiencies and mismanagement of funds in PBK leading to delayed payment to farmers. When farmers suffer losses, they consider uprooting the crop and they engage in other crop farming for their daily food (Agriterra, 2011)

Pyrethrum wilt is a threatening cause of yield loss in pyrethrum since it leads to wilting and eventual death of the crop (Murimi, 1996). The study was done in Kisii, Molo, Mwongoris, Sotik and Limuru regions in Kenya. In the study, root-nematodes is another cause of decline and death of pyrethrum plants causing 95% of the plants parasitic nematodes and leading to 20-30% yield loss in pyrethrum.

Some weeds also have adverse effects on the production of pyrethrum such as Kikuyu grass as seen from a study done in Molo- Rift valley Kenya. Kikuyu grass is hard to control and it reduces yields of pyrethrum and also the pyrethrin content. In the study it is recommended that chemical weed control be done to farms infested by the weed (Wanjala, 2003). This is a challenge especially for the small scale farmers whose level of income and returns from pyrethrum would not allow them to apply the chemicals.

The fact that pyrethrum has been declining over time and later leading to a collapse in 2000 has been noted and studies have been done in different areas in Kenya to ascertain the causes of this decline but none has been done in Nyandarua County. This necessitates a study in this area since
factors that could have caused a collapse of a crop in a certain region may not be the same factors in another region.

1.3 Purpose of the Study
The purpose of this study is to evaluate factors influencing pyrethrum production sector in Nyandarua County. The specific objectives of this study are;

a) To assess the relationship between extension services and pyrethrum production in Nyandarua County.

b) To assess the relationship of level of technology and the decline in pyrethrum production sector in Nyandarua County.

1.4 Hypothesis
a) That Lack of Extension services does not lead to decline of the pyrethrum production in Nyandarua County.

b) That level of technology has no effect on production of pyrethrum in Nyandarua County.

1.5 Justification of the Study
The study will expose many underlying factors that have been the cause of crippling and failure in the pyrethrum sector in the County. This will be very important information for the Pyrethrum Growers Association (PGA) – who will be able to address all underground factors affecting pyrethrum production, the PBK who are interested in reviving the sector and any interested parastatal and donors in the sector to channel their money into projects that will address the underlying issues. The information is also useful to the Government who fund the pyrethrum sector.
1.6 Study Area

Nyandarua County which is in the former central province located in the slopes of Aberdare ranges has farming as its major economic activity. The area has a climate favorable for pyrethrum production at an altitude of 2000m, mean rainfall is 1000mm and reliable with two rainy seasons March-April-May (Long rains) and November (Short rains) and low temperatures fitting the spring climate. (Obare et al., 2012)

Nyandarua County is my study area since pyrethrum production was the major cash crop in the area alongside wheat and the potatoes which have now dominated over the sector (Obare et al., 2012). The area has a good climate adaptable for pyrethrum growing and is near the Pyrethrum board of Kenya (PBK) processing factory that is based in Nakuru.

It is also clear from the meeting that has been held by pyrethrum growers association that the sector has since 2000 collapsed hence attracting a lot concern about the possible income effect to farmers in the area who sorely depended on the pyrethrum production sector for their
subsistence, that is, source of money for food, fees for their children clothing and other basic needs which are at risk for now. (PGA, 2010).

Nyandarua County is currently faced by a problem of poor roads which if improved would lead to decreased losses when transporting produce from the firms where large produce is got but loses quality along the way to the market. Agricultural production decline in the County leads to the sale of part of the farm land to new developments such as real estates. Those who buy it use it for non-agricultural activities therefore leading to a general drop in Agricultural production. (Mandere et al., 2010)

The current condition of people changing their livelihood strategies after collapse of the sector stirred me to do a study of causes of the pyrethrum sector collapse in order to shed light for Agricultural development in the County as a model which can be adapted then emulated in other pyrethrum growing areas in Kenya.

1.7 Organization of the Project
The rest of the project is organized as follows; Chapter 2 Literature review – Empirical reviews, Chapter 3, Methodology, Chapter 4, Analysis, Chapter 5 Conclusions and recommendations then References.
2.0 LITERATURE REVIEW

2.1 Empirical studies
A study on determination of regional and aggregate price elasticity in pyrethrum industry by Ngugi, (1991) which focuses on the causes of decline in pyrethrum production in Kiambu County identifies the decline in pyrethrum production to be associated with other factors other than the collapse of PBK. He uses a supply responsive approach, partial adjustment model and model of formulation to study the effects of technology, delayed payments and rainfall variability on pyrethrum production.

Winter-Nelson (1992) used econometric analysis by using past data on costs and effectiveness of synthetics to model market demand for pyrethrum and found out that the increase in the level of production of synthetics always negatively affected the demand for pyrethrum.

Kinyua et al (2001) while studying pyrethrum wilt in Kenya discusses how pyrethrum wilt disease has extreme effects on the production of pyrethrum by lowering yields. The disease is described as to causing wilting and later death of pyrethrum plants. The study done by collection of the diseased plants from 5 different pyrethrum growing areas in Kenya showed that the use of fungal inoculum or a combination of nematode- fungal inoculum increased the severity as well as the onset of the wilt disease. Screening of different clones did not act as a remedy for the disease since all the screened varieties were seen to succumb to the wilt disease.

Wanjala, (2003) shows through various sample tests how pyrethrum succumbs to the Kikuyu grass weed. It was realized that the yields and pyrethrin content of the plants growing where the weed was controlled as compared to the plants affected by the weed was better. Chemical control of the weed was seen not to have any significant effects. Hand weeding was seen to have good results in control of Kikuyu grass but was found to be quite expensive and only applicable for small scale farmers.

The report on Kenya’s pyrethrum industry, (2005) also notes the stringent control of Government in the marketing of the cash crop through the Pyrethrum Board of Kenya (PBK). The report also records the fluctuations in demand of pyrethrum extracts in Kenya, mainly due to fluctuations in demand in the world market and also due to increasing competition from inorganic products.
More study and research need to be done to help analyse possible hindrances to the growth of the sector and the remedies sought if farmers in Nyandarua County are ever going to enjoy getting income from pyrethrum as compared to other crop production systems that they embarked on after uprooting pyrethrum plants when the pyrethrum sector nearly collapsed.
3.0 METHODOLOGY

3.1 Data and sampling
Data in this study was collected using a structured questionnaire through face to face interviews with the respondents. The study used multistage sampling which was done in three stages. Nyandarua County comprises of 4 constituencies, Kinangop, Kipipiri, Olkalou and Ndaragwa. The 4 constituencies formed the first clusters. Ndaragwa constituency was purposively selected since it was the leading in pyrethrum production in the 90s. This was considered to be the first stage of sampling.

In Ndaragwa constituency, there are 4 wards. The wards formed the second step clusters where the study purposively selected Leshau Pondo ward where pyrethrum has been doing well in the past years. After the samples above, the study generated a list of pyrethrum farmers from villages in Leshau Pondo ward and then random selection was done. This was the third step of sampling. Due to time and money constraint, the study only selected a sample size of 32 farmers. Data analysis was done using SPSS version 20.

3.2 Model used
The study used the ordinary least squares (OLS) since it involves Y (Land area under pyrethrum production) which is continuous. The model is used to show relationship between an independent variable and dependent variables. The formula used;

\[ y = \alpha + \beta X_1 + \epsilon \]

Where y = is the independent variable
\( \alpha = \) a constant (representing other variables not included in the model)
\( X_1 = \) dependent variables
\( \beta = \) Beta (To be determined by regression model)
\( \epsilon = \) error term
### 3.3 Variables in the model

**Table 1: Variables and expected sign**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Age of the respondent</td>
<td>+</td>
</tr>
<tr>
<td>Gender</td>
<td>Gender of the respondent</td>
<td>+</td>
</tr>
<tr>
<td>Land</td>
<td>Total land owned</td>
<td>+</td>
</tr>
<tr>
<td>Cultivation</td>
<td>Years of cultivation</td>
<td>+</td>
</tr>
<tr>
<td>Technology</td>
<td>Level of technology</td>
<td>+</td>
</tr>
<tr>
<td>Extension</td>
<td>Number of interactions with extension services</td>
<td>+</td>
</tr>
<tr>
<td>Capital</td>
<td>Lack of capital</td>
<td>-</td>
</tr>
<tr>
<td>Disease2</td>
<td>Pyrethrum wilt</td>
<td>-</td>
</tr>
<tr>
<td>Disease3</td>
<td>Other diseases</td>
<td>-</td>
</tr>
</tbody>
</table>

In most cases young people are not in possession of Land which would limit the chances of participating in pyrethrum production since pyrethrum is a perennial cash crop. It is expected that the older a person is the higher are the chances of the individual participating in pyrethrum production thus a positive relationship between age and pyrethrum production as shown in Table 1.

Women are in most cases alienated from owning land. This is from the traditional view that is gender biased. It is therefore expected that the majority of farmers practicing pyrethrum production are men. This gives an expected positive relationship between a household being male headed and pyrethrum production.

The total land owned determines what alternatives enterprises to practice. Those with big farms will possibly have more enterprises than those with small farms. Those who hire land are constrained by the type enterprise to have and in most cases, they focus on the one that will lead to highest returns and those that act as a source of food for them. It is hence expected that the bigger the land owned then the bigger the land under pyrethrum farming thus yielding a positive relationship.
The experience that one gets during production could positively influence the level of production of an individual. Those who have cultivated pyrethrum for a longer time are better placed to produce more pyrethrum yields than those with little experience. It is therefore expected a positive relationship to be there between the number of years that one has practiced pyrethrum production and level of pyrethrum production.

Technological improvement will always lead to a boost in the level of production. This is because the same level of inputs can be used to produce greater level of output than with a lower level of technology. This study then hypothesized a positive relationship between the level of technology and the level of pyrethrum production.

The number of interactions with extension services provider are likely to have a positive effect on pyrethrum production. This is because farmers exposed to extension services are expected to have better knowledge on dealing with pests and diseases and even better ways of improving yields of pyrethrum flowers than those with minimal or no interactions with extension services providers.

Lack of capital has always been a major challenge to most farmers in the area. The farmers who are challenged with lack of capital are expected to have low levels of pyrethrum production than those who have no problem with capital, hence a negative relationship is expected between pyrethrum production and lack of capital.

Pyrethrum wilt leads to wilting followed by death of pyrethrum plants. Most varieties of pyrethrum succumb to this disease (Murimi, 1996). A negative relationship is therefore expected to exist between pyrethrum production and pyrethrum wilt disease incidence in a given farm.

Other diseases apart from pyrethrum wilt and pyrethrum root rot are also an important variable in studying whether apart from the known diseases there could be other diseases affecting the production of pyrethrum in Nyandarua County. It is expected that a negative relationship exists between presence of other diseases and pyrethrum production.
4.0 RESULTS AND DISCUSSION

4.1 Descriptive statistics
Most of the pyrethrum farmers interviewed in the area are at their 40-50s. The average age of the respondents interviewed is 49 years. Majority of the farmers have no land of their own and those with have only small pieces of land below two acres where the total area of land owned determines the land to be assigned to pyrethrum production. The mean area of land owned by pyrethrum farmers in the sample area is 4.23 acres as shown in Table 2.

Table 2: Descriptive statistics for continuous variables and frequencies

<table>
<thead>
<tr>
<th>Variable</th>
<th>Descriptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age of respondent</td>
<td>48.91(13.63)</td>
</tr>
<tr>
<td>Mean total area of land</td>
<td>4.23(2.77)</td>
</tr>
<tr>
<td>Mean total area under pyrethrum</td>
<td>0.94(0.75)</td>
</tr>
<tr>
<td>Mean number of years of cultivation</td>
<td>8.13(5.90)</td>
</tr>
<tr>
<td>Mean number of interactions with extension services</td>
<td>0.60(0.246)</td>
</tr>
<tr>
<td>Gender (% male)</td>
<td>65.6</td>
</tr>
<tr>
<td>Capital (% challenge)</td>
<td>71.9</td>
</tr>
<tr>
<td>Technology (% poor)</td>
<td>84.4</td>
</tr>
<tr>
<td>Pyrethrum wilt (% challenge)</td>
<td>93.8</td>
</tr>
</tbody>
</table>

Note: standard deviation for continuous variables are in parenthesis

The average land under pyrethrum production is 0.94 acres which is barely one acre. The number of years that farmers have practiced pyrethrum farming averages at 8.13 years. The study shows that the average number of interactions with an extension officer for the last 5 years is 0.6 times which approximates to 1. Majority of men are in possession of land as compared to women which is due to gender discrimination in ownership of land which denies most women an opportunity to practice pyrethrum farming leading to drop in pyrethrum production. Among the interviewed, 65.6% were men. Lack of capital is a major challenge in pyrethrum production. Of the total respondents interviewed, 71.9% face the challenge of lack of capital which leads to lack proper
inputs such as the right clones, chemicals for disease and pest control and fertilizers to boost production of pyrethrum.

Low technology level is represented by 84.4% where most pyrethrum growers have no idea of the clone of pyrethrum that they grow. There are only few cases of farmers who have used fertilizers or chemicals during pyrethrum production showing that farmers are not advanced in technology in pyrethrum production. Pest and diseases are another great challenge in pyrethrum production. The specific disease that have been a challenge is Pyrethrum wilt which is a challenge at 93.8%. The disease affect nearly every farm under pyrethrum greatly lowering yields and even later leading to total loss after total drying of the pyrethrum plants.

4.2 Factors affecting pyrethrum production in Nyandarua County
From the regression results in Table 3, five variables are significant. The variable gender of the respondent has a positive coefficient. More males own land as compared to females in the study area. This means that being male has a positive effect on pyrethrum production. The total land owned or rented by these individuals determines the area of land that they can assign to pyrethrum production and thus affecting pyrethrum production, this is consistent with the expectations where land has a positive coefficient. Experience in pyrethrum production places a farmer to do better in pyrethrum production as compared to those with no or little experience. This is the reason why the number of years of pyrethrum production variable has a positive coefficient.

Pyrethrum wilt disease has detrimental effects to pyrethrum production reducing yields to a great extent. The disease has a negative coefficient which means that it negatively affects pyrethrum production. This is consistent with the expectations meaning that the presence of the disease leads to decline in pyrethrum production. Contrary to the expectations, presence of other diseases has a positive coefficient which means that whether the other diseases are there or not then pyrethrum production is not affected. The constant term in Table 3 represents all other factors not included in the model but have an effect on pyrethrum production.
Table 3: Estimates of relationship between Land under pyrethrum and farmers characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std error</th>
<th>Sig (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cons</td>
<td>0.651</td>
<td>0.578</td>
<td>0.272</td>
</tr>
<tr>
<td>Age</td>
<td>-0.009</td>
<td>0.011</td>
<td>0.428</td>
</tr>
<tr>
<td>Gender</td>
<td>0.447</td>
<td>0.239</td>
<td>0.075</td>
</tr>
<tr>
<td>Land</td>
<td>0.141</td>
<td>0.470006</td>
<td></td>
</tr>
<tr>
<td>Cultivation</td>
<td>0.061</td>
<td>0.250023</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>0.037</td>
<td>0.369</td>
<td>0.922</td>
</tr>
<tr>
<td>Extension</td>
<td>-0.219</td>
<td>0.456</td>
<td>0.636</td>
</tr>
<tr>
<td>Capital</td>
<td>0.422</td>
<td>0.105</td>
<td></td>
</tr>
<tr>
<td>Disease2</td>
<td>-1.173</td>
<td>0.463</td>
<td>0.019</td>
</tr>
<tr>
<td>Disease3</td>
<td>0.688</td>
<td>0.261</td>
<td>0.015</td>
</tr>
</tbody>
</table>
5.0 CONCLUSION

These are a number of underlying factors affecting pyrethrum production in Kenya which include factors such as gender of the farmer, total area of land that a farmer owns, number of years of pyrethrum cultivation and presence of diseases such as pyrethrum wilt and other diseases. Most men are in possession of land compared to women which limits the chances of growth of the sector since most men rarely follow up on maintenance of their farms but are busy with other jobs away from the farm.

Young people below 30 years and old people above 70 years are not involved in pyrethrum production. This is because young people have no land to allocate to pyrethrum production considering the challenges of leasing land for a perennial crop such as pyrethrum. The old people are weak which makes it a challenge for them to practice pyrethrum production since the crop is laborious.

Most farmers have no idea what clone of pyrethrum that they grow or even the diseases affecting their crops. When a pyrethrum plant dries, they don’t what the problem is or how to react from that and in the process diseases such as pyrethrum wilt spread throughout the whole plantation leading to massive losses. This is due to most farmers having no access to extensional services.

This calls for policies that enhance extension services to pyrethrum farmers in the area especially on issues such as the best type of clone to be grown in the area and other production practices such as weed and disease control and application of fertilizers that will boost pyrethrum production. The study recommends that focus on dealing with the factors affecting pyrethrum in Nyandarua County alongside the revival of the pyrethrum board of Kenya be done. This would ensure that the sector is back on its feet and greater contribution of the sector to the County and national GDP.

The study also recommends that extensional services and level of technology be improved in the area so as to ensure that pyrethrum production is up to the best production standards. This can be done by ensuring provision of the right clone of pyrethrum and fertilizers at subsidized prices. There should be not less than two interactions with the pyrethrum growers and extension providers on best practices of pyrethrum production and control of pyrethrum diseases in a year.

Comment [K P1]: You can now form your slides and show them to me latest by tomorrow.
REFERENCES


Farming systems (INMASP) Report...


**ANNEXES**

**ANNEXE 1: FIELD QUESTIONNAIRE**

QUESTIONNAIRE FOR ASSESSMENT OF FACTORS AFFECTING THE COLLAPSE OF PYRETHRUM SECTOR IN NYANDARUA COUNTY.
1. Name of the Interviewer. | ZACHARIAH GITAU GAKERE
---|---
2. Name of the respondent
3. Gender of the farmer
4. Year of birth
5. Number of years of education

6. What is your total average income per month in Ksh?
- < 1000
- 1000-5000
- 5000-10,000
- 10,000-20,000
- > 20,000

7. Distance of the farm from the main road.

8. Total area of land owned/rented by the household……………….Acres
9. Land under pyrethrum……………….Acres
10. For how long have you cultivated pyrethrum?……………….yrs
11. What challenges have you faced
   i. In pyrethrum production?
      - Lack of capital
      - Pests and diseases
      - Weeds
      - Lack of Labour
      - Poor weather
      - other
   ii. Pyrethrum marketing?
      - Lack of market
      - Presence of brokers
      - Poor prices
      - Poor roads
      - other

12. When was the last time you were paid for pyrethrum flowers by the PBK board?

13. Do you know the clone of pyrethrum you grow? ………………….
    If yes which clone?
    - Mo/66/700
    - L/66/506
    - L/66/473
14. Do you use fertilizer or manure for production of the cash crop? …………………
   If fertilizer, what type of fertilizer
   
<table>
<thead>
<tr>
<th>NPK</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAP</td>
</tr>
<tr>
<td>CAN</td>
</tr>
<tr>
<td>Urea</td>
</tr>
<tr>
<td>other</td>
</tr>
</tbody>
</table>

15. How many times have you got an extension officer on pyrethrum production in the last
    one year? ……………………times.

16. What method of weed and disease control do you use?
   
   | Mechanical | 
   | Cultural   | 
   | Chemical   | 

17. What diseases have affected the pyrethrum crops during production?
   
   | Pyrethrum root rot | 
   | Pyrethrum wilt     | 
   | Other              | 

18. How available is labour for pyrethrum production during picking? Tick appropriately.
   
   | i. Readily available | 
   | ii. Available        | 
   | iii. Unavailable     | 
   | iv. Not readily available | 

19. Do you have access to marketing information on pyrethrum? YES NO

20. In your view, what should be done to improve the pyrethrum production sector?
   ……………………………………………………………………………………………………………
   ……………………………………………………………………………………………………………

   THANKYOU FOR YOUR TIME