

SOMALI REGION PASTORAL AND AGRO-PASTORAL RESEARCH INSTITUTE (SoRPARI)

ABSTRACT BOOKLET OF SoRPARI's RESEARCH REPORT

Initiated By:

Mohammed Sharif Ali

Abdulkarim Mohammed

Compiled and Edited By:

Abdulkarim Mohammed Ali

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Contents

ABOUT SoRPARI 2
Abstacts From Livestock And Forage Research Directorate 5
Abstracts From Crop Research Directorare 17
Abstracts From Food Science And Nutrition Research Directorate 40
Abstracts From Agricultural Mechanization Research Directorate 48
Abstracts From Soil And Water Research Directorate 55
Abstracts From Socio-Economic And Gender Research Directorate 61
Abstracts From Rangeland & Forestry Research Directorate 66

ABOUT SoRPARI

Establishment

The Somali Region Pastoral and Agro-pastoral Research Institute (SoRPARI) was established in 2002 by Proclamation No. 31/2002, as the first regionally coordinated agricultural research system in the region. SoRPARI was established with a mission to deliver and popularize agricultural technologies, knowledge and information in a participatory and integrated way for all the pastoral and agro-pastoral communities in the SRS, in particular, and similar communities in other regions of Ethiopia in general.

Vision

To become center of excellence in pastoral and research agro-pastoral in Eastern Africa with respect to the generation of pastoral and agro-pastoral technologies, knowledge and information usable to ensure food self-sufficiency; food-security; and economic development in the SRS, in particular, and pastoral and agro-pastoral communities elsewhere in Africa.

Mission

Deliver and popularize agricultural technologies, knowledge and information in a participatory and integrated way for all the pastoral and agro-pastoral communities in the SRS, in particular, and similar communities in other regions of Ethiopia in general.

Values

The operational philosophy; values; ethics; mottos; and principles are:

- Working towards satisfying customers' needs;
- Creativeness and new way of doing thing;
- Change becomes our culture;
- Building accountability and transparency;
- Respect scientific research principles;
- Respect diversity of ideas
- Building works ethics;
- Gender sensitivity.

Strategic Objectives

The institute shall have the following objectives.

1. Generate, develop and adapt agricultural technologies that are in accordance with the regional agricultural and development policy and strategy and improve the living standard of the population and region.
2. Coordinate research activities of agro-pastoral and pastoral research centers, higher learning institutes and other related establishment, which undertake agro-pastoral and pastoral researches.
3. Build up a research capacity and establish a system that will make agro-pastoral and pastoral research as efficient, effective ad concurrent with the development needs of the region.
4. Popularize agro-pastoral and pastoral research results.

Core Functions

- Adaptation and generation of improved agricultural technologies and information,
- Multiplication and provision of source technologies,
- Demonstration and popularizing of improved technologies,
- Capacity building of research staff, and
- Networking and partnership.

Core Research Disciplines

- Crops
- Livestock
- Natural Resources
- Agricultural Mechanization
- Socio-economics, Gender and Agricultural Extension
- Food Sciences and Nutrition

Organizational Setup

As part of the reform, the research and support setup of SoRPARI has been restructured. The governing body of the institute included the director general; core processes, technical supportive directorates and support processes are stated below.

Core Research and Technical Directorates

Research directorates are answerable to the DG and DDG, and carry out responsibilities assigned to them. Core research and technical directors guide, coordinate and oversee research in their respective disciplines. The followings are core research and technical directorates:

- Livestock and Forage Research Directorate
- Crop Research Directorate
- Soil and Water Research Directorate
- Rangeland and Forestry Research Directorate
- Agricultural Mechanization Research Directorate
- Socio-economic and Gender Research Directorate
- Agricultural Extension and Communication Research Directorate
- Technology Multiplication and Seed Research Directorate
- Food Science and Nutrition Research Directorate

Support Directorates and Services

Support Directorates are answerable to Director General and Deputy Director General and carry out responsibilities assigned to them. Their major duties are related with administrative support for discharging effectively the duties and responsibilities of the institute. The following offices represent support directorates and services:

- Legal Affairs Service
- Internal Audit Service
- Engineering and Maintenance Service
- Planning Monitoring and Evaluation Directorate
- Human Resources Development and Management Directorate
- Finance, Procurement and Property Management Directorate
- Public Relation Directorate
- Information and Communication Technology and Knowledge Management Directorate

ABSTACTS FROM LIVESTOCK AND FORAGE RESEARCH DIRECTORATE

Prevalence, Characterization and Determination of Antibiotic Sensitivity on Camel Mastitis Causing Agents in And Around Jigjiga City, Fafen Zone, Somali Region, Ethiopia

Mohamoud Mohamed Jama[1], Muhumed Ali Farah [2], Ziad Abdullahi Darod [3] and Fardowsa Mohamed Tahir [4]

E-mail:- moha.moha17@gmail.com[1], ziadabdilahi@gmail.com[3]

Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI) P. O. Box: 398, Jigjiga, Ethiopia.

Abstract

A questionnaire-based survey and a cross-sectional study was conducted on purposefully selected 60 individual lactating she-camel owners and 244 lactating she-camels from 3 privately owned camel dairy farms respectively. With the aim of investigating camel mastitis prevalence and characterization and determination of antibiotic sensitivity on camel mastitis causing agents in and around Jigjiga city of Fafen zone, Somali region, Ethiopia. Furthermore, direct interview with dairy camel farm owners were conducted. About 66.7% and 33.3% of dairy camel owners apply herd grazing method and separate grazing method. In this study, 98.3% of the respondents told that there is a feed shortage problem. Moreover, 65%, 25% and 10% of the respondents treat clinically sick camels with modern vet drugs, traditional medicines and combination of the two, respectively. The overall prevalence of she-camel sub- clinical mastitis in the study area was 10.6%. The prevalence of subclinical mastitis at she-camel level was 12.5%, 11.1% and 9.9% in Suleka, Dhaygel and Barkomal dairy camel farms, respectively. Nevertheless, statistically there was no significant difference in the prevalence of sub-clinical mastitis among the studied dairy camel farms (P > 0.05). Age and the hygiene of udder and legs for the examined she camels were the risk factors that statistically influenced the result of CMT (P < 0.05). A total of 510 bacteria consisting three types with four species of bacteria were isolated. Among these the most predominant bacterium was S. aureus with prevalence of 34.5% followed by Sr. agalactiae, Sr. dysgalactiae and Pasteurella multocida with prevalence of 29.8% 19.4% and 16.2%, respectively. Kirby-Bauer disk diffusion method was employed to determine the drug sensitivity of all bacterial isolates for selected antibiotics. Thus, 100%, 89.4%, 61.6% and 69.8% of the S. aureus, Str. agalactiae, Str. dysgalactiae and P. multocida, respectively were found to be highly susceptible to erythromycin. Hence, erythromycin was best drug of choice. From the 510 isolated bacteria 84.5%, 60%, 44.7% and 36.7% were sensitive to Erythromycin, Streptomycin, Oxytetracycline and Tetracycline, respectively. Furthermore, results of the camel dairy farm owners' interview revealed that neither the farmers emphasized the need to milk healthy cows first and the diseased cows later to prevent transmission of mastitis nor the milkers used disinfectant and even water to clean teats before and after milking.

Key words: *Antibiotic Sensitivity, Camel Mastitis, Characterization, Ethiopia, Fafen Zone, Prevalence, Somali region*

Assessment of Agro-Pastoralists' Small Ruminant Breeding Objectives and Production Potential in Fafen Zone for Community-Based Breeding Program

Kiflay Welday[1] Abdulahi Mahamed[2] Mahamed Hassen[3] Abdulahi Gas[4]

welday.kflom807@gmail.com[2],Abuu6973@gmail.com raabi6947@gmail.com
abdilahi124@gmail.com
Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI) P. O. Box: 398, Jigjiga, Ethiopia.

Abstract

Breeding program described as community-based (CBBP) typically relate to low-input systems with farmers having a common interest to improve and share their genetic resources. A study was conducted in Harishn, Kebri-bayah and Shebelley belong to Fafen Zone, Somali Region with the aim of identifying small ruminant production objectives and potential and major challenges in the study areas. Six kebeles and 20 households from each kebele with a total of 120 households were selected and subject to an interview with semi-structured questionnaires, focus group discussion and field observation. Quantitative data which were collected form the survey such as land holding size, flock composition and flock structures were subjected to Analysis of variance (ANOVA) using the general linear model procedure of Statically Analysis System (SAS 2009) whereas qualitative data such as demographic characteristics and breeding animal selection criteria were analyzed using SPSS (2019). Out of 120 interviewed respondents, from three districts 90% were males with an average of 41 years old. Findings of this study based on educational attainment revealed that more than half of the respondents in the study areas were illiterate, which could have negative impacts on livestock production improvement interventions. Sheep and goats share the highest (33.29 and 28.19) contribution of flock compositions but donkey and chicken share the lowest number (0.37 and 1.81) of the livestock population respectively. Primary reason for keeping sheep and goat in all study areas was income generation with 0.441 index value followed by as sources of food (milk and meat). Other reasons mentioned by small ruminants' owners and their respective indices were), social security (0.059) and social prestige (0.026). Natural pastures (0.313) and grazing and browsing shrubs (0.225) are the dominant feed resources in all study districts where as crop residues supplemented in rear amount. But the availability both in quantity and quality of these feed resources are varied between wet and dry seasons. Body conformation, adaptability, pedigree, growth rate and twining ability were among the selection criteria for selection breeding sheep and goats in all study areas. Ewes and does with short lambing and kidding intervals and good twining rate were more preferred compared to long lambing/kidding intervals and single birth. Most of Agro-pastoralist using breeding calendar for sheep but not for goat because goats have better drought tolerance due to their browsing habitats to different browsing plant species and shrubs. Generally, small ruminants are kept under traditional production system which is constrained by, shortage of feed, diseases, water scarcity, frequent drought, predators, and poor veterinary service. The level of productivity is low and less attention is given to husbandry and breed

improvement. In order to raise productivity, it is important to involve farmers and other stockholders in designing breed improvement interventions, considering the existing breeding practices, management systems and trait preferences of the community. Therefore, to sustainable genetic improvement of small ruminants for improve food security and malnutrition community-based breeding program (with active participation of the society) should be established and implemented properly.
***Key words**: Breeding objectives, major production challenges, production potential small ruminants*

Ethno-Botanical Study of Medicinal Plants Used to Treat Livestock and Human Diseases in Fafan and Jerar Zones of Somali Region, Ethiopia.

Muhumed Ali Farah [1], Mohamoud Mohamed Jama[2], Ziad Abdullahi Darod [3] and Fardowsa Mohamed Tahir [4]

E-mail:- moha.moha17@gmail.com[1], ziadabdilahi@gmail.com[3]

Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI) P. O. Box: 398, Jigjiga, Ethiopia.

Abstract

Ethno botanical study of traditional medicinal plant species was conducted from October, 2021 to May, 2022 with the aim of identifying and documenting medicinal plants used for livestock and human diseases treatments and also the associated indigenous knowledge in purposefully selected six districts of Fafen and jerar zones of Somali region, Eastern Ethiopia. The Data was collected through semi-structured and key informative interviews supported by field observations. All of the collected ethno botanical data were analyzed using descriptive statistics; Additionally, Pearson's correlation analysis was employed to determine correlation of medicinal plant knowledge with potentially associated intrinsic factors. A total of 75 indigenous ethno-medicinally important plant species used for different animal and human diseases distributed in the study area were recorded in this study. Of the total medicinal plants collected, the majority (53.3%) were used to treat human diseases followed by animals as 26.7% and both humans and animals as 20.0%. The findings of the present study revealed body and back ache as common diseases in the area followed by headache, stomach ache, muscle ache, placenta retention, wounds and common cold. However, the scientific names of these plants are not yet identified and grouped in accordingly. On the other hand, important livestock diseases reported in the study area were mastitis, pasteurellosis, CCBP, CBPP, Bloat, coughing and pneumonia in young stocks, poor milk yield and stunted growth. The most commonly used plant parts for herbals preparation in the study areas were roots (30.7%) followed by leaves (25.3%), stems (10.7%) and whole parts (9.3%) of the total reported plants. The study also revealed that among the different routes of application utilized, oral application was the most widely used (58.7%) followed by topical (25.3%). Our result mainly showed that all most all of the medicinal plants were obtained from natural forest. This designates essential to give priority to the conservation of the habitats most preferred by the medicinal plants of the study area together with awareness raising activities on the community.

***Key words**: Ethno-botanical, Ethiopia, Human Diseases, Somali Region, Livestock, Medicinal Plants.*

On-station evaluation of straws and stovers with urea to increase utilization in Somali Region

Daniel Seyoum Esheta[1*] and Woldegebriel Tesfamariam[2]

Tel: - +251920688458[1]

E-mail:- danielsyyoum101@gmail.com[1],

[1]Animal Nutritionist, Somali Region Pastoral and Agro-pastoral Research Institute (SoRPARI), Jigjiga, Ethiopia.

[2]Animal Nutritionist, Ethiopian Institute of Agricultural Research (EIAR), Addis Ababa, Ethiopia.

Abstract

Wheat straw (WS), barley straw (BS), sorghum Stover (SS), and maize Stover (MS) were subjected to different times of ensiling and urea treatment levels in order to identify the most effective ensiling time and urea treatment level to attain preferable nutritional aptitude. Both straws and stovers were treated with 0.40 and 0.50 g concentration levels of urea solution dissolved in 0.8 L of water and sealed plastic sheet for one to four weeks. Accordingly, to the general observation at the time of opening, there was no mold growth, appeared golden brown in color, and had soft consistency with a strong ammonia smell ensuring the effectiveness of the treatment. The chemical analyses and IVDMD were done at HRCL. The results showed that the urea level had a no-significant effect on all chemical compositions and IVDMD for all urea-treated straws and stovers. Therefore, treatment with 40 g urea may be more economical. On the other hand, negative and significant ($P<0.001$) correlations existed between IVDMD and fiber fractions for all treatments. While other quality parameters, IVDMD and CP, were strongly correlated ($r=0.90$) ($P<0.01$) for WS and BS. The results also revealed that the treatment duration on both straws and stovers should be 28 days.

Key words: *Treatment, ensiling time, chemical analysis, digestibility, crop residues*

Assessment on major indigenous knowledge's of milk and milk products handling and processing in pastoral and agro-pastoral production system in Jigjiga Woreda of Ethiopia Somali Region

Daniel Seyoum[1], Tel: - +251920688458[1]E-mail:- danielsyyoum101@gmail.com[1],

Animal feed and nutrition Research program

Somali Region Pastoral and Agro-pastoral Research Institute (SoRPARI)

ABSTRACT

The study was conducted in Jigjiga woredas of Somali Regional State, with the general objectives of assessing the major indigenous knowledge and traditional milk and milk products and preservation methods. Two kebeles, Fafan and Hadow that have milk production potential were purposively selected and used for the study. The average family size of the study area was 7.3. The study area has a mean livestock population of 9.39Tropical Livestock Units (TLU) per household. Almost all villages of the producer's respondents are well aware of colostrum's feeding for the new born animals and understand the beneficial effect on health of the young. Milk is consumed either as fresh or in fermented form in the current study; the majority of the milk produced is sold in both kebeles. Plastic bucket is the major container used for milking and sale dairy products in the study area. With regard to milk fermentation, the majority of the respondents use wooden container. The use of plastic and traditional containers can be a potential source for the contamination of milk by bacteria because it is impossible with practical cleaning but none of the respondents mentioned problem in regarding to difficulty of cleaning. Instead they proudly said wooden containers have its own advantage in improving flavor and shelf life on their milk. The most common technique of washing milk utensils is by putting plant leaves of Berkaketi(Lantana camara) together with water and shaking for some times and finally rinsing with water. Moreover, they rub milk utensils not only for washing but also flavoring milk containers. On the other hand, Woob is the most common woody plants species used to add flavor to churning material by boiling its stem cover (bark) with water into the container before putting the milk.Balanitesglabra (Kadiin Somali), Oleaafricana (Agarsein Somali) and Acacia etbaica (Sogsogin Somali) are the most frequently used plant species for smoking milk vessels in the study areas. Besides, Acacia nilotica and Acacia brevespica are used when they miss the others. And also, Acacia brevespica is used for smoking milk containers only for camel in the study area. The majority of the respondents used Acalyphafruticosa to keep butter for longer period of time and to add flavor. The average shelf life of raw milk was 2.45 days at an ambient temperature. The estimated milk post-harvest loss per week in this study is 11.85 and 16.33% for Hadow and Fafan, this was mainly attributed by rejected from sale. The major points of milk sale for dairy products in Fafan sell fresh milk to collectors (76.3%), individuals (62.5%) and at kiosk (65.0%), while the sale for fresh milk in Hadow were (6.3%) to individuals, 90 percent to collectors and at the farm gate (3.8%). The average estimated time to milk delivery was 45.53 and 34.22 minutes in Hadow and Fafan, respectively. An average price of 10.2 and 16.4 Birr/liter for fresh whole milk and 46 and 60.7 Birr/kg for butter were reported for the wet and dry seasons, respectively. The lower price of fresh milk and butter price in wet season than dry season may be attributed to the surplus milk production during wet season in the study area. The research revealed some challenges or constraints involved in milk production, processing,

marketing and consumption of the study areas. Low milk yield, poor quality of feeds, feed shortage, poor market infrastructure and unavailability of smallscale milk processing equipment's are the most important constraints associated with milk production. Area.

Key Words: *indigenous knowledge, milk, handling, processing, production*

Investigation of Severe Silent Outbreak of Camel Abortion in Mayomuluko Districts, Erer Zone, Somali Region, Ethiopia.

Muhumed Ali Farah [1], Muhumed Ali [2], Abdu Salam [3]
Abdi Malik [4] and Ahmed Dek[5]
Tel: +251911024107[1]
Animal health research program, Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI)

ABSTRACT

A questionnaire based survey and a cross-sectional study was conducted from October 2017 to October 2019 on randomly selected 50 individual she-camel owners and 100 she-camels (50 for blood smear and 50 for serological examinations) from the study area with the aim of investigating Investigation of Severe Silent Outbreak of Camel Abortion in Mayomuluko District, Erer Zone, Somali Region, Ethiopia. From the studied district five kebele namely Bulbul, Harjano, jiidamissa, degmayo and 3rd kebele in Mayumulukho Town were randomly selected. The word camel is derived from the Greek word "kremal, which is meaning running". Camel is an important component of the desert ecosystem from time immemorial and is recognized as the "Ship of the desert, Humans depend on this animal not just for meat, milk and hide but also as one of the most important mode of transport in the desert where impossible other means of transportation, Camel is one of the large ruminants reared by 70 % of Somali pastoral community depending on their livelihood in the semi-arid hardship land they live and it is the only animal can provide milk for their children and elders during summer time when other livestock are in danger due to shortage of feed and water. Despite the important camel as a potential animal food security provider is neglected for centuries, until now it has no single vaccine produced to protect them from different diseases affecting them except camel pox vaccine which is recently produced and is in experimental stage and not yet evaluated its efficiency in mass vaccination, there many diseases killing camel not yet identified. e g camel respiratory disease syndrome (95/96), camel posterior paralysis since (1974), camel killer disease, (2005), etc., even bacterial diseases which their vaccine available in this country not yet adjust dosage for camel, like Anthrax and Pasteurella vaccines which are the only two vaccines use for camel against their infection with bacterial diseases and not yet adjust dosage for camel but use cattle dosage.

Key words*: Camel Abortion, Ethiopia, Investigation, Mayomuluko, Nogob Zone, Outbreak, Somali region*

Participatory On-farm Evaluation and Demonstration of Improved Forage Legume and Grass at Gursum Woreda, Somali Regional state, Ethiopia

Abdi Mohamed Ali[1], Daniel Siyum Eshatu[2]Tel
Tel - +251915006131[1], +251920688458[2]
E-mail:- Abdicade9921@gmail.com[1] , danielsyyoum101@gmail.com[2],
Animal Feed & Nutrition Program, Livestock & Forage Research Directorate, Somali Region Pastoral and Agro-Pastoral research Institute (SoRPARI)

Abstract

Livestock development and production is constrained and challenged by feed shortage. Forage innovation is proposed to minimize feed shortage for the livestock sector. Participatory evaluation and demonstration of both forage grass and legume forage crops namely Panicum Maximum, Rhodes grass, Cinchrus cilliaris and Medicago sativa and Caw pea small were undertaken under agro-pastoralist area under irrigated condition in fafan dry river irrigated area. Agro pastoralists FRG/PRG group formation and problem identification under taken prior to the implementation of demonstration activity. Land preparation, sowing and overall husbandry was undertaken based on the agronomic recommendation so far developed by SoRPARI Research Institute the whole forage cultivation activity undertaken by the members of FRG/PRG. Variety evaluation in participatory way and organization of field days was undertaken, to collect the perception of agro-pastoralists towards the productivity of each forage crops and to create linkage for further adoption of the technology. From herbaceous grasses panicum maximum is found to be better in plant height, early maturity and higher fresh and dry matter yield. Rhodes grass is found to be late in maturity but with better biomass yield followed by panicum antidotal but cinchrus cilliaris is found to be tolerant to stress but with lower dry matter. From herbaceous legumes Caw pea small is found to be superior in early maturing and biomass yield however due to the possibility of multiple harvests from Medicago sativa the annual biomass yield and cost of production is found to better for Medicago sativa. Agro pastoral perception collected indicated that among the tested forage varieties from grasses interms of biomass yield, early maturing, ease of establishment, multiple harvest and nature of purpose as well a resistance to stress Panicum ranked first followed by Rhodes there by cinchrus species, from leguminous species Caw pea small is found to be better in most of agro-pastoralists evaluation criteria but due to the possibility of multiple harvest without replanting and due to feed preference from domestic animals Medicago sativa is found to be superior feed and selected as best forage crop. From the above participatory variety evaluation work it's found that most of the parameters agro-pastoralists use to select variety have similarity with scientific criteria.

Key words: *Farmer research group, participatory variety evaluation, herbaceous grasses, herbaceous legumes.*

On-farm demonstration and pre-scaling up of Beef fattening technologies to attain market weight under semi-intensive feeding systems in Gursum Woreda, SRS

Daniel Seyoum[1], Aden Omer [2], Hassan Abdurahman [3] and Ahmed A [4]
Tel: - +251920688458[1], +251915004263[2], +251915189064[3]
E-mail:- danielsyyoum101@gmail.com[1], abdirahman2018a@gmail.com[3]
Animal Feed & Nutrition Program, Livestock & Forage Research Directorate,
Somali Region Pastoral and Agro-pastoral Research Institute (SoRPARI) & Jigjiga University

Abstract

This activity was conducted at Gursum woreda of Somali Regional State of Ethiopia with the objective of demonstrating and pre-scaling up of feeding technological options for fattening beef cattle to model agro-pastoralists engaged in beef finishing at this woreda. A total of twenty agro-pastoralists (10 female and 10 male), each having at least five male Ogaden cattle breed with the same age (1.8-2 years) were selected from the agro-pastoralist herd groups have been selected to participate in this activity based on their previous engagement in fattening activities and their willingness to participate in the activity. The selected agro-pastoralists were randomly assigned to one group, while providing them with a supplementary feeding technological option made of ration constituting of Wheat bran (49.5%), Noug Cake (49.5%) and common salt (1%) for beef finishing group. Beneficiary agro-pastoralists, DAs and livestock experts were given trainings on improved small ruminant fattening techniques and feeding management of the experimental animals as awareness creation and capacity building. Experimental feed was introduced to beef cattle at 0.6kg/head/day with gradual increment within ten days period. Initial live body weights have been measured and recorded prior to the experiment and weight gains were monitored through fortnight live body weight measurement and recording for a period of sixteen weeks (56 days). Data were analyzed using ANOVA and GLM procedure of SAS (2002). There has been a significantly ($P<0.05$) different in mean live body weights before and after the experiment. The average initial body weight was 231.15kg whereas the average final body weight was 273.58 kg and the average total weights gain was42.43 kg. On the other hand, Average daily weight gains were 353.58g/*h/day and there were no significant difference ($P>0.05$) in final body weight and total weight gain between the entire agro-pastoralist group. The partial budget analysis shows that the average gross return and net return were the highest as compared to on-station with same breed. In this study highest additional profit (5,690.54ETB) and the highest net return of (2,860.25ETB/h/120days)on average was obtained from the beef fattening at on-farm conditions. Somali beef cattle's perform better when supplemented with concentrate after day time grazing.*

Keywords: *Demonstration, Pre-scale up, Beef, Fattening, Technologies.*

On-Farm Demonstration and Pre-Scaling Up of Black Head Somali Sheep and Long Eared Somali Goats Fattening Technologies to Attain Market Weight Under Semi-Intensive Feeding Systems in Gursum Woreda, SRS

Muhyadin Mohamed [1] Daniel Seyoum[2], Hassan Abdurrahman [3] and Ahmed A [4]
Tel: -+251915752889 +251920688458[1], , +251915189064[3]
E-mail:- danielsyyoum101@gmail.com[1]
Animal Feed & Nutrition Program, Livestock & Forage Research Directorate,
Somali Region Pastoral and Agro-pastoral Research Institute (SoRPARI) & Jigjiga University

ABSTRACT

This activity was conducted at Gursum woreda of Somali Regional State of Ethiopia with the objective of demonstrating and pre-scaling up of feeding technological options for fattening Black Head Somali Sheep and Long Eared Somali Goat yearlings to model agro-pastoralists engaged in small ruminant finishing at this woreda. Twenty model agro-pastoralists having ten BHS and LESG yearlings (Five from each spp) have been selected to participate in this activity based on their previous engagement in fattening activities and their willingness to participate in the activity. The selected agro-pastoralists were randomly assigned to two groups (i.e. BHS finishing group and LESG finishing group), while providing them each with a supplementary feeding technological option made of ration constituting of Wheat bran (49.5%), Noug Cake (49.5%) and common salt (1%) for BHS finishing group and a ration constituting of Wheat bran (24.5%), Noug Cake (74.5%) and common salt (1%) for LESG finishing group. Beneficiary agro-pastoralists, DAs and livestock experts were given trainings on improved small ruminant fattening techniques and feeding management of the experimental animals as awareness creation and capacity building. Experimental feed was introduced to BHS and LESG yearlings at 0.6kg/head/day with gradual increment within ten days period. Initial live body weights have been measured and recorded prior to the experiment and weight gains were monitored through fortnight live body weight measurement and recording for a period of eight weeks (56 days). Data were analyzed using ANOVA and GLM procedure of SAS (2002). There has been a significantly ($P<0.05$) different in mean live body weights before and after the experiment. The overall mean initial live body weights, final live body weights, total weight gains and daily weight gains were found to be 15.99±.34kgs, 24.15±.46kgs, 8.17±.31kgs and 14.09±.005gm of live weights, respectively. Accordingly, the economic benefits model agro-pastoralists obtained after selling their finished BHS & LESG was very high. Therefore; these two feeding technological options are recommended for scale up at larger scale.

Keywords: *Demonstration, Pre-scale up, BHS, LESG, Fattening, Technologies.*

ABSTRACTS FROM CROP RESEARCH DIRECTORATE

Adaptation Study of Released Haricot Bean (*Phaseolus vulgaris L.*) Varieties in Irrigated and Rainfed Areas of Somali Regional State, Ethiopia.

Abdikadir Sh/Abdurahman[1*]

[1]*Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia*

Corresponding Author: E-mail: cabdiqadirshekh19@gmail.com

Abstract

Haricot bean is an important source of protein, calories and cash for small holder farmers of Ethiopia. Studies on the evaluation of variety performance provide opportunities to increase productivity of haricot bean. therefore, the current study evaluates the performance of varieties on growth, yield and yield components of Haricot bean at two locations of Fafen and Dollo-ado station. The treatment consisted of six nationally released varieties. The experiments were conducted during 2021 and 2022 main cropping seasons at Fafen and Dollo-ado station, respectively. It was laid out in a randomized complete block design with three replications. Data on growth, yield and yield related parameters were collected and analyzed using GenStat software. The results showed that at Fafen station varieties had a significant effect on days to maturity, number of pods per plant, total biomass, 100 seed weight, and grain yield while at Dollo-ado station a significant variation on plant height, number of pods per plant, number of seed per pod and grain yield. The highest grain yield was recorded from Seri 119 (1484 kg/ha) and Seri 125 (2142 kg/ha) while the lowest grain yield was recorded from Awash-2 (680.6 kg/ha) and Awash-mitin (716 kg/ha) at Fafen and Dollo-ado station respectively. Accordingly, these two varieties are recommended for the study area and similar agro ecologies. If need arises for additional confirmation; further adaptation trials across more locations and years are of paramount importance.

Keywords: *Haricot bean, phaseolus vulgaris L. adaptations, varieties***.**

Evaluation of Soybean Varieties (Glycine Max L Meril), For Adaptation for Irrigated of Somali Regional State, Ethiopia.

Abdikadir Sh/Abdurahman[1*]

[1]*Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia*

Corresponding Author: E-mail: cabdiqadirshekh19@gmail.com

Abstract

Pulses and legumes in general are important staple crop for smallholders in Ethiopia. Achieving national food security and diversifying export earnings from agricultural products is one of the major challenges currently facing developing countries like Ethiopia. Pulse crops in general and soya bean in particular play great role in improving households' food security, increasing income for smallholder farmers. The process of plant growth and development is important to the successful adaptation of a species to its geographic and climatic environment. Evaluating the adaptability of released soybean varieties in diverse agro ecology is important for efficient use of nationally released varieties in their area of adaptation and thereby increases production and productivity of soybean in the country. The trial was conducted with 5 released soybean varieties in the year 2022 main cropping season at Dollo-ado and Jarati research station, Eastern parts of Ethiopia. The experimental design used was RCBD with three replications. The parameters collected include; days to emergency, days to flowering, days to maturity, plant height, number of pods per plant, number of seed per plant, hundred seed weight, biomass yield and grain yield. Combined analysis of variance (ANOVA) showed significant variability among varieties for some of the parameters studied such as days to flowering, thousand seed weight, biomass yield and grain yield. The varieties Pawe-02 and Pawe-03 were found to be high yielding varieties with mean grain yield levels of 2195 and 1890 kg/ha-1, with combined mean yield of 1972 and 1978 kg/ha respectively at Dollo-ado and Jarati research station. Therefore, these two varieties are recommended for production in the study area and similar environments.

Keywords: Soybeans, Varieties, Ecology, Adaptation and grain yield

Multi-Locations adaptability study of Soybean (Glycine Max L. Merill) Varieties in Irrigated areas of Somali regional state, Ethiopia

Abdikadir Sh/Abdurahman[1*]

[1]*Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia*

Corresponding Author: E-mail: cabdiqadirshekh19@gmail.com

Abstract

*Soybean (Glycine max) is one of the most valuable crops in the world, due to its multiple uses as a source of livestock and aquaculture feed, protein and oil for the human diet. Field experiments were conducted at Godey and Kelafo research station to evaluate the adaptation of six soybean varieties for the last two years of (2021 and 2022) to this agro-ecological zone. The varieties were Pawe-01, Pawe--02, Pawe-03, Gizo, Gazale and Tefatch. The parameters collected and analyzed include Days to 50% emergency, Days to 50% Flowering, Days to 90% maturity, plant height, number of pods per plant, number of seed per pod, biomass yield (kg/ha) and grain yield (kg/ha). The statistical analysis performed on combined data showed that varieties and location had significant differences ($p < 0.05$ and $P \leq 0.001$) on all the studied parameters. year showed Highly significant for all studied parameters, except Days to 50% emergency and number of pods per plant. Genotype by environment interaction showed a significant difference except plant height and grain yield. Year*location showed a significant variation for all parameters, except Days to 50% Flowering and number of pods per plant. Year * location * genotype was highly significant only on Days to 50% emergency and maturity. significantly higher mean value of grain yield and stability was recorded from Pawe-03 (1539 kg/ha) and Pawe-02 (1372 kg/ha). According to these varieties are recommended for the study areas and similar agro ecologies. Therefore, these varieties can be promoted in farmers' field evaluation and demonstration.*

Keywords*: Soya bean, varieties, adaptability, grain yield, GGE-biplo*t

Haricot Bean (Phaseolus vulgaris L) Adaptability and Performance Evaluation at Shabelle zone of Somali regional state, Eastern Ethiopia

Abdikadir Sh/Abdurahman[1*]

[1]*Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia*

Corresponding Author: E-mail: cabdiqadirshekh19@gmail.com

Abstract

*Haricot bean (Phaseolus vulgaris L.) is one of the most important food legumes of Ethiopia and it is considered as the main cash crop and the least expensive source of protein for the farmers in many lowlands and mid altitude of the country. Low production and productivity, which is mainly associated with lack of access to improved varieties, was one of the major problems in haricot bean production. A field experiment was conducted at Godey and Kalafo research stations in Shabelle zone of Somali Regional State during 2021 and 2022 cropping season with the objective of to select and recommend the best adapted haricot bean varieties in the study areas. Six haricot beans (Phaseolus vulgaris L.) varieties were evaluated. The trial was laid out in the randomized complete block design with three replications. Combined analysis of variance (ANOVA) showed significant variability among varieties, locations and year for all the parameters studied. The genotype*environment interaction showed significant differences among treatments like number of pods per plant, number of seed pods per plant, biomass yield and grain yield. Variety*year showed the presence of significant differences for all the studied traits. Location*year*varieties showed highly significant differences only on Number of pods per plant and grain yield. The varieties Seri119 and Seri125 were found to be high yielding varieties with mean grain yield levels of 1960 and 1821 kg/ha-1, respectively. Therefore, these two varieties are recommended for production in the study area and similar environments.*

Keywords*: Haricot bean, grain yield, Variety, Evaluation*

Performance Evaluation of three Improved Mung Bean (*Vigna radiata L.*) Varieties for growth and yield in Somali Region, Eastern Ethiopia

Abdikadir Sh/Abdurahman[1*]

[1]*Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia*

Corresponding Author: E-mail: cabdiqadirshekh19@gmail.com

Abstract

Mungbean (Vigna radiata (L.) Wilczek) is an important source of nutrients and income for smallholder farmers in dry-land areas of the country and in the study area. However, the productivity of the crop is constrained by biotic and abiotic factors, mainly lack of adaptable varieties, and peer agronomic practices. The experiment was conducted at Godey, Kalafo, Dollo-ado and Jarati of Somali regional state on station during the main cropping season under irrigation with the objective to investigate and select the best adapted mung bean variety for the study area. The experiment consisted of three mung bean varieties arranged in Randomized Complete Block Design (RCBD) with three replications. The genotype and environment main effects and genotype x environment interaction effect were significant on mung bean varieties. AMMI model shows varieties accounted 103.75%, GXE 17.42%, environment 6.12% of the total variation. The high percentage of varieties is an indication that the major factor that influence yield performance of soybean in the study area is the varieties. The first two IPCAs are the most accurate model that could be predicted the stability of the genotype and each explained 23.92% and 4.43% respectively of the total variation in GEI. According to the Combined mean yield and stability analysis revealed that NVL-1 variety is the most stable varieties and high yielding across test location. Therefore, NVL-1 was recommended for production in the study area and similar agro-ecologies.

***Key words**: haricot bean, Genotype by Environment Interaction, grain yield, AMMI, GGE-Biplot*

Survey of Disease and Insect Pests of Cultivated Fruit and Vegetable Crops in Siti, Shebelle and Fafan Zones of Somali Regional State

Tadeos Shiferaw* and Hassan Isken

Somali Regional Pastoral and Agro pastoral Research in Institute (SoRPARI), Somali Region Jigjiga, Ethiopia.

Corresponding E-mail: tadu1352@gmail.com

Abstract

The survey aimed at identifying and recording disease and insect pests that attack fruit and vegetable crops grown in three irrigation areas namely Siti, Fafen and Shebelle zone of Somali region was conducted. Totally eleven insect pests and seventeen diseases identified and recorded from three key vegetable crops grown in four districts of Somali regional state namely Godey, Gursum, Shebelley and Erar woredas. The highest disease incidence was receded from onion which is onion purple blotch across all location where the highest 64.47% were recorded from the Sheblle zone followed by Siti and Fafan zone 56.5 and 55.12% respectively. According to the result twelve disease and sixteen insect pests were identified and reordered from five major cultivated fruit crops in surveyed districts. The highest disease prevalence 100% was recorded from Siti zone fruit orchards for Anthracnose, Canker, Phytophtorarot and Dieback. The average higher fruit disease incidence 39 % was recorded from the dieback of citrus lowest was recorded from Citrus sudden death 1.7% among different locations. Majority of identified and recorded disease and insect pests were belonged to citrus fruits. Similarly, among major disease recorded from vegetables disease such as onion purple blotch, downy mildew and tomato leaf spot are major ones. The findings of current study could be useful as a baseline for further research on management of specific insect pests and disease on major cultivated fruit and vegetable crops.

Key Words: *identifying; recording; disease and insect pests of; fruit and vegetable crops*

Screening of potato Germplasms for Heat Stress at lowland, Fafen, Somali Region, Ethiopia

Abdikadir Sh/Abdurahman[1*]

[1]*Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia*

Corresponding Author: E-mail: cabdiqadirshekh19@gmail.com

Abstract

Potato is an important food security crop and a major source of household income for smallholder farmers in Ethiopia. Potato (Solanum tuberosum L.) produces more nutritious food on less land with time, but the production in lowland areas is limited by the temperature. The production of potato at lowland areas demands to develop heat tolerant cultivars adaptable specific to high temperatures. thus, it is very important to evaluate such genotypes, which have high yield potential and are suitable to our local environmental conditions. A field experiment was conducted at Fafen Research Station, during 2021 and 2022, to evaluate the performance of fifty potato genotypes for plant, and tuber yield characters. The experiment was laid out in a randomized complete block design with three replications. The genotypes and year showed highly significant difference for all the traits except flowering and days to maturity. The interaction between genotypes and years revealed significant differences in all the studied parameters except days flowering, maturity, plant vigor and plant height. Genotype CIP312923.522 and CIP312906.575 produced more marketable tubers for category I and II (>80g and >30g tuber[1]) and total tuber yield than all other genotypes respectively. Thus, the genotypes are recommended to be promoted to variety verification trial in the coming year for further evaluation at on-farm and on-station in the study area and similar agro ecologies.

Keywords: *screening, heat tolerance, germplasm, potato, yield*

Adaptability and Performance Evaluation of Hot Pepper (capsicum species) varieties for Growth and Pod Yield in Dollo-ado district, Somali region, Ethiopia

Abdikadir Sh/Abdurahman[1*]

[1]*Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia*

Corresponding Author: E-mail: cabdiqadirshekh19@gmail.com

Abstract

Hot pepper is one of the most important vegetables and spice crops cultivated in many parts of the country. Despite its economic, nutritional, and medicinal purposes, no research was done so far on this crop in the study area. Therefore, this study was initiated to investigate the performance of different varieties of hot pepper for growth and green pod yield at the study area. a field experiment was carried out in Dollo-ado, Eastern Ethiopia during 2021. The experiment was laid out in a randomized complete block design with three replications. Treatments included five hot pepper varieties (Melka Zala, Melka Awaze, Melka Shote, Oda Haro and Kume) varieties against one Commercial variety (HarbadF1)). Analysis of variances (ANOVA) revealed that varieties differed significantly (P≤0.05) in number of branches per stem, fruit diameter, fruit length, number of pods per plant, marketable green pod yield, un-marketable green pod yield and Total green pod yield but had no significant effect on days to first harvest and number of flowers per plant. As a result, the highest number of branches per stem attained was from Kume, while the highest number of pods per plant was recorded in Oda haro. The highest fruit length attained was from Melka awaze variety. On the other hand, the widest fruit diameter was recorded at HarbadF1 varieties; where the thinnest fruit size of was attained at Melka Shote. the highest marketable green pod yield(kg/ha) of hot peppers was recorded in Oda haro, Melka Shote, and HarbadF1 respectively. The highest un-marketable green pod yield(kg/ha) observed was from Kume variety; while the lowest was from Oda haro variety. the highest total green pod yield was exhibited by Oda haro (5033kg/ha) followed by Melka Shote (4183 kg/ha) variety. So, varieties Oda haro and Melka Shote were high yielder under the study area, so it would be highly recommended under irrigation conditions at Dollo-ado as well as similar growing vicinity. Since this study was done one seasons at one location; it would be advisable to conduct further research across location and year.

Keywords: *adaptability, Hop pepper, green pod yield.*

Adaptation Trail of Improved Hybrid Maize (Zea Mays L.) Varieties under Rain fed and Irrigation Condition in SRS.

Yohannes Seyoum, Khalid Ibrahim, Abdi Hussen

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: yohanes1195@gmail.com

Abstract

Maize is one of a major crop in Ethiopia in production, consumption and income generation for both resource constrained men and women. Although, productivity of maize in Ethiopia is showing increment in recent years, productivity in Somali region is still low compared to the national and regional average. The experiment was conducted at lowland areas of Somali region namely Godey and Dollo-ado research station in 2019/20 cropping seasons. The study was done with the objectives to evaluate the performance of hybrid maize varieties for their adaptability, high yielder and to recommend variety/ies for the study areas and similar agro-ecologies. The experiment was conducted with Randomized Complete Block Design with three replications. There was significance variation in hybrid maize varieties for the traits evaluated. The highest mean grain yield (7116.45 and 5884.44 kg ha-1) was obtained from variety MH140 in both Jigjiga, and Dolo-ado. Respectively. Besides, variety BH546 had no statistical difference from high mean grain yield recorded variety MH140 in Jigjiga and it also had no statistical difference from low mean grain yield recorded variety Melkasssa 2 in Dolo-ado. Thus, it can be concluded that hybrid maize varieties MH140 resulted the highest yield across location followed by BH546.22 and BH547. Therefore, variety MH140 were selected for both locations and variety BH546.22 and BH547 were selected as second alternative recommendation for Jigjiga and Dolo ado locations, respectively. Therefore, for sustainable maize production in the study area these varieties had been recommended and need to be demonstrated with local varieties to users along with their improved production packages.

Keywords: hybrid maize, adaptability, grain yield

Adaptation Trail of Improved Hybrid Maize (Zea Mays L.) Varieties under Irrigation Condition in Godey Woreda, Shabelle Zone, Somali Regional State (SRS), Ethiopia

Hassen Iskeen, Abdikadir Shekh Abdurahman

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: hassennour99@gmail.com

Abstract

Six Maize genotypes were planted in RCBD with three replications with plot size of 22.5 m^2 (5m length x 4.5 width) with inter-row and intra-row spacing's of 0.75 m and 0.25 m, respectively, by furrow irrigation to evaluate adaptation performance of Maize genotypes and identify high yielding and heat tolerant genotypes adapted to Godey in order to enhance the net national crop production in general and product diversification in Godey in particular in the near future. The analysis of variance showed that genotypes included in the test differed highly and significantly at (p=0.05) probability level for all traits, except days to 50% emergence. Maize grain yield mean value comparison or mean separation result indicated that the genotype BH-547 is superior compared to others with 44.22 quintals grain yield per hectare followed by BH-546 and BH-5661 genotypes with 41.91 and 40.37 quintals grain yield per hectare value. Based on the productivity standard the superior genotype BH-547 scored 47.4% yield advantage over the national (30 qt/ha) maize average productivity.

Keywords: varieties, adaptation, and performance

Evaluation of adaptability and yield performance of quality protein maize (*Zea mays* l) varieties at Hadegala district of Siti zone, Somali regional state, Ethiopia

Tadeos Shiferaw

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: tadu1352@gmail.com

Abstract

The experiment was conducted on SoRPARI research farm at Hadegala research center which is located at Hadegala woreda of Siti zone Somali region state eastern Ethiopia. The study was performed to evaluate of adaptability and yield performance of maize varieties. The treatment consisted of five improved varieties namely Melkassa 2, MH 138 Q, Melkassa 6Q and MH 140 were planted on (4.5m x 7.5m) plots at spacing of 75 cm x 25 cm. The experiment was laid in RCBD with three replications. Data on plant height, Number of ear plant/plant, 1000 grain weight and grain yield were recorded. The analysis of variance showed that there were highly significant (P<0.01) differences among varieties for grain yield, biomass and other parameters among maize varieties. The highest plant height of 202 cm was recorded from MH 138 Q. The variety MH 138 Q gave the highest grain yield (1022 kgha^{-1}). Thus, variety Melkassa 2 was superior in terms of bio mass yield yielded 464 kg/ha. It is, therefore suggested that since the study is a single season experiment for the area to have reliable data on maize varieties the experiment must be repeated by including other promising varieties.

Keywords: quality protein maize, grain yield evaluation, varieties

Grain yield evaluation of quality protein maize in Gode and Babile districts of Somali region

Yohannes Seyoum, Khalid Ibrahim, Abdi Hussen

Somali region pastoral and agro-pastoral research institute (SoRPARI), jigjiga, ethiopia

Corresponding Author: E-mail: yohanes1195@gmail.com

Abstract

A field experiment was conducted at the research centers representing the lowland districts of somali region, eastern Ethiopia using six quality protein maize varieties during 2018 and 2019 main cropping season. The study was envisaged to assess the adaptability of six quality protein maize varieties at Godey and babile district. The field experiment was laid out in a Randomized Complete Block Design (RCBD) with two replications for 2019 on The gross plot size was 25m^2 (5m x 4.5m) and net plot size 15m^2 (5m x 3m). The combined analysis of variance revealed that, there was highly significant difference among the test varieties for mean grain yield. Results revealed that Melkassa-2, Melkassa 1Q and Melkasa 6Q showed to be best performing variety across locations Therefore, based on nutrition aspect and due to variety and location interaction, varieties were recommended on location base. Thus, variety Melkassa 1Q for Jigjiga and Dolo-ado; Melkassa 6Q for Gode and Dolo-ado were recommended.

Keywords: quality protein maize, grain yield, evaluation

Adaptation Trial of Improved Sorghum Varieties Under Irrigation in Kallafo Woreda, Shabelle Zone, Somali Regional State (ESRS), Ethiopia

Hassen iskeen, Abdikadir Shekh Abdurahman

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: hassennour99@gmail.com

Abstract

Five sorghum *genotypes were planted in RCBD with three replications with plot size of 11.25m^2 (3m length x 3.75m width) with inter-row and intra-row spacing's of 0.75 m and 0.25 m, respectively, by furrow irrigation to evaluate adaptation performance of* sorghum *genotypes and identify high yielding and heat tolerant genotypes adapted to Kallafo in order to enhance the net national crop production in general and product diversification in Kallafo in particular in the near future. The analysis of variance showed that genotypes included in the test differed highly and significantly at (p=0.05) probability level for days to 50% emergence, days to 90% maturity, plant height, head weight, thousand kernel weight, grain yield. Sorghum grain yield mean value comparison or mean separation result indicated that the genotype ESH-1 is superior compared to others with 32.00 quintals grain yield per hectare followed by melkam genotype with 31.11 quintals grain yield per hectare value. Based on the productivity standard the superior genotype ESH-*1 *scored 52.38% yield advantage over the national (21 qt/ha) sorghum average productivity.*

Keywords: Sorghum, Grain Yield, Varieties

Adaptability Evaluation of Recent Released Bread Wheat Varieties in Somali region State, Eastern Ethiopia.

Yohannes Seyoum, Khalid Ibrahim, Abdikadir shekh Abdurahman

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: yohanes1195@gmail.com

Abstract

*Wheat is one of the major staple crop in Ethiopia in terms of both production and consumption. Even though it is such an important cereal crop in Ethiopia, it gives low yield due to many production constraints such as lack of improved varieties, poor agronomic practice (inappropriate seeding rate and row spacing), diseases, weeds and low soil fertility in Ethiopia in general and in Somali region in particular. Therefore, field experiment was conducted during the 2019 main cropping season at Godey to select high yielding bread wheat varieties for irrigated areas of Somali region. The experiment was laid out RCBD in a factorial arrangement with three replications using four wheat varieties Fentale-1, Fentale-2, Amibare-1 and Amibare-2 as a test crop. Analysis of the results revealed that all considered parameters were significantly (P<0.05) affected by varieties. The highest maturity date was recorded from Fentale-1 (*83.0) while the lowest maturity date (78.00 days) was obtained from *Fentale-2. variety Fentale-2) had highest TSW (26.67gm), while Variety Amibara-1 had the lowest TSW (21.67gm). The highest grain yield (*34.99 *and* 29.17 *qt/ha), was obtained from Amibara-2 and Fentale-2. Therefore, Variety 'Fentale-2' and 'Amibara-2" were selected by their high grain yield and other agronomic performance from tested varieties under irrigated condition in lowland area*

Keywords: bread wheat, grain yield, adaptation

Performance evaluation of released bread wheat varieties at Hadegala District of Siti zone, Somali Regional State, Ethiopia

Tadeos shiferaw

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: tadu1352@gmail.com

Abstract

Study was conducted at Hadegala woreda woreda sitizone of Somali regional state Gabi research center to evaluate the performance and yield of six released bread wheat varieties. Study was conducted by involving six varieties including Amibara, Fantale 1, Fantale 2 Werer1, Pavon and Dunada and Kingbird were used as testing materials were tasted in RCBD. The analysis of variance (ANOVA) indicated presence of highly significant differences at (P≤0.01) among the evaluated bread wheat varieties on crop penology, grain and biomass yield of bread wheat. Grain yield was highly significantly (P<0.05) due to varieties. The maximum grain yield (6667 kg/ha) was recorded for variety Amibara2, followed by variety Dunda (6111 kg/ha). Similarly variety Fentale 1 and Fental 2 had similar grain yield 5833b kg/ha. The lowest grain yield was recorded from Kingbird which was 723 kg/ha. The result in Table 2 also indicted intermediate grain yield obtained from 4722 kg/ha warer2 and 5000 kg/ha and pavone 76. There was also significant difference on biomass yield of the varieties at P< 0.05. The value of biomass of varieties ranges from 3333.3 to 10666.7 kg/ha. The highest biomass recorded in the present study was 10666.7 kg/ha from variety Dunda, and the lowest biomass recorded was 3333.3 kg/ha from Amibara 2 variety. Related biomass yield range was reported by Adhiena (2015). However Amibara 2 and Kingbirsd produced the lowest yield with 3333.3 and 5555.3 kg/ha respectively. Current finding corroborates with Kifle et al, (2017) reported maximum above ground biomass of 10491.7 kg/ha with current finding 10666.7 kg/ha. Current study finding indicated promising varieties for grain yield and biomass has been identified. However since this is single season single location trail to find reliable data on bread wheat varieties the trail must be repeated.

Keywords: bread wheat, grain yield, adaptation

Quality Protein Maize Adaptation Trial in Kelafo Research Station of Somali Region

Yohannes Seyoum, Abdi Hussen, Abdirahman Osman

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: yohanes1195@gmail.com

Abstract

Lack of improved maize variety is the most important limiting factor in different parts of Ethiopia for maize production and productivity. The experiment was conducted on two quality protein maize varieties against two checks Melkassa-2 and local check at Kelafo research sub-sites of Godey Research Center (HSARC) for 2020 cropping season to identify and recommend high yielding varieties for Kelafo and similar agro-ecologies of Somali region. The seeds were planted in Randomized Completed Block Design (RCBD) with three replications in which gross plot size was 25m^2 (5m x 4.5m) and net plot size 15m^2 (5m x 3m). Agronomic traits viz. days to Maturity, biomass yield and grain yield were collected and analyzed. Analysis of variance revealed significant difference among varieties for most observed traits. Local variety recorded highest number of days to maturity while the lowest number of days to maturity was recorded from Melkassa 2. The highest biomass yield (kg/ha) were from Melkassa 2 which was at par with MHQ138 and Melkassa 6Q. the highest yield was obtained from Melkassa 2 followed by MHQ138 and Melkassa 6Q. Therefore, based on nutrition aspect, varieties Melkassa-6Q and MHQ138 were recommended in the study area and similar area.

Keywords: varieties, quality protein maize, grain yield, adaptation

Performance evaluation of Improved Hybrid Maize varieties for grain yield in Kelafo, Somali region, Ethiopia

Yohannes Seyoum, Abdi Hussen, Abdikadir Shekh Abdurahman

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: yohanes1195@gmail.com

Abstract

Lack of improved maize variety is highly affecting its production in different parts of Ethiopia due to inaccessibility. Lowlands of Somali region is one of such areas where the technologies are not widely addressed and adopted so far. This study was conducted by Kelafo agricultural research sub-center with the objective of selecting and recommending adaptable high yielding quality protien maize varieties for low land agro-ecologies of Somali region. The experiment was done at Kelafo research sub-center during 2020 cropping season. Four released hybrid maize varieties with two checks were evaluated in RCBD design with three replications with net plot size was 15m^2 (5m length x 3 width). All phonological and yield data were collected subjected to analysis using GenStat software. Data analysis was used to test the performance of the varieties across the testing locations. The result of the study shows that, all varieties revealed significant difference for the selected characters. Based on the obtained result, two hybrid Maize varieties (BH549 and BH661) were early maturing. The highest biomass yield was recorded from BH549, BH661 and BH547 *and gave higher yield. Therefore, BH549 and BH547 varieties were selected and recommended in the study area and similar agro-ecology zone in the region.*

Keywords: varieties, hybrid maize, grain yield, adaptation

Adaptability of Food-Feed Root Crop, Sweet Potato (*Ipomoea batatas* L) In Fafen, Kelafo, Jerati and Dolo Ado District of Somali Regional State, Ethiopian

Takele Dejene

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: tekeyafet@gmail.com

Abstract

Sweet Potato (Ipomoea batatas L) is the seventh most important food crop in the world. In Ethiopia, sweet potato is among important root crops cultivated in different parts of the country. The adaptability of four nationally released sweet potato viz., Awassa 83, Awassa 09, Kulfo and NASpot-12 varieties were studied at Gode, Kelafo, Jerati and Dolo Ado districts at on stations, Somali region. In both areas the experiment carried out in Randomized Complete Block Design (RCBD) in three replications. The vine length of 30 cm planted on plots 3.75 width x 3 length (11.25 m^2) with 1 m and 1.5 m space between plots and replication, respectively. The distance between rows and plants maintained at 75 and 30 cm, respectively. The cutting were planted nearly horizontal with two third (20 cm) of the length placed in the soil, while one-third (10 cm) remaining above the soil surface. All agronomic management recommended for sweet potato applied. The highest tuber yield obtained from NASpot-12 (45.15 t/ha) followed by Awassa09 (44.09 t/ha) and Awassa 83(37.79 t/ha). The Kulfo, orange flesh tuber variety gave the lowest tuber yield tone per ha 24.83, 25.31, 26.94 and 31.43 in Grusum, Kelafo, Jerati and Dolo ado, respectively. In recommendation, all tested variety including Kulfo will be promoted to end users of respective location.

Keywords: Sweet potato, white flesh, orange flesh

Evaluation of Cotton varieties for seed and tint yield in Godey of Somali Regional state, Eastern Ethiopia

Yohannes Seyoum, Abdikadir shekh Abdurahman, Abdirahman Osman

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: yohanes1195@gmail.com

Abstract

The experiment was conducted at Godey Research Center during 2020 main cropping seasons with the objective to identify adaptable and high yielding cotton varieties for Somali region. Six released cotton varieties were used as a planting material. The experiment was laid down in Randomized Complete Block Design (RCBD) with three replications and 5m x 4.5m gross plot size and 5m x 2.7m net plot size were used. The distance between rows and plants was 90cm and 20cm, respectively. Planting depth was maintained between 3-5 cm. Data on seed cotton yield (kg ha -1) and lint yield (kg ha $^{-1}$), were collected and analyzed. The anaylsis of result revalead that There was significant difference among varieties in terms of seed and lint yield traits. The highest seed cotton yield and lint yield were obtained from Werer-50 and Weyto-07. Therefore, variety Werer-50 and Weyto-07 are recommend by their high performance of cotton seed and lint yield in the study areas as well as similar agro-ecological zone.

Keywords: seed yield, lint yield, varieties, cotton

Response of Sesame (Sesame Indicum L.) Varieties to Different Sowing Dates in Lowland Irrigated Areas of Somali Region, Ethiopia.

Omar Hassan, Abdikadir Shekh Abdurrahman

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: omerhassen780@gmail.com

Abstract

A field experiment was conducted to investigate the yield performance of four sesame varieties in different sowing dates to determine optimum sowing date on performance of improved sesame varieties for lowland irrigated areas of Somali region. The experiment was laid out in randomized completely block design (RCBD) with three replications. In each location Iidan, Barsan, Kelafo and Serkamo sesame varieties and four sowing date (in mid-April, late April, mid-May, and late May) were used as treatments. These research findings showed that the sesame varieties and sowing dates were significantly differed in yield related traits. The variety Idan (ACCOO44) recorded maximum number of capsules per plant (37.75) and Biomass yield (2489kg/ha) and kelafo variety recorded the maximum number of seeds per capsule (53.0), thousand seed weight (2.23g) and grain yield (2216kg/ha). On the other hand, the plots sown on mid April scored highest number of capsule per plant, number of seeds per capsule, thousand seed weight(g), biomass yield(kg/ha) and grain yield(kg/ha) comparing to the other sowing dates. So the present research work recommends that the two varieties, Kelafo and Idan (ACCOO44) should be sown on mid April to earn higher grain and biomass yield in the study areas.

Key words: Biomass yield, Grain yield, Sesame, Sowing dates.

Study on the Effect of Inter-Row Spacing and Seed Rate on Yield and Yield Components of Rice in Irrigated Ecosystems in Somali Region.

Omar Hassan, Abdikadir shekh Abdurrahman

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: omerhassen780@gmail.com

Abstract

A field experiment was conducted in Godey research center, eastern Ethiopia in 2019 years to study to investigate the effect of seeding rate and interrow spacing and their interactions effects on yield and yield components of rice under irrigation in Somali region. The treatments were four levels row spacing (10, 20, 25, and 30 cm) and four seed rates (60, 80, 100 and 120 kgha^{-1}) was tested. The experiment was laid out in RCBD in factorial arrangement with three replications using a rice variety known as 'Nerica-1' as a test crop. The analysis showed that almost all parameters studied were significantly ($P<0.05$ and $P<0.01$) affected by the main effect of spacing and seed rate. The highest number of effective tillers (12 and 12.37) was observed at seed rate of 60 kgha^{-1} and 30cm respectively. The maximum plant height was recorded (78.47 and 82.32cm) at seed rate and spacing of 120 kg ha^{-1} and 30cm respectively. The longest panicle length(22.73cm) was recorded from 10 cm inter-row spacing whereas the shortest panicle length(20.26cm) was recorded from inter-row spacing of 30cm. The highest number of filled grains per panicle (38.59 and 45.28) was found at seed rate and inter-row spacing of 60 kg ha^{-1} and 30cm. Highest thousand seed weight (30.73 g) was obtained from the interaction effect of seed rate of 80 kg ha-1 at 30cm of row spacing. Maximum straw yield (6172 kgha^{-1}) was produced at seeding rate of 120kg ha^{-1} while minimum straw yield (3694kg ha^{-1}) was produced at seeding rate of 60kg ha^{-1}. The highest grain yield (3624 kgha^{-1}) was obtained from seeding rate of 100 kg ha^{-1} at 30cm inter-row spacing and the lowest grain yield was 2630kgha^{-1} obtained from seeding rate of 120 kg ha^{-1} at 10cm inter-row spacing. Therefore, using a seeding rate of 100 kg/ha combine with inter-row spacing of 30 cm can be recommended to obtain maximum rate of return for rice in the above-mentioned study area.

Keywords: Rice, inter-row spacing, seed rate, grain yield

Survey of Major Arthropod and Disease Pests of Cereals and Horticultural crops in four Districts of Somali Regional State

Takele Dejene

Somali region pastoral and agro-pastoral research institute (SoRPARI), Jigjiga, Ethiopia

Corresponding Author: E-mail: tekeyafet@gmail.com

Abstract

Pest survey was conducted to assess and identify major crop pests (insects and disease) of cereal and horticultural crops during 2020 and 2021 in four districts viz., Gursum, Gode, Berano and Kelafo. The four districts situated in different agro-ecologies with altitudes ranging from 350 to 1568 meters above sea level (m.a.s.l.). Pests were assessed both on plants at research on station and farmers field. Tomato, onion, pepper, okra, water melon and oranges, lemon, papaya, mango were grown in surveyed districts. Sorghum and maize are the dominant cereals in all districts. The survey revealed the occurrences of different economically important arthropods (insects and mites), and diseases on plant at on station and farmers field. Arthropods includes red spider mites, tomato leaf miner (Liriomyza spp.), white flies (Bemisia spp.), Aphids, mealy bugs, thrips, stem borers, fall armyworm, termites, and diseases such as Leaf curl, powdery mildew, purple blotch were recorded on plants in survey locations. The incidences and severity of pests varies across the districts.

Keywords: Cereal, vegetable, fruit, insect, mite and diseases

ABSTRACTS FROM FOOD SCIENCE AND NUTRITION RESEARCH DIRECTORATE

Proximate and Functional Properties of Different SORGHUM Varieties Produced in Somali Regional State Ethiopia

Abdulkarim Mohammed Ali[1], Hoodo Mohamed Jama[2],

adnanbdu302@gmail.com, hoodoqali042@gmail.com

Somali Region Pastoral and Agro-Pastoral Research Institute, Food Science and Nutrition Research Directorate. Jigjiga, Ethiopia.

Abstract

Sorghum is one the staple food or crop that widely consumed in Somali community. The study was conducted in Somali Regional state with objective to analyze proximate, functional and physical of different sorghum varieties produced in Somali reginal state. Six different types of samples such as Dekeka, AdoKaye, ESH-1, Melkam, ASSO-1 and JLM control as control sample were collected. The collected sorghum samples were individually grounded to a fine powder (30 mesh size), packed in air tight polyethylene plastic bags and were stored at 4°C until further analysis. Proximate composition such as crude Protein, crude Fat, crude fiber, moisture content, carbohydrate, total energy, different minerals like Calcium, Iron, Magnesium and Total phosphorous were determined by AOAC. The functional and physical properties of the sorghum were determined different standard procedures. Based on the result all locally adapted those sorghum varieties adapted by the Somali region research institute were better in both macro and micro nutrients especially when it comes fiber, total ash, moisture content as compared to the control sample with brand name JLM control which imported from abroad. All sample's protein content is very low which in the range 5.23 to 6.50%. There is significant different in different components of sorghum between different varieties at $p<0.05$. Significance difference were also observed at $p<0.05$ in minerals content such as Calcium, zinc, iron and Total Phosphorous. The functional and physical properties of different sorghum varieties under study are almost not significantly different at $p<0.05$. Overall, from the finding we conclude that, almost all locally adapted sorghum varieties have better in nutritional content especially moisture, ash and fiber and very poor in protein content. Therefore, all actors on sorghum should apply fortification especially bio-fortification to enhance the nutrient content in particular the protein content as sorghum is one of the staple crops in Somali region.

Key words: *Sorghum, Proximate composition, Functional Properties, Physical properties.*

Macro and Micro-Nutrient Analysis of Different SESAME Varieties Produced/Adapted Under SoRPARI in Somali Regional State

Abdulkarim Mohammed Ali[1], Hoodo Mohamed Jama[2]

adnanbdu302@gmail.com, hoodoqali042@gmail.com

Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI), Food Science and Nutrition Research Directorate. Jigjiga, Ethiopia.

Abstract

The study was conducted in Somali Regional state with objective to analyze the macronutrient and micronutrient (minerals) content of different sesame varieties produced in Somali reginal state. Five different types of samples such as Idaan, Adi, Barsan Local and JLM control as control sample were collected. The collected sesame samples were individually grounded to a fine powder (30 mesh size), packed in air tight polyethylene plastic bags and were stored at 4°C until further analysis. Proximate composition such as crude Protein, crude Fat, crude fiber, moisture content, carbohydrate, total energy, different minerals like Calcium, Iron, Zinc and Total phosphorous were determined by AOAC. Based on the result all locally adapted those sesame varieties adapted by the Somali region research institute were better in both macro and micro nutrients especially when it comes fiber, protein, total ash, moisture content as compared to the control sample with brand name JLM control which is purchased from Jigjiga local market. Fat content is exceptional which means the control sample has high amount fat as compared to samples. There is significant different in different components of sesame between different varieties at $p<0.05$. Significance difference were also observed at $p<0.05$ in minerals content such as Calcium, zinc, iron and Total Phosphorous. Overall, from the finding we conclude that, almost all locally adapted and the control sesame varieties have better in nutritional content especially moisture, ash, protein fat, and fiber and very poor in carbohydrate content. Therefore, all actors should engage in mass production of sesame with improved varieties so as to get more income and currency from abroad.

Key words: *Sesame, macronutrient composition, micronutrient composition, oil content.*

PHYSICOCHEMICAL PROPERTIES, PROXIMATE AND FUNCTIONAL PROPERTIES OF DIFFERENT RICE VARIETIES PRODUCED/ADAPTED UNDER SOMALI REGION AND IMPORTED RICE

ABDULKARIM MOHAMMED[1], MOHAMMED DOL[2], HODO MOHAMED JAMA[2], HODO MOHAMED2

1. Somali Region Pastoral & Agro-Pastoral research institute, Food Science and Nutrition Research Directorate.
2. Somali Region Pastoral & Agro-Pastoral research institute, Food Science and Nutrition Research Directorate.

Abstract

Rice is one the staple food or crop that widely consumed in Somali community. The study was conducted in Somali Regional state with objective to analyze proximate, functional, physical and cooking qualities of different rice varieties produced in Somali reginal state. Six different types of samples such as Nerica 14, Nerica4, Nerica 2, Gode 1, Shabele 1 and Sukeyna as control sample were collected. Only whole rice grains without any physical damage or insect infestation were selected for analysis. The collected rice samples were individually grounded to a fine powder (30 mesh size), packed in air tight polyethylene plastic bags and were stored at 4°C until further analysis. Proximate composition such as crude Protein, crude Fat, crude fiber, moisture content, carbohydrate, total energy, different minerals like Calcium, Iron, Magnesium and Total phosphorous were determined by AOAC. The functional and physical as well as cooking quality of the rice were determined different standard procedures. Based on the result all locally adapted rice varieties were better in both macro and micro nutrients especially Nerica 14, Nerica 2, and Gode 1 as compared to the control sample with brand name SUKEYNA which imported from abroad. The protein content ranges from 10.41% to 14.54%, while the ash content ranges from 0.51% to 1.25%. The same is true with other parameters such carbohydrate, crude fat, total energy too. There is significant different in different components of rice between different varieties at $p<0.05$. Significance difference were also observed at $p<0.05$ in minerals content such as Calcium, Magnesium, iron and Total Phosphorous where Nerica 14 had highest in almost all minerals content. The functional and physical properties of different rice varieties under study also significantly different at $p<0.05$. Overall, from the finding we conclude that, all locally adapted rice varieties have better in nutritional content both macro and micro -nutrient and also better in functional as well as physical properties. Therefore, all actors of rice should contribute the promotion as well large-scale production of these adapted rice varieties in order to substitute the imported rice from abroad.

Key words: Rice, Proximate composition, Functional Properties, Physical properties, Cooking time.

PROXIMATE COMPOSITION ANALYSIS OF DIFFERENT MAIZE VARIETIES ADAPTED UNDER SOMALI REGION PASTORAL AND AGRO-PASTORAL RESEARCH INSTITUTE (SoRPARI) ETHIOPIA.

ABDULKARIM MOHAMMED[1], MOHAMMED DOL[2], HOODO MOHAMMED[2], HOODO MOHAMED MOHAMUD[2]

1. Somali Region Pastoral & Agro-Pastoral research institute, Food Science and Nutrition research Directorate.
2. Somali Region Pastoral & Agro-Pastoral research institute, Food Science and Nutrition research Directorate.

Abstract

The study was conducted in Somali Regional state with objective to analyze macronutrient and mineral content of different maize varieties adapted under Somali Region pastoral and Agro-pastoral research institute (SoRPARI). Four different types of samples such as Melkasa-6Q, MH-138, BH661 and BH-549 sample were collected. The collected maize samples were individually grounded to a fine powder (30 mesh size), packed in air tight polyethylene plastic bags and were stored at 4°C until further analysis. Proximate composition such as crude Protein, crude Fat, crude fiber, moisture content, carbohydrate, different minerals like Calcium, Iron, zinc and total phosphorous were determined by AOAC. Based on the result obtained, the ash content of the four maize varieties is in the range 4.06(Bh-549)-5.88% (Melksa-6Q), while the protein content from 12.82 (BH-549)-15.24% (Melkasa-6Q). The fat content is in the range 11.89 (BH661)-31.61%(Melkasa-6Q) while the carbohydrate content is in the range of 34% (Melkasa-6Q)-59.07% (BH-549). Significant difference was observed in most of these macronutrient content at $p<0.05$. Significant difference was also observed at $p<0.05$ in minerals content such as Calcium, Zinc, iron and Total Phosphorous where Melkasa-6Q had highest in almost all minerals content. Overall, from the finding we conclude that, all adapted maize varieties have good in both macronutrient and minerals especially Melkasa-6Q. Therefore, all actors of maize should contribute to the promotion of nutrient dense varieties of maize to the local community which in turn important for the fight against malnutrition.

Key words: *Maize, maize varieties, macronutrient, mineral content*.

PROXIMATE AND MINERALS CONTENT ANAYSIS OF DIFFERENT MEAT SOURCES IN JIGJIGA CITY

Abdulkarim Mohammed Ali[1], Mohammed Dol Ateye[2], Hoodo Mohamed Jama[2],

1. Somali Region Pastoral & Agro-Pastoral research institute, Food Science and Nutrition research directorate. ***adnanbdu302@gmail.com***
2. Somali Region Pastoral & Agro-Pastoral research institute, Food Science and Nutrition research directorate. ***Ateye069@gmail.com*, *hoodoqali042@gmail.com***

Abstract

Meat is a good source of protein and different micronutrient that widely consumed by Somali community. The study was conducted in Jigjiga City Somali Regional state with objective to analyze macronutrient and micronutrient/minerals of different meat sources in different part of the city. Four different types of meat samples from camel, cattle, goat and sheep with total of eight (8) samples were collected from different part of Jigjiga city. The collected meat samples were individually grounded packed in air tight polyethylene plastic bags and were stored at -15°C until further analysis. Proximate composition such as crude Protein, crude Fat, crude fiber, moisture content, different minerals like Calcium, Iron, Zinc, sodium, magnesium and Potassium were determined by AOAC. Based on the result obtained the moisture, ash, protein and fat are in the range of 71.97% (SheMH02) -75.94% (GoaMH), 0.99 %(CamM01) -1.57% (CatM02), 19.12% (CamMH) -23.32% (SheMH02) and 3.01% (GoaMH) -5.25% (CatM01) respectively and most of them are statistically different at $P<0.05$. The minerals content is also in the range of 18.20 (CatM02) – 33.33mg/100g (CamM01), 15.78 (GoaMSH) – 59.16mg/100g (CamM01), 8.97 (CatM01) – 21.84mg/100g (CamM01), 30.59 (CamM01)-31.40mg/100g (GoaMSH), 660.93 (CamM01) – 992.32mg/100g (SheMH02) and 59.59 (CatM02) – 198.43mg/100g (Ca,M01) for calcium, iron, zinc, magnesium, potassium and sodium respectively and more or less they were statistically different at $P<0.05$. Overall, from the finding we conclude that, sheep is better in protein content followed by cattle, goat and camel. Species difference, breed difference, livestock management, pre and post slaughter handling practice and some other reasons might be the factor for their different in their nutritional content.

Key words: Meat, camel, cattle, goat, sheep, Nutrition, minerals.

NUTRITIONAL, ANTI-NUTRITIONAL AND PHYSICO-CHEMICAL PROPERTIES OF DIFFERENT HARICOT BEAN VARIETIES ADAPTED UNDER SoRPARI's DIFFERENT RESEARCH CENTERS

Abdulkarim Mohammed Ali[1], Mohammed Dol Ateye[2], Hoodo Mohamed Jama[2],

1. Somali Region Pastoral & Agro-Pastoral research institute, Food Science and Nutrition research directorate. ***adnanbdu302@gmail.com***
2. Somali Region Pastoral & Agro-Pastoral research institute, Food Science and Nutrition research directorate. ***Ateye069@gmail.com*, *hoodogali042@gmail.com***

Abstract

Haricot bean one the legume crop that widely consumed in Somali community. The study was conducted in Somali Regional state with objective to analyze macronutrient, micronutrient/minerals, antinutritional content, functional and physical of different haricot bean varieties adapted by Somali region pastoral and Agro-pastoral Research Institute. Six different types of samples such as *Awash mittin, Awash 2, Seri 119, Seri 125, Adi* and D Control as control with total of fifteen (15) samples were collected from three different research center namely Dolo-Ado, Fafan and Kelafo. The collected haricot samples were individually grounded to a fine powder (30 mesh size), packed in air tight polyethylene plastic bags and were stored at 4°C until further analysis. Proximate composition such as crude Protein, crude Fat, crude fiber, moisture content, carbohydrate, total energy, different minerals like Calcium, Iron, Zinc and Potassium were determined by AOAC. The Anti-Nutritional content such as tannins and phytate, functional and physical properties were also determined by different standard procedures. Based on the result obtained the moisture, ash, crude fiber, protein and fat are in the range of 7.915 (K-Seri 119) -11.533% (F-Adi), 4.218 (F-Awash-2) -5.606% (K-Seri 125), 2.230 (F-Seri 125) -4.480% (F-Awash - 2), 16.210 (K-Seri 125) -22.180% (D-Awash mittin) and 0.540 (D.Seri 125) – 2.250% (D-Awash -2) respectively and most of them are statistically different at $P<0.05$. The minerals content is also in the range of 65.96 (F-Adi) – 108.07mg/100g (D-control), 126.0 (D-Seri 119) – 152.0mg/100g (K-Seri 125), 3.092 (K-Awash 2) – 4.798mg/100g (D-Awash 2) and 4.306 (K-Seri 119)-6.571mg/100g (D-control) for calcium, potassium, zinc and iron respectively and more or less they were statistically different at $P<0.05$. Regarding the anti-nutritional content, the tannins and phytate content is in the range of 0.30 (F-Adi and F-Awash 2) -34.95mg/g (D-Seri 119) and 2.193 (K-Seri 119) – 4.05mg/g (D-Seri 119) for tannins and phytate respectively and statistically different for tannins content at $P<0.05$. The functional and physical properties of different haricot bean varieties under study were more or less statistically different at $p<0.05$. Overall, from the finding we conclude that, adapted haricot bean varieties have better in nutritional content especially, ash and fiber and protein content especially varieties with D-Awash mittin. Varietal difference, agro-ecology, nature of soil, farming management and some other reason might be the factor for their different in their nutritional content. Haricot bean is reached in protein, minerals and other important nutrient and therefore, we recommend that, it can be used either alone or mix with those staple cereals as part of fighting against malnutrition and in the preparation of different recipe.

Key words: Haricot bean, macro-nutrient, minerals content, Anti-nutritional content, Functional Properties, Physical property

ABSTRACTS FROM AGRICULTURAL MECHANIZATION RESEARCH DIRECTORATE

Pre-extension Demonstration and Evaluation of Engine Driven Maize Sheller in Kelafo and Dollo Ado Woredas, Somali Region, Ethiopia

Firew Kassahun[1], Kalid Hussein[2]
Email: firew2719@gmail.com and kalidxusen2015@gmail.com
Somali Region Pastoral and Agro-pastoral Research Institute, Agricultural Mechanization Research Directorate, Jigjiga, Ethiopia

Abstract

The pre-extension demonstration of engine driven maize Sheller helps to separate maize from the cob. The fabricated design consists of a body casing, drum, shelling unit, grain and cob discharge unit, air blower part, machine frame, hopper (Feeding chute), bearing as some of the major component. It is powered by diesel engine motor connected the shelling unit by B-belt. SoRPARI-Agricultural Mechanization research directorate were demonstrated the maize sheller and found to be about 97.54-98.76% efficient with output capacity of about 26.530 Qu/hr. The machine is relatively cheap, simple and portable when compared to imported product of similar capacity and other internal manufacture. 20 agro-pastoralists from each Kelafo and Dollo Ado woredas were selected for the maize Sheller demonstration and two machines were provided for both woreda to create wider awareness. The cost benefit analysis of the maize sheller machine was conducted using the payback period and the benefit-cost ratio. It calculated the machine cost benefit ratio and payback period is 1.15 and 1.94 this indicate that the machine is cost effective to popularization and scaling.

Keywords: *Maize Sheller, Engine driven, Demonstration, Kelafo and Dollo Ado, Cost Benefit Analysis*

Pre-extension Demonstration and Evaluation of Horizontal Hay Baler Machine in Kelafo and Dollo Ado Woredas, Somali Region, Ethiopia

Kalid Hussein[1], Firew Kassahun[2]
Email: kalidxusen2015@gmail.com and firew2719@gmail.com
Somali Region Pastoral and Agro-pastoral Research Institute, Agricultural Mechanization Research Directorate, Jigjiga, Ethiopia

Abstract

The pre-extension demonstration of hay baller machine helps the pastoral and agro-pastoral community to prepare feed for their livestock easily that used during dry season. Only one person operates the horizontal hay baler. SoRPARI-Agricultural Mechanization research directorate were demonstrated the hay baler and found the output capacity of the hay baler about 15-20 kg per baled (1000 kg/hr). The machine is relatively cheap, simple and portable when compared to other internal manufacture. 20 agro-pastoralists from each Kelafo and Dollo Ado woredas were selected for the hay baller machine demonstration and two machines were provided for both woreda to create wider awareness. The cost benefit analysis of the baler machine was conducted using the payback period and the benefit-cost ratio. It calculated the machine cost benefit ratio and payback period is 1.43 and 1.5 this indicate that the machine is cost effective to popularization and scaling up.

Keywords: *Horizontal hay baler machine, Demonstration, Kelafo and Dollo Ado, Cost Benefit Analysis*

Development and evaluation of engine driven Multi-crop Grain Cleaner in Somali Region State, Ethiopia

Firew Kassahun[1], Kalid Hussein[2]
Email: firew2719@gmail.com and kalidxusen2015@gmail.com
Somali Region Pastoral and Agro-pastoral Research Institute, Agricultural Mechanization Research Directorate, Jigjiga, Ethiopia

ABSTRACT:

It is impossible to grow and harvest cereal grains without getting undesirable intermixtures despite proper care and tending of the crops. The cleanliness of small sized grains such as sorghum and millet, is usually challenging after threshing operations. A grain cleaning machine was developed using locally available materials and based on detailed engineering design. The machine was used to clean sorghum and millet. It was evaluated using output capacity, cleaning efficiency, and percentage grain scatter loss as the performance parameters, while feed rate, air speed and crank amplitudes were used as the experimental factors. Results from the machine evaluation, indicates that the output capacity ranged between 620.83 to 1088.5 kg/hr. and 620.50to 1097.83 kg/hr. for sorghum and millet, respectively while the cleaning efficiency ranged between 98.04 to98.66 % and 97.30 to 98.05 % for sorghum and millet, respectively. The scatter loss was obtained within ranges of 0.83 - 1.27 % and 1.31 - 2.12 % for millet and sorghum, respectively. The best performance of the machine

was obtained at air speed and crank amplitude of 4.5 m/s and 25 mm, respectively for both crops, and feed rates of 1400 kg/hr. for sorghum and 1200 kg/hr. for millet. The research however, achieved the best cleaning efficiencies of 98.64 and 98.05 %, for sorghum and millet, respectively.

KEYWORDS: *Grain cleaning, fabrication, cleaning efficiency, output capacity, grain scatter loss*

Development of Rice Para-Boiler and Socking Machine in Somali region

Firew Kassahun[1], Kalid Hussein[2]
Email: firew2719@gmail.com and kalidxusen2015@gmail.com
Somali Region Pastoral and Agro-pastoral Research Institute, Agricultural Mechanization Research Directorate, Jigjiga, Ethiopia

Abstract:

The rice parboiling machine is used for parboiling of paddy rice before milling. The machine is made to have five main units which includes the water supply tank, boiler, energy unit, steamer and the soaking unit. The existing parboiling machine has a production capacity of 5kg per batch in every five hours and has no provision for soaking the paddy. In the traditional parboiling process, paddy is soaked in water for 3 days, steamed and dried before milling, and the rice usually give off bad odor due to fermentation as a result of prolonged soaking. The modified rice par boiling machine is designed to par boil about 400kg per day which will take not less than 5 days to parboil traditionally

Keywords: *Rice, parboil, milling, boiler steamer, soaking*

Introduction and Evaluation of Walking Type Two Wheel Wheat Harvester (Reaper and Binder) in Lefyssa Kebele, Awubere Woreda, Somali Region, Ethiopia

Kalid Hussein[1], Firew Kassahun[2]

Email: kalidxusen2015@gmail.com and firew2719@gmail.com

Somali Region Pastoral and Agro-pastoral Research Institute, Agricultural Mechanization Research Directorate, Jigjiga, Ethiopia

Abstract

The walking type harvester machine was introduced and evaluated its performance by harvesting wheat. The field experiments were carried out at Jigjiga Research Center research field. The main Parameters considered during this study were crop mositure content, operating of the harvesting machine, harvesting losses and cost of harvesting. The average effective field capacity and field efficiency of the harvester was found to be 0.182 ha/h and 81% respectively whereas the effective field capacity in manual harvesting was 0.008 ha/h. Fuel consumption of the reaper was 0.92 lit/h, 5.08 lit/ha. Average value of harvest losses in mechanical harvesting was 1.42 percent only whereas average value of harvesting losses in manual harvesting was 1.73% which is more than that of mechanical harvesting. The cost of harvesting for harvester and for manual harvesting were 479Birr/ha and 1600Birr/ha respectively. The percent saving in the cost of harvesting is reduced by 30% harvesting of wheat with harvester over manual harvesting. Hence, the machine harvesting would be feasible and economical compared to manual harvesting method in terms of time, money and labor requirement.

Keywords: *walking behind harvester, field capacity, field efficiency, harvesting lose.*

Adaptation and Evaluation of Hammer mill (Livestock and poultry Miler) in Somali Region Fafen Zone

Kalid Hussein[1], Firew Kassahun[2]

Email: kalidxusen2015@gmail.com and firew2719@gmail.com

Somali Region Pastoral and Agro-pastoral Research Institute, Agricultural Mechanization Research Directorate, Jigjiga, Ethiopia

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Abstract

Crop residues are considered among the most important materials in Ethiopia especially maize Stalk, beanstalk, sorghum stalk, and wheat and barley straw. There are many types and models of imported top hammer miller in Ethiopia to assist in milling the grain. Those machines, which are imported, have many problems such as size of mill and rusting of hammers which not advisable to human food. Therefore, the machines adapted and evaluated for livestock feed process purpose in terms of crop residues like maize stalk, beanstalk and wheat straw with predetermined feed rate and hammers' shaft speed (RPM). The research was conducted at Somali Region Pastoral & Agro-pastoral Research Institute (SoRPARI) to evaluate the machine performance in crushing maize stalk, beanstalk, and wheat straw for animal feed. In this paper, two top feed hammer mills were used. They are collected from market in Jigjiga town. The performance of the machine is evaluated in terms of crushing capacity, crushing efficiency and crushing loss. The output of the market top hammer miller was satisfactory. The market top hammer miller produced a highest crushing efficiency and capacity about 99.33 % and 152.54 kg/hr. while the BAERC's was produced 94% and 78.68 kg/hr, respectively. The crushing losses of the market top hammer miller were 2.67, 0.67 and 5 % on maize stalk, bean stalk and wheat straw respectively.

Key words: crushing capacity, crushing loss, crushing efficiency.

ABSTRACTS FROM SOIL AND WATER RESEARCH DIRECTORATE

Performance Evaluation of Gully control Measures implemented at Karamarda Watershed, South Jigjiga District, Somali Region

Mahamed Omer Yusuf, *email: amiinsheik@gmail.com*,

Soil and Water Research Directorate, Somali Region Pastoral and Agro-Pastoral Research Institute, Jigjiga, Ethiopia.

Abstract

Land degradation in the form of soil erosion is a serious global, regional, national, and local challenge to agricultural productivity and overall economic growth for which immediate and long-term control mechanism is momentous by using various interventions including physical structures like check-dams and weir structures. Such interventions require continuous evaluation of theirbiophysical, technical, and socio-economic performance. Hence, study was aimed to evaluate the biophysical and technical performance of the gully control measures implemented at Karamarda watershed, South Jigjiga district. Due to lack of sufficient bench mark data the study subjected to use a participatory approach of data collection through field measurement and observations, focus group discussions, and key informants' interviews (KIIs). In addition, performance indicator criterion approach was applied. The study revealed that the amount of soil deposited behind the structure's ranges between0.2-0.90 m and 0.4 -1.5 m depth in hilly grazing land and cultivated land respectively. in addition,crop yield was increased by 15%. Similarly, surface water availability, moisture retention, and vegetation cover were increased. Furthermore, the soil erosion was decreased and gullies stabilized and changed into cultivated land. However, ground water utilization showed no change indicating that there was no wells and irrigation schemes available in the study area. From the technical parameters, vertical interval between every two successive check-dams exceeded the standard mean layout that showed p-value of 0.002. Moreover, there was limitation of repair, maintenance, and management of the implemented structures in the study area. Based on the finding of this study, the implemented Control measures were effective if properly managed and maintained.

Key words: *land degradation, performance evaluation, gully control measures, Karamarda watershed, Eastern Ethiopia.*

Evaluation of Furrow Irrigation Methods on Water Use Efficiency and Yield of Maize in Shebelle and Ganale Rivers of Somali Region

Dahir Yosuf Abdi[1], Abdinasir Ismail,[2] Liban Abdikarin[2] Abdirizak Abdulahi[2]

Somali Region Pastoral & Agro-Pastoral research institute, E-mail: daahirtwo@gmail.com;

Abstract

Water scarcity is a major constraint for the production of food in arid and semi-arid areas. Therefore, method of irrigation systems are important concerns to improve water use efficiency without significant yield loss. The objective of an experiment was evaluating the performance of furrow irrigation methods on Maize yield and water use efficiency. The treatments were three furrow irrigation systems and laid out randomized complete block design (RCBD) with three replications. The result revealed that, maize grain yield responded differently significantly across locations to different irrigation methods. The highest grain yield and water use efficiency were obtained from CFI and AFI respectively. from the result obtained highest yield was scored in conventional furrow irrigation water management method at Gode (1777.80kg/ha), Kalafo (2292.4 kg/ha) and Dolo-Addo (1805.30 kg/ha) and it has a significant difference with alternative furrow irrigation and fixed furrow irrigation water management methods. Maximum WUE was observed at Kalafo (7.64 kg/ha/m^3), Gode (4.17 kg/ha/m^3) and Dolo-ado (3.3 kg/ha/m^3) alternate furrow method was statistically higher than both conventional and fixed furrow methods. Therefore, it can be decided that Alternative furrow irrigation increased water use efficiency without significant yield reduction and it can solve the poor irrigation water application in the study areas. As well it will be solution for the environmental problems experienced in the study areas.

Key words: *Alternate Furrow; Crop Water Requirement; Maize; Water Use Efficiency*

Determination of Optimum Water Regime and Scheduling for Sesame in Gode, Somali Region, Ethiopia

Authors; Dahir Yosuf Abdi[1]Abdinasir Esmail[1]Mustafe Ismail Mohamed[2]; **2019**

Somali Regional Pastoral and Agro-pastoral Research Institute (SoRPARI), Soil and Water Research Directorate

Abstract

Water is the most limiting factor for crop production in arid and semiarid areas. Hence, determining the appropriate time of irrigation and the amount of water applied to the crop is of paramount importance to increase yield and water productivity. In view of this, a field study was carried out with an objective to determine the net water requirement and optimum irrigation schedule for sesame in Gode, Somali region, Ethiopia. The experiment was conducted for two consecutive years (2018 and 2019) at Gode Agricultural Research Center. The treatments consisted of three irrigation levels established based on moisture depletion levels (MDL) at 60%, 80% and 100% soil MDL. The experiment was laid out in a randomized complete block design with three replications. Long term metrological data (1990-2018 years) and CROPWAT 8.0 software were used to determine optimum irrigation depth and scheduling for sesame. Partial flume was used to compute the daily soil moisture depletion and thereby to determine crop water requirement of each treatment. Results of the analysis of variance revealed that the grain and biomass yield as well as water use efficiency of sesame responded significantly to the different deficient irrigation levels. The maximum grain yield (1643.7 kg ha^{-1}) was obtained when sesame was irrigated at 100% of SMD followed by 80% SMD (1359.1 ka ha^{-1}), while the lowest yield (1232.5 kg ha^{-1}) was recorded for 60% SMD treatment. However, the highest (1.57kg m^{-3}) and lowest (1.32 kg m^{-3}) water use efficiency (WUE) was recorded for 100% and 60% SMD treatments, respectively. Therefore, it can be concluded that grain and biomass yield of sesame increased with irrigation management at increased SMDL while an in increase WUE was observed when irrigation was managed at reduced SWDL.

Keywords: CROPWAT 8.0, SMDL, Optimum water requirement, Sesame.

Determination of Optimum Water Regime and Scheduling for Maize in Gode, Somali Region, Ethiopia

Authors; Dahir Yosuf Abdi[1]Abdinasir Esmail[1]Mustafe Ismail Mohamed[2];**2019**

Somali Regional Pastoral and Agro-pastoral Research Institute (SoRPARI), Soil and Water Research Directorate

Abstract

Irrigation means applying adequate water at the right time to crops in the right amount. A significant concern has become the sustainable use of water in agriculture. The adoption of irrigation water saving and the maintenance of acceptable yields could help preserve this ever more restricted resource in most cases. Although irrigation has been practiced for a long time, farmers have limited experience of this. It is therefore very important to monitor soil moisture levels for effective management of irrigation water. For two successive years, a field study was conducted to determine the optimum water requirement and irrigation schedule for Maize crop production at Gode. The study' was aimed to evaluate the effect of different irrigation regime (different levels of depletion of soil moisture) on yield and water use efficiency of Maize(malkassa-2) variety. The treatments were established based on the levels of depletion of soil moisture as SMDL1 (60% Soil moisture depletion level (SMDL), SMDL2 (80% SMDL) and SMDL3 (100% SMDL). These were then used (selected to evaluate the optimum irrigation water regime and schedule, the result showed that even though statistically not significant (P> 0.05), SMD3 has increased the grain and biomass yield of maize by 34 and 54.4% (in 2018) and by 33.3 and 13.9% (in 2019), respectively Likewise, a non-significant response of water use efficiency (WUE) of maize was noted due to the irrigation treatments. However, the WUE values were observed to decrease from 5.22 to 3.39kg/m3 (in 2018) and from 2.51 to 1.67kg/m3 (in 2019) as the SWDL is increased from 60% to 100%. The findings of the present study did not lie within the ranges recommended by FAO. Therefore, the study suggests that more such studies need to be carried out in similar ago-ecologies to validate the findings of the present study

Keywords: Gode, Irrigation scheduling, Maize, Water use Efficiency.

Variability of Soil Chemical Properties in Lower Wabi-Shebelle Sub-Basin in Somali Region Ethiopia, as Influenced by Land Use and Land Cover

By: Dahir Yosuf Abdi; Email: daahirtwo@gmail.com; **2020**

Somali Regional Pastoral and Agro-pastoral Research Institute (SoRPARI), Soil and Water Research Directorate

Abstract

Study was performed at lower Wabishebele sub-basin in Somali region south eastern Ethiopia to analyze the land use and cover and spatial variability of soil chemical properties of the sub-basin and develop soil map. A total of 41 soil samples were collected from 0-30 cm depth and analyzed for; pH Total Nitrogen (TN), Available Phosphorus (AP), and Exchangeable Potassium (EK). The data was analyzed through descriptive statistics and geostatistical methods. The results showed that highest mean value of pH was recorded from bare land (8.05). The highest mean of soil N was seen on potential croplands (0.251) followed by dense shrub land (0.230), woodland (0.230), croplands (0.187), and sparse shrub land (0.159) and bare land (0.151). The highest mean of AP recorded at dense shrub land (7.279) followed by potential croplands (6.607ppm), cropland, woodland, bare land and sparse shrub land. Soil map was developed for lower Wabishebele sub-basin. Therefore, the findings of this study can be used as baseline information to implement appropriate soil management intervention for current study area.

ABSTRACTS FROM SOCIO-ECONOMIC AND GENDER RESEARCH DIRECTORATE

Factors Affecting Adoption of Improved Wheat Varieties in Awbarre Worda, Fafan Zone of SRS, Ethiopia

Mohamed Abdikadir Dhiis[1], Hadis Ibrahim[2], Mohamed Abdi Yususf[3], Ahmed Mohamed Ali[4]

Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI)

Abstract

The main objectives of the study were to measure and analyze the main factors affecting the adoption of wheat (Triticum aestivum) varieties in Awbare woreda employing simple descriptive statistics and logistic regression (binary logit) model. Household adoption, were analyzed to measure the state of household adoption of improved wheat (Triticum aestivum) varieties, 95 farm households were selected from two kebeles. The logistic model was initially fitted with 13 variables of which nine were found to be significant. Oxen ownership is the main factor that determine to adopt new technology at household level. Off-farm and non-farm incomes also influence adoption of farm households in the study area. Their importance is significant in supplementing total farm income and enhancing the state of household adoption of wheat varieties. the differences in the use of chemical fertilizer have also significant impact on the improvement adoption of new technology. That increase the productivity of off-farm/non-farm income and livestock should be given prior attention. It is also appropriate to the area to promote intensive agriculture thereby attain adoption of new technology

Key Words: *Wheat, Varieties, Adoption, Non-adoption,*

Analysis of Production and Marketing of Gum and Resin to Integrate Pastoralist Sustainable Economic Benefits

Mohamed Abdikadir Dhiis[1], Hadis Ibrahim[2], Ahmed Mohamed Ali[3]

Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI)

Abstract

The main objectives of the study were to analyze production and marketing of gum and resin to integrate Pastoralists' sustainable economic benefits in Adadle Woreda of Shebele Zone. The major data sources of this study were both primary and secondary data sources. The initial survey was conducted to collect village-level information such as Challenges facing by gum and resin production in pastoral community's, Market opportunities for gum and Resin and Socio-economic benefits of gum and resin and others livelihood activities major gum and resin collectors and traders. For the quantitative analyses, a total of 67 households from study area were randomly selected. The study was mainly used descriptive method of data analysis. Data collected from the sources were cleaned, coded and entered in to Excel and made ready for analysis. Qualitative data obtained through focused group and key informants discussion were summarized, interpreted and narrated. The finding of this study shows that majority of the interviewed respondents were cooperatives. Finally, the study showed that their positive expectation of the respondents towards gum and resin collection if practiced community awareness creation, mobilization and establish strong linkage from collectors, retailers/whole sellers, cooperatives and national actors of gum and resin product.

Key Words: *Production, Gum and Resin, Marketing*

Value Chain Analysis of Sesame in Kelafo District, Somali Region, Ethiopia

Hadis Ibrahim Goni[1], Mohamed Abdulkadir Di'is[2], Mohamed Abdi Yusuf[3], Ahmed Mohamed Ali[4]

Hadis Ibrahim, e-mail address: goniyare19@gmail.com,

Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI)

Abstract

Globally, the top largest producers of sesame are Myanmar, India, China, Sudan, Uganda and Ethiopia. In terms of export potential, Ethiopia is the third world exporter of sesame seeds after India and Sudan. Sesame is the second major export cash crop in Ethiopia, next to coffee. Therefore, the objective of this study was to analyze the value chain analysis of sesame in Kelafo District, Somali Region, Ethiopia. The study was employed two-stage sampling techniques to draw 123 sesame producers and other chain actors. Descriptive statistics and econometric models were used to analyze the data. The results of this study show that there are different actors across the sesame value chain in Kellafo District. The major once is input suppliers, producers, traders, oil miller's processors and exporters. The results of profit and marketing margins of actors in sesame value chain showed that producers and collectors receive the highest profit share as well as marketing margin in the sesame value chain in Kellafo District. Moreover, the linear regression model result showed that family member aged in 15-70, land cultivated to sesame, yield per hectare, Seasons harvested sesame, farmer experience of sesame production, Access to loan, Usage of improved sesame seed have statistically significantly affected the amount of sesame supply to the market.

Keywords: *Kelafo, value chain, marketing margin, Sesame*

Value Chain Analysis of Wheat in Tuli Guled Woreda of Fafen Zone, Somali Region, Ethiopia.

Mahamud Mohamed Musa

E-mail address: mahamudmusa6@gmail.com,

Telephone: +251940271074

Somali Region Pastoral And Agro-Pastoral Research Institute (SoRPARI)

ABSTRACT

This study focused on the analysis of the wheat value chain in the Tuli Guled District of Fafen Zone with specific objectives of analyzing the market structure-conduct-performance of wheat markets; identifying the value chain of wheat supply to the market and market outlet choice of wheat producers, and wheat value addition at different stages of the marketing chain. Primary data were collected from 90 farmers and 30 wheat traders using structured questionnaires. Descriptive statistics were used to analyze the collected data. Results show that the study area's main wheat value chain actors are input suppliers, farmers/producers, assemblers, wholesalers, processors, retailers, and cooperatives. Results from the functional and institutional approach of value chain analysis showed that input providers, producers, cooperatives, collectors, wholesalers, retailers, and processors were found to be important wheat value chain actors. According to the survey results, only 15.8% only from the total sample households had access to credit and the remaining 84.2% had no access to credit. Cooperatives, Somali microfinance credit, and saving institutions, traders, and families/relatives are the sources of credit in the study area. The results of the study Woreda, indicate that the major wheat production constraint includes lack of stability, high input costs, shortage of rainfall, shortage of seeds of improved varieties, less awareness of farmers about improved crop management practices, the spread of weeds, and difficulty of saving pure seeds from farmers' harvest in combine harvested areas, and high cost of combine harvesting are among constraints reducing the productivity, production and return from the crop. Therefore, policies aiming to increase farmers' awareness of producing value-added wheat produce to enhance value creation are recommended to strengthen chain development.

Keywords: wheat, value chain Analysis, value chain actors, margin, market channel.

ABSTRACTS FROM RANGELAND & FORESTRY RESEARCH DIRECTORATE

Effect of Integrated Mechanical and Chemical Management Tactics against *Prosopis Julifloral*

Abdinasir Abdikadir[1] and Tedious Shiferew[2]

Email:-aweisbare22@gmail.com[1]; tadu1352@gmail.com[2]; Telephone: +251915076088[1] +251953185591[2].

1. Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI), Rangeland and Forestry Research Directorate
2. Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI). Crop Research Directorate,

ABSTRACT

Prosopis julifloral is regarded as one of the worst weed in the world because of its invasiveness, potential for spread, and economic and environmental impacts. The trees continue to invade forests and range lands in many countries across the world. The cost to remove these trees is staggering, the invasions of prosopis have created challenges for livelihood of pastoralist and agro pastoralist communities in invaded areas, similar scenarios happening in Shebelle zone, the weed is making the lives of pastoralist and agro-pastoralist in Kalafo difficult. Therefore, study was conducted at Kelafo woreda under natural prosopis invaded area. Based on the following objectives to study integrated effect of cutting/stumping and herbicide application against the rejuvenation of Prosopis julifloral: Effect of different mechanical, chemical and herbicide treatment against the rejuvenation of Prosopis julifloral stump, the study was used 2, 4-D, Oxyfluorfen and Glyphosate, the study recommends to Introduce and popularizing prosopis based rural livelihood alternatives those which can be implemented using prosopis as a resource income.

Keywords*:* *Chemical Management, Mechanical, Management Tactics, Prosopis Julifloral*

Assessment of market opportunities, challenges and production of gum and resins into local economic pastoralist livelihood in Somali region.

[Idil Amin ,tell +251915731434 email: idilamin90@gmail.com][1], [Ibrahim Jibril, tell: +251915774379 email: abduyeehani@gmail.com][1] [Abdinasir Abdikader, Tell: +251915076088 email:awiesbare22@gmail.com][1] Somali Region Pastoral & Agro-Pastoral research institute, Range and Forestry research Directorate.

Abstract

*A study on evaluation of gum and resins Production, challenge and opportunities was carried out in Qorahay, shabele and Afdher zone of Somali Region. The study was conducted at Dhobo weyn, Adadle and Qohale district at the study sites, which were selected on the bases of the presence of good population of the study species The potential gum and resin yield from the vegetation resources were estimated based on literature data on annual yields of gum and resin per tree. To assess the socio-economic importance of the study species, a multi-stage sampling procedure was used to select sample households. In the first stage three districts with higher abundance and distriuution of the study species were selected purposively Then the number of households who are native to district and know the socio- economic uses of the gum and resin in the area were determined based on probability proportional to the size (number of households of the three districts). For this study, the number of households (N) selected for face to face interview were 130: N ≥ 50 + (8*10)=130. The numbers of households from each district were determined proportional to the total numuer of households in each district. A total of 3 Kebles, from three districts were systematically identified and 39, 42 and 45 households were randomly selected from Dhoboweyne ,Adadle and Qahole district respectively The three major commercial gum and resin in the study areas include frankincense from the three Boswellia species, myrrh from Commiphora myrrha and opoponax from Commiphora guidott. Based on the present study, the total potential annual production for frankincense is about 15,161.54, 17,651.10 and 23,659.83 tonnes (Table 9) from the vegetation of Shebelle, Korahe and Afder zone. The total potential annual production for myrrh is auout 18,222.10, 269.72 and 6,241.55 tonnes (Table 9) from the vegetation of Shebelle, Korahe and Afder zone. The total potential annual production for opoponax is about 12,485.51, 809.17 and 5,795.73 tonnes (Table 9) from the vegetation of Shebelle, Korahe and Afder zone. In addition to animal husbandry significant numbers of households, 54.5% at Adadle, 73.1% at Dobo Weyn and 68.4% at Kohle participate in gum and resin production to generate cash income. The results of this study had also showed that collection and sale of oleo-gum resins from vegetation in Adadle, Dobo weyn and Kohle district supplied on average US$ 1613.22, 94.47 and 47.69 incomes per household per year (1USD = 45 ETB in August 2021).*

Key words: gum, resin, yield, socio economic importance, house hold income marketing

Plant Survey and Resource Mapping of Gum and Resins Production, Challenge and Opportunities in Somali Region

[Idil Amin ,tell +251915731434 email: idilamin90@gmail.com][1], [Ibrahim Jibril, tell: +251915774379 email: abduyeehani@gmail.com][1] [Abdinasir Abdikader, Tell: +251915076088 email:awiesbare22@gmail.com][1]

Somali Region Pastoral & Agro-Pastoral research institute, Range and Forestry research Directorate.

Abstract

A study on evaluation of gum and resins Production, challenge and opportunities was carried in Qorahay, shabele and Afdher zone of Somali Region. The study was conducted at Dhobo weyn, Adadle and Qohale district at the study sites, which were selected on the bases of the presence of good population of the study species. Remote sensing data collection and classification of land use land covers were used for resource mapping. Transect lines were systematically laid at 500 metersr distance apart for the study sites in two districts (Kohle and Adadle) while at 1000m distance apart for the study site at Dobo weyn district. a total of sample 105 plots (45 at Adadle, 30 at Kohle and 30 at Dobo weyn) were used to collect data on the vegetation of the area. Quadrates were distributed in east west compass directions along established transect lines located at approximately 500 m from each other. In each quadrat, vegetation data such as identity, abundance, DBH, height, and counting of seedlings and saplings were made .The potential gum and resin yield from the vegetation resources were estimated based on literature data on annual yields of gum and resin per tree. Based on the analyses of remote sensing and geospatial data, The study area is characterized by hot, arid to semiarid, corresponding to the Ethiopian "Bereha" and "Kola" climatic zones altitude range between The altitude ranges between 87 and 1600 meters above sea level, with an average altitude of less than 450 meters above sea levelGypsisols and Calcisols are the two most commonly types of soils in the area. The area is dominated by sandy textures. Usually, the Acacia - Commiphora woodland ecosystem found on red (locally referred as "Soben") or brown (locally referred as "Deber") sand soils.. vegetation survey shows A total of 21, 16 in Adadle, 17 in Dobo weyn and 11 in Kohle woodlands, gum and resin bearing tree and shrub species were recorded, respectively. Of these, 8 species occurred at the three sites. Dobo weyn was (648.3 individuals/ha) was higher than in Adadle (319.4) and Kohle (340).Boswellia species are more dominant in Dobo weyn and Kohle than in Adadle while gum commiphora bearing species are more dominant in Adadle.

The three major commercial gum and resin in the study areas include frankincense from the three Boswellia species, myrrh from Commiphora myrrha and opoponax from Commiphora guidotti

Keywords; dry land, Gum and resin, gum and resin bearing species, vegetation survey.

Characterization And Mapping of Gum And Incense Tree At Selected District of Adadle, Elwayne And Kalafo Somali Region, Ethiopia

Abdinasir Abdikadir [1] Ibrahim Jibril[1] Idil Amin[1] Somali Region Pastoral and Agro-Pastoral Research Institute (SoRPARI) Forestry Resource Program Range and Forestry Research Directorate

ABTRACT

Ethiopia has large coverage of gum and resin bearing species, widely distributed throughout its arid and semi-arid agro-ecological zones (Wubalem Tadesse et al., 2002). According to Vollesen (1989) there are about six species of Boswellia, 52 species of Commiphora and many Acacia species in Ethiopia. According to Coulter (1987), for instance, a large volume of myrrh produced and exported in Somali is actually originated from Ethiopia, mainly from Borana and Somali regional zones. Hence, collection and trade of gum and resin in Ethiopian economy in general and the local communities, in particular cannot be overlooked, as this sub-sector is still among the few export articles the country have to earn foreign currency. Somali region especially some of the districts (e.g. Elwayne, godey and Adadle etc..) has huge potential of gum and incense resin production that can significantly support the income of the local people and the country. Therefore, this research is designed and conducted to address the research gap exist in the country and the specific objective are to 1) conduct biometry survey and characterize the gum and incense trees and shrubs of selected districts; 2) understand the species composition of gum and incense trees and 3) map the spatial location of gum and incense tress within selected districts, and 4) to estimate above ground biomass and carbon stock potential of gum and incense trees and shrubs at the selected districts. The study was conducted at three districts of Somali region which are named as Elwayne, Adadle and Karinka (midway between Gode and kalafo district). We travelled to the selected district to collect land use and cover (LULC) data as well as to conduct biometry survey and identify species composition of gum and incense tress. We used Garmin GPSMAP64 devices with a reported 2-m accuracy to collect representative ground truth data for each land use and cover in the selected zones. to match the coordinate and projection system of GPS readings. Then, hybrid unsupervised and supervised classification was carried out. About 179 GPS points (20–30 samples for each class) were used for classification accuracy; thereby, our classification achieved overall accuracy of 92 pe cent. Besides the land use and cover investigation, we made a transect walk in the areas where there is a significant coverage of "gum and incense trees covers" and selected study plot where we collected biometry species composition data, The dominant land use and cover in the district includes woodland (58.37%), shrubland (18.27%) and bareland (23.36%), Accordingly, the height of ***gum and incense*** *trees in the district ranges from 2.4 to 4.89 meter while the mean height is 4.11 meter. The DBH ranges from 33 to 11 cm (mean 71.92 cm) while tree density ranges from 475 to 725 (mean 589.58 count/ha). The AGB biomass ranges from 2,310 to 211,203 (54,158 kg/ha) while the carbon stock ranges from 1,086 to 99,265 (mean 25,455 kg/ha).In Adadle district, the largest coverage is bare land (22.31) and sparse shrub land (22.15%) followed by woodland (16 .79%) . Accordingly, the height of* ***gum and incense*** *trees in the district ranges from 2.55 to 4.55 meter while the mean height is 4.18 meter. The DBH ranges from 45 to 91 cm (mean 73.50 cm) while tree density ranges from 375 to 650 (mean 575 count/ha). The AGB biomass range from 7,178 to 28,096 (mean 19,362 kg/ha) while the carbon stock ranges from 3373 to 13205.28 (mean 9100*

kg/ha Thus, our result revealed that Elwayne district alone could stock a carbon which amount 3642.12 ton from gum and incense trees followed by Adadle (1115.59 ton) and Godey (723.46 ton). Thus, similar to AGB, Elwayne district ranks first in this aspect as well followed Adadle and Godey district.

Keywords: - Characterization, Mapping Gum and Incense