



Challenges Affecting the Tea in Nyeri County, Kenya

Faith N. W. Maina^{1*}

¹*Department of Seed, Crop and Horticultural Sciences University of Eldoret, P.O.Box 1125-30100, Eldoret, Kenya.*

Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/AJAEES/2018/39867

Editor(s):

(1) Mehmood Ali Noor, Chinese Academy of Agricultural Sciences, Institute of Crop Science, Key Laboratory of Crop Physiology and Ecology, Ministry of Agriculture, China.

Reviewers:

(1) Subrata Kumar Mandal, Central Mechanical Engineering Research Institute, India.
(2) Preeya P. Wangsomnuk, Khon Kaen University, Thailand.

Complete Peer review History: <http://www.sciencedomain.org/review-history/24688>

Original Research Article

Received 15th January 2018
Accepted 19th March 2018
Published 19th May 2018

ABSTRACT

Aim: To investigate the factors curtailing production of tea in Nyeri and come up with possible mitigating measures.

Study Design: In-depth qualitative survey that involved the interviewing of 28 tea farmers and 4 key informants (Subcounty Agricultural Officers)

Place and Duration of Study: Othaya, Tetu and Mathira sub counties of Nyeri County: July 2014

Methodology: Twenty eight farmers and 4 Key informants were interviewed using 2 structured questionnaires. The interviewees were selected using systematic random sampling. Data was collected on the challenges that face the tea sector as well as the mitigating measures used to address them. Data was analyzed using descriptive statistics (percentages and means) using SPSS statistical program.

Results: Low prices, lack of technical know-how on some aspects of tea production, adverse climatic conditions, lack of markets for purple tea were identified as major issues limiting tea sector in the county. Possible solutions have been discussed in this paper.

Conclusion: Challenges that face the tea sector need to be addressed expeditiously in order to maximize tea production and earnings in Kenya.

Keywords: Tea; challenges; mitigating measures.

*Corresponding author: E-mail: maina_faith@yahoo.com;

1. INTRODUCTION

Kenya is the 3rd largest producer of tea. Tea is the leading cash crop in Kenya with significant contribution to the economy as it contributes 20% of the export earnings [1]. It is the highest export earning single commodity and crop in Kenya. About 3 million (almost 10%) of the Kenyan population derive their livelihood from tea. It contributes significantly to infrastructure development and environmental conservation. The small holder sub sector contributes 60% of the total production of tea [1]. The task of managing small scale farmers lies with the Kenya Tea Development Agency [1].

Tea is produced best in tropical red loam mixed with volcanic soils found in the higher altitudes of Kenya usually between 1800-2000m above sea level. Soils are required to be well drained within 2 meters depth and have a PH range between 4.5 and 6.5. Tea thrives with rainfall ranging from 1,200 mm to 2,500 mm annually, preferably with long and sunny intervals [2]. These conditions are found in Nyeri County making it one of the leading producers of tea in Kenya.

Tea production is a function of a combination of several factors which include land, number of bushes planted and their age, labor availability and its utilization, plucking cycle, proximity to collection or buying centers, rainfall and soil conditions (fertility and level of pH) and general tea husbandry [3]. Kenya tea is grown in prime lands capable of producing over 6 tons/ha/year of made tea under good cropping and weather. However, smallholder teas yield on the average less than 2 tons/ha/year of made tea due to use of inappropriate agronomic and cultural practices resulting from low adaptation and adoption of developed and recommended research technologies [4]. This study attempts to identify and address these and other challenges in the tea production of Nyeri County.

2. METHODOLOGY

A survey was conducted in July 2014 in Othaya, Tetu and Mathira sub counties of Nyeri County.

2.1 Site Description

Othaya, Tetu and Mathira subcounties are classified as the tea and dairy zone. They fall under the LH1 ecological zone. They receive a mean of 1400-1800 mm of annual rainfall. They lie at the altitude of 1950-2070 m asl. Some parts of Othaya and Mathira are also classified

as UM1 ecological zone which is the coffee-tea zone. These parts receive 1100-1600 mm of mean annual rainfall [5]. These parts are 1710-1780 m asl. Soils in the subcounties are red volcanic soils. Soil Ph in Tetu and Othaya is strongly acidic with pH ranging from 4.1 to 4.4 and is moderately acidic in Mathira where it stands at 5.4 [6].

2.2 Questionnaire Development

Twenty eight farmers and 4 Key informants were interviewed using 2 different structured questionnaires. A review of literature on tea production was conducted to provide a basis for constructing the questionnaires. A draft of questions was then constructed for each questionnaire. The questionnaires were discussed with the members of staff at the School of Agriculture, Karatina University and revision made according.

2.3 Sampling and Interviewing

The 4 key informants were purposively selected from the subcounty offices of Othaya, Tetu and Mathira. Criteria used were their involvement in overseeing extension activities on tea production in the subcounties. Ten farmers were interviewed in each of the subcounties of Mathira and Tetu while 8 farmers were interviewed in Othaya. The farmers were selected using simple random sampling. This involved picking a random starting point in each of the subcounty and then picking the homesteads randomly.

2.4 Data Collection and Analysis

The researcher interviewed the farmers and key informants following the respective questionnaires. Each question was read and the respondents' responses were recorded. Data was collected on the challenges that face the tea sector as well as the mitigating measures used to address them. Data was analyzed using descriptive statistics (percentages and means) using Statistical Package for Social Sciences (SPSS) statistical program.

3. RESULTS AND DISCUSSION

3.1 Socioeconomic Data of the Respondents

3.1.1 Age

Majority of the farmers were between 36 to 50 years. Only 8% were in the age bracket of 18 to

35 years (Table 1). This could be to the fact that tea farming is mainly done by the older generation. This reflects a widespread issue since in Kenya the average age of the farming fraternity is 60 years old [7]. The youth tend to shun agriculture as a dirty job and are looking for 'white collar' jobs to sustain themselves. Key informant ages ranged from 36-55 years still showing lack of involvement of youth in tea production.

3.1.2 Education level

Majority of the farmers had primary/secondary school level of education (Table 1). This has implications for farmer education meaning that the materials should be simplified. Audio visuals and field demonstrations should be used to ensure all farmers understand whatever innovations that are being taught [8].

All key informants had college education and held various positions in KTDA i.e. Tea Extension, Production manager, Factory unit manager and Field services coordinator. All the informants had worked for over 10 years. The college education and work experience implies that they were well educated and able to pass technical information to farmers.

3.1.3 Gender

Most of the farmers interviewed were male (Table 1). This does not mean that women are not involved in tea production. Studies indicate that women provide most of the labor in tea production [9]. However, men tend to be involved in educational forums and surveys like the present one while women are unable to attend due to numerous agricultural and household chores. Tensions have also been recorded as a result of conflicts over the control of proceeds of tea sales as the men are likely to receive them while women may not benefit much. These negative gender relations affect tea production adversely and lead to low productivity due to neglected tea fields [9].

3.1.4 Size of the farm

The average size of the farms of the respondents was 2.2 acres. This indicates that most of the farmers are small scale and borne out by the fact that the farmers interviewed are serviced by KTDA whose mandate is to aid in production and marketing of tea produced by small scale farmers. Other authors found that the average size of land under tea was 0.85 acres. Seventy

eight percent of the farmers had one acre and below under tea production [10]. Small land sizes have been reported to be constrain productivity in Nyeri County due to declining soil fertility [10].

Table 1. Socioeconomic characteristics of farmers interviewed

Socio economic data of the respondents	Percentage
Age of respondents	
18 to 35 years	8%
36 to 50 years	44%
Over 51 years	48%
Education	
Did not go to School	11%
Primary school level	37%
Secondary school level	41%
High school/college level	11%
Gender	
Male	91%
Female	9%

3.2 Sources of Information for the Farmers

Majority of the farmers obtained information on tea from KTDA (Table 2). Half of the farmers indicated that they obtained information on tea from the public extension service. Less than half of the farmers indicated that they did not obtain information from fellow farmers. These findings are in line with the fact that one of the roles of KTDA is training of farmers and the role of public extension service in farmers' fields schools [10].

3.3 KTDA Farmer Field Schools (FFSs)

Majority of the respondents have heard of the FFSs (Table 2). Almost half of the farmers were members of the KTDA of FFSs. Those that were members of the schools were asked to rate them. Forty six percent rated them as adequate while 38% rated them as highly adequate. Only 15% rated the schools as not adequate. Key informants indicated that the role of the FFSs was training of farmers in all aspects of tea production as well as other crops or animals that farmers choose, provide a link between public extension and tea farmers and mobilizing leaders among the farmers.

A study done on the impact of the field schools indicated that the farmers were very positive with the program however the income of participating group was lower than non-participating group.

This was attributed to increased use of fertilizer and labor [11]. KTDA has also indicated that tea production has been boosted by 30% country wide [12]. This raises the question on who is benefitting from the adoption of sustainable agricultural practices and this could also explain the 15% who rate the schools as not adequate. KTDA plans to roll out the FFS program to the 3200 collecting centers it has with the help of the Unilever Company and other stakeholders. Environmental conservation is an important part of modern agriculture. Proposed certification of the KTDA factories by Rain Forest Alliance will also safeguard future tea production in Kenya [12]. However, the income aspects of the adopting farmers need to be addressed.

Table 2. Sources of information and KTDA farmers field schools awareness and membership of the respondents

	Percentage
Sources of Information	
Kenya Tea Development Agency (KTDA)	75%*
Government Extension Service	50%*
Fellow farmers	48%*
KTDA farmers field schools	
Are aware of them	79%
Are not aware of them	21%
Are members of the FFSs	48%
Are not members of FFSs	52%

*Percentages do not add up to 100% as the farmers were allowed to give multiple answers

Other challenges were enumerated by key informants included by low support of the schools by young farmers, low farmer enrolments, frequent absenteeism of some members, interruption due to some social activities in the local areas, limited time for training trainers, limited funds to compensate trainers and lengthy program which causes a lot of drop outs. These challenges need to be addressed.

3.4 Farmers' Knowledge of Tea Production Practices

Majority of the farmers were able to describe various tea production practices which included land clearing (slashing of bushes, cutting and uprooting of trees that is done before the rains), land preparation (digging), crop establishment (plant spacing, depth of planting, transplanting). Findings from key informants also support this.

Mean adoption percentages for land preparation, planting techniques, weeding and plucking table establishment were high (Fig. 1). There were somewhat lower mean percentages the on use of manure, plucking frequency and pruning (Fig. 1). Low tea output has been attributed lack of diffusion of adequate production technologies and inefficient use of fertilizers [2].

3.5 Fertilizers

Fertilizers are provided by the government on credit to the farmers.

Half of the farmers indicated that fertilizers were available but the amounts given were not adequate in some cases. Small percentage of the farmers indicated that the fertilizers are available but they were brought late or fertilizers provided were of low quality. Few farmers indicated that the fertilizers were available without any problems (Fig. 2).

Majority of the farmers (88%) indicated that they had no problem with excessive fertilizer use. However, key informants indicated the problem does exist and said the Tea Research Foundation of Kenya (TRFK) tests soils periodically and recommends liming where need be. Farmer education has also been used to reduce its occurrence.

3.6 Pests and Diseases

Majority of the farmers indicated that they did not have any problems with pests in tea production (Table 3). Of the farmers that experienced the pests, aphids and rodents were a problem. Control measures used were rodenticides. Other farmers said that the aphids were killed by rains. Most of the key informants (75%) also indicated that pests do affect tea production however their effect on tea is minimal. Key informants indicated that the pests observed in farmers' fields were red spider mites, scales, thrips, aphids and crevice mites. Control measures suggested were cultural measures like good nutrition. This supports the view that by and large tea production in Kenya is pesticide free.

Over half of the farmers (54%) indicated that *Armillaria* root rot is a problem in tea production. The control measure of this disease was reported to be uprooting the affected plants and venturing into different enterprises on the affected land.

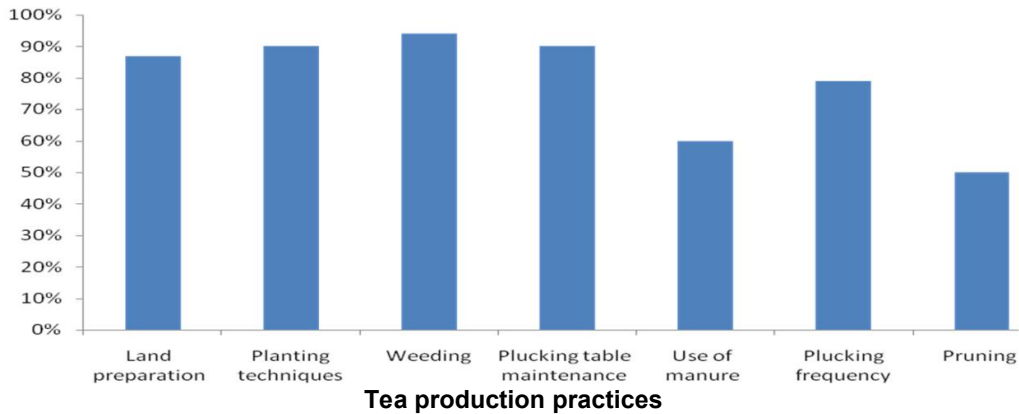


Fig. 1. Farmers knowledge on tea production practices in Nyeri County

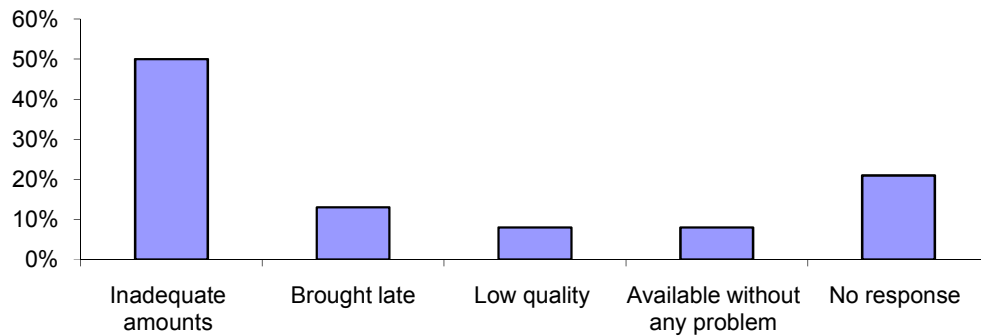


Fig. 2. Availability and quality of fertilizers used by the respondents in tea production

Table 3. Pests, Diseases and soil erosion incidence on farmers' fields

	Percentage
Pests	
Observed pests	18%
Did not observe any pests	82%
Diseases	
Observed disease (<i>Armillaria</i> root rot)	54%
Did not observe any diseases	46%
Soil erosion	
Is a problem	28%
Is not a problem	72%

All the key informants indicated that diseases encountered in tea were *Armillaria* root rot, *Hypoxyton* wood root and stem canker. Disease control measures suggested were for *Armillaria* uprooting of the tea, for *Hypoxyton* proper pruning and chemicals for stem canker. Other studies have also indicated these diseases affect tea [13].

3.7 Soil Erosion

Majority of the farmers indicated that soil erosion is not a problem (Table 3). Of the farmers that indicated soil erosion was a problem 28% indicated that it occurred on the sides of the mature tea and in young tea. Control measures such as contour cultivation, terracing and cover cropping were used to reduce soil erosion. Key informants expressed the same sentiments.

3.8 Labor

In most tea growing areas labor is manual and only multinationals use tea plucking machines [13]. Most of farmers (68%) said that labor is easily available. However, the price of labor was rated to be high by majority of the farmers (96%) and it ranged from Kshs. 8 to 12 per kilo of tea plucked. Similar sentiments were echoed by the key informants that is labor costs are very high when compared to the proceeds from tea. Farmers need adequate monthly payment to organize harvesting of entire crop. During the

monthly green leaf payment, KTDA needs to workout rates that can facilitate the smallholders to remove all crop on the bush. If the farmers are unable to remove all ready shoots, there is overgrowth which translates into losses [14].

3.9 Machine Plucking

Almost half of the farmers do not know about the machine picking (Fig. 3).

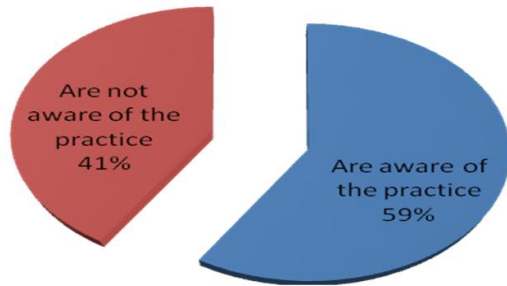


Fig. 3. Farmers awareness of mechanized tea plucking in Nyeri county

The farmers who were aware of mechanized tea plucking also indicated that machine picking was not done in the area, machine picking was cheaper than hand picking but gave low quality tea and damages the bushes affecting their ability to sprout and that it is not recommended for hilly terrain which is found in Nyeri County.

Half of the key informants indicated that machine plucking is the best and has high acceptability. Other advantages of machine plucking were enumerated as reduction in cost of plucking, fast plucking and ease of maintaining the plucking table. Ongoing research indicates that machine plucking does not have adverse effect on tea quality but it significantly reduces costs [15].

3.10 Quantity of Tea Harvested in Rainy and Dry Seasons

The mean quantity of tea harvested in the wet season was 96 kg/acre. In the dry season the mean quantity harvested was 52 kg/acre. Key informants indicated that tea productivity was lower than the potential given Nyeri County climate and soils.

3.11 Tea Factory/Collecting Centers

The respondents took their tea harvests to Chinga and Ragati, Gitugi, Iriani and Gahuthi factories. Collecting centers were numerous. The mean distance between the farms and the collecting centers was 0.8 km. Majority of the farmers (96%) carried tea harvested on the back to the collecting centers while only one farmer indicated that the lorry picked the harvest from his farm. Most of the collecting centers in the County are at the recommended distance of 1km. Proximity to the factory/ collecting centers is important to reduce quality deterioration and reduce leaf spillage [16].

3.12 Climate

All farmers indicated that low rainfall, extreme cold or heat and frost affects productivity of tea. All the Key informants also indicated that adverse weather reduces yield significantly. Majority of the farmers either said nothing could be done about the climate or they did not know the mitigation measures that can be used (Fig. 4). Mitigation measures against climate suggested by the rest of the farmers were tree planting and farmer education on climate change (Fig. 4).



Fig. 4. Mitigation measures against adverse climate in tea production

Key informants suggested interventions that were mainly based on planting of trees and preserving of existing forested areas through energy saving jikos and renewable energy sources. Farmers' and key informant responses show low level of knowledge on what can be done to mitigate the effects of adverse climate.

Adaptations to adverse climatic changes are numerous and include crop management practices (choice of fields, planting densities, crop varieties and planting dates), livestock management practices (feeding and animal feeding practices), land use and management (fallowing, tree planting or protection, irrigation and water harvesting, soil and water conservation measures, tillage practices and soil fertility management), livelihood practices (mix of crop and animal production, permanent or temporary migration and agricultural and non-agricultural activities) [17]. Some clones developed by Tea Research of Kenya are also resistant to frost damage and are recommended for those areas that suffer from frost.

3.13 Prices and Revenue of Tea

Majority of the farmers (78%) and all the key informants indicated that low tea prices are a serious problem in tea production. Average revenue obtained from the tea by the respondents was Kshs.102,416 per year. However, the maximum amount of revenue obtained from tea was Kshs. 300,000 per year while the minimum amount was Kshs. 10,000 per year. Revenue levels are still low and dependent on a myriad of factors.

KTDA reported that low tea prices are mainly due to oversupply of tea in the market, volatile political environment in some of key export markets like Egypt, Pakistan and Syria and depreciating currency in Pakistan [17]. Low prices have in the past led to some small-scale farmers in Nyeri County to uprooting their crop, citing frustrations in payments. Kenya Tea Board and Kenya Tea Development Agency (KTDA), however, moved to arrest the situation and warned errant farmers with legal action, if they uprooted their bushes [18]. Whereas, KTDA claims that Kenyan farmers are among the best paid in the world the sentiments of the farmers surveyed shows the income they get is not enough to sustain their livelihoods.

Some farmers (37%) indicated that nothing can be done concerning prices because marketing of

their tea is in the hands of KTDA. This reveals the feeling of helplessness farmers have about tea prices which fuels resentment towards KTDA. Others suggested looking for new markets. The same intervention was expressed by the key informants. KTDA has set up strategies to mitigate these challenges through business and market diversification across the supply chain [19]. A lot still need to be done for the effect of diversification to be felt by farmers.

Other farmers suggested government intervention in the tea industry. Government subsidies to farmers are used the world over to protect farmers. This can be introduced in tea production especially when the prices are very low. A small percentage (4%) suggested value addition of the tea. A taskforce commissioned by the Nyeri County government has also recommended value addition of tea as the way forward in the tea sector as barely 5% of the tea in Kenya is sold in value added form [20]. Value addition strategies included market and product development support, physical and logistical support, enhancement of Kenya tea brand and compliance with consumer requirement. Benefits of tea value addition include competitive prices, increase in income, creation of cottage industries, diversification of products, knowledge and technology development. Other stakeholders such as Karatina University are spear heading research on value addition of tea [21].

Farmers in this study also suggested that improvement in tea grades would increase the prices. This is also a critical suggestion since high quality tea attracts high prices. KTDA is trying to address this through introduction of different tea clones and farmer education [19]. Studies on the impact of KTDA FFSS indicate that leaf rejection at factories has significantly reduced. This was because farmers were taught on quality tea production. This needs to be encouraged to help mitigate low tea prices.

Another mitigating measure though not mentioned by the farmers in this study is diversifying to other enterprises that require little land (much of the land is under tea) but are rewarding income wise. Dairy goats, piggery, rabbits, horticulture and green houses are the new emerging agricultural opportunities in the County. Already some these incentives have been introduced. For example 6,000 tea farmers

for the Iriana Tea Factory have acquired hundreds of beehives to help diversify their income and a 150-acre plot of land on which they hoped to erect 12,000 beehives [22].

3.14 Purple Tea Planting

All the farmers interviewed did not grow purple tea. Various reasons were given for not growing purple tea. These include no knowledge on purple tea, lack of land to diversify to purple tea production, purple tea seedlings were not available in the area, climate was not suitable for purple tea production and no market for purple tea (Fig. 5).

Most of the key informants indicated that their organizations grew purple tea. The one that did not grow the purple tea indicated the lack of market and equipment to process the tea as hindrances. Mean acreage under purple tea was 4.83 acres which quite minimal. Research studies also indicate the main constraints to purple tea production are low prices and low consumer uptake [23].

3.15 Disposal of Agricultural Chemical Containers

Although tea production in Kenya does not need a lot pesticide, fungicides or herbicides the many tea farmers are involved in vegetable production that requires a lot of these chemicals. Over half of the farmers did not know of any special way of disposing agricultural chemicals containers (Figure 6). This is critical as proper disposal of chemical containers is crucial in preventing pollution of land and water sources in the area. Few farmers indicated that the containers should be buried or KTDA should collect the containers for disposal or containers should be thrown into the latrine or dustbin. Others suggested farmers should be educated on container disposal.

Most of the key informants (75%) did not know of special way of disposing chemical containers. Those that knew suggested washing the container 3 times and burying in the ground. Recommended practices include combustion of the containers in licensed incinerator and burying of containers after rendering them unusable [24].

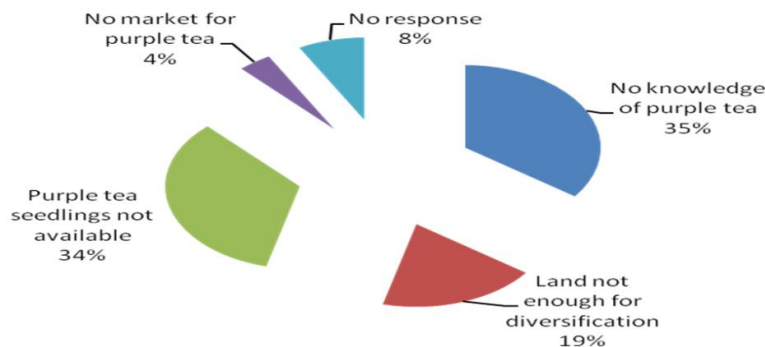


Fig. 5. Reasons farmers are not growing purple tea in Nyeri County

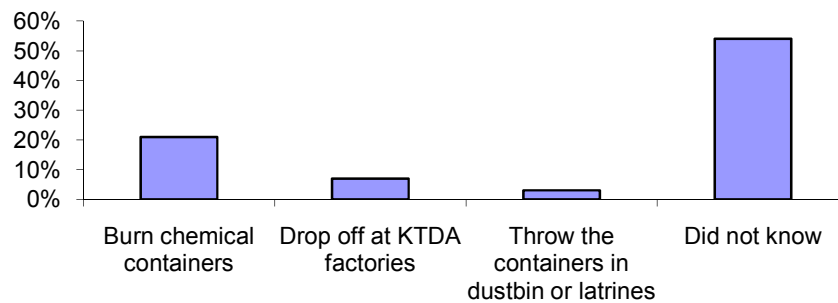


Fig. 6. Ways of disposing agricultural chemical containers as indicated by tea farmers in Nyeri County

3.16 Role of KTDA in Tea Production

The farmers indicated the roles of KTDA as transporting, processing and marketing of tea, road maintenance, provision of bursaries to deserving students, provision of SACCO loans and inputs. Interesting 7% of the farmers added that KTDA does not have transparency and oppresses farmers. Key informants also indicated the above named roles. The roles observed by the farmers are accurate as they are reflected in the services that KTDA provides to farmers [1].

3.17 Other Challenges

Other challenges enumerated by the farmers include wastage of time at the collecting center waiting for the clerk or trucks, delay in payments, dusts and smoke from the factories affect the nearby tea plantations, lack of proper clothing during cold and rainy seasons, and non-tallying of tea weight. Challenges indicated by key informants included the fact that 50% of the labour has no formal training, other players apart from KTDA who want to construct factories, lack of farm management services to manage labour, competition from other beverages, political interferences, poor infrastructure and high processing costs due to high prices of firewood. Other studies have similarly enumerated infrastructure, poor extension coverage and governance issues as problems facing tea in Kenya [12,18].

4. CONCLUSION

Challenges that face small scale farmers need to be mitigated for tea production in Nyeri County to go to the next level. These challenges include poor gender relations, low adoption of some aspects of tea husbandry, low prices, adverse weather, pests and diseases and high labour costs. Opportunities in the tea industry are diversification to other enterprises to reduce the risks of low tea prices, value addition, purple tea production, research on effective tea husbandry and clones and KTDA farmers field schools.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Chang K, Brattof M. Contribution of tea production and exports to food security, rural development and small holder welfare in selected producing countries: FAO, Rome; 2015.
2. Owuor PO. Tea in Kenya: Production and country profile. Two and a Bud. 2011;58:10-18.
3. TBK. Getting it right on tea growing economics. (Accessed 28/8/2014)
Available:www.teaboard.or.ke/getting-it-right-on-tea-growing-economics.html
4. Anonymous. Tea Board of Kenya Projections; 2001.
5. Jaetzold R, Schmidt H, Hornetz B and Shisanya C. Farm management handbook of Kenya Vol. II – Natural Conditions and Farm Management Information; 2005.
6. Mugo I. Researchers raise red flag on soils in Nyeri. (Accessed April 2018).
Available:<https://www.nation.co.ke/seedsofgold/red-flag-on-soils-in-Nyeri>
7. UNDP. Cultivating youth entrepreneurship through agribusiness. (Accessed March 2018).
Available:www.ke.undp.org/inecgr/success_stories
8. Orey M. Emerging perspectives in learning, teaching and technology. Global Tex Project, Zurich, Switzerland; 2010.
9. Sorensen A, Von Bulow D. Gender and contractual farming in Kericho, Kenya. Center for development research q990 DR project paper 90.4 Denmark; 1990.
10. Owuor B, Wambui B, Argwings-Kodhek G, Poulton C. The role and performance of ministry of agriculture in Nyeri South District. Research Paper 018, Future Agricultures; 2010.
11. Waarts YL Ge, Ton G, Jansen D. Sustainable tea production in Kenya: Impact assessment of rain alliance and farmers field schools training. LEI Report 2012-043, Wageningen, Hague, Netherlands; 2012.
12. Mudoga E. How KTDA's investment in farmer field schools is paying off. (Accessed March 2018).
Available:www.ktdatea.com/index>blogs>item
13. Otieno W. Epidemiology and management of Hypoxylon wood rot of tea. Tea.1997; 18:175-83.
14. Owuor PO, Kavoi MM Wachira, FN Ogola, SO. Sustainability of Smallholder Tea Growing in Kenya; 2011.

15. TBK. Tea Board of Kenya Statistics, Nairobi, Kenya; 2011.
16. Owuor PO, Orchard Le, Robinson IM, Taylor SJ. Variations in the chemical composition of Clonal black tea due to delayed withering. *Journal of the Science of Food and Agriculture*. 1990;52:55-61.
17. Bryan E, Okoba B, Roncoli C, Silvertri S, Herrero M. Adapting agriculture to climate change in Kenya: Household and community strategies determinants. World Bank Project, USA; 2011.
18. Reuters. Battered by falling prices, Kenya's tea farmers threaten to uproot. Accessed 12/3/2018). Available:<http://www.reuters.com>article>
19. KTDA. Chai Bulletin. Iss. 3 Dec. 2014. April 2018. Available:www.ktdateas.com
20. Weru J. Farmers dump tea for sweet honey; 2013. (Accessed June 2014). Available:<http://www.standardmedia.co.ke>
21. Nganga S. Support tea research. (Accessed 27/8/2014). Available at: www.karatinauniversity.ac.ke.
22. Weru J. Bid to end tea, coffee farmers woes. (Accessed June 2014). Available: <http://www.standardmedia.co.ke>
23. Jiwaji A. Purple tinted future of Kenya's tea sector. Nairobi Business Monthly. (Accessed 28/8/2014). Available:www.nairobibusinessmonthly.com
24. Ayiamba PO, Nyabudi KW. Guidelines on Agro-chemicals products waste disposal for sustainable farming. TRFK Bulletin. 2008;13:(2).

© 2018 Maina; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sciencedomain.org/review-history/24688>