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Review on Research Status and Scientific View on Minimizing Yield Gap of Lentil (*Lens culinaris* Medik) Production and Productivity in Ethiopia

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Abstract: Lentil (*Lens culinaris* Medik) is the oldest ancient annual food crops that have been grown as an important food source for over 8, 000 years. Lentil plays a significant role in human and animal nutrition and in maintenance and improvement of soil fertility. The primary product of lentil is its seed which has relatively higher contents of protein, carbohydrate and calories compared to other legumes. It efficiently complements the cereal rich food in making nourishing meal by balancing the amino acid and micronutrient content of the diet. Legumes have always been critical components of the agro ecosystems throughout the world because of their ability to fix atmospheric nitrogen into usable plant proteins. The production constraints include both biotic (insects, diseases and weeds) and abiotic (temperature, soil fertility and drought) stresses affecting the vertical or horizontal production of lentil. The best time for harvest should be carefully monitored to avoid shattering of pods; harvesting should be done only during the fresh period of the day when there is sufficient air moisture. This review focused on, to fill the production gap of lentil for the future using the following packages: such as advancement lentil production through research, using newly released improved varieties, using blended (mixed) fertilizers, on-farm lentil production, reduce loss of lentil post-harvest and make cash or market oriented crop.

Key words: Lentil · Production · Productivity · Yield Gap

INTRODUCTION

Lentil (*Lens culinaris* Medik) is the oldest ancient annual food crops that have been grown as an important food source for over 8, 000 years [1]. It is one of the early domesticated species, as old as those of einkorn, emmer, barley and pea for cultivation [2]. Canada, India, Turkey, Australia, United States of America, Nepal, China and Ethiopia are the major players in global lentil production. It is an important crop in food, feed and farming systems of West Asia and North and East Africa. It has been established in a wide range of agro-ecology but production is limited to tropical areas. The spread of lentil from the center of origin has been accompanied by the selection of traits important for adaptation to environments that can be climate, soil and their impact on season length, abiotic and biotic stresses.

Lentil plays a significant role in human and animal nutrition and in maintenance and improvement of soil fertility [3]. Its cultivation enriches soil nutrient status by adding nitrogen, carbon and organic matter which promotes sustainable cereal-based systems of crop production. It is a nutritious food legume. It is cultivated for its seed and mostly eaten as split [4]. The primary product of lentil is its seed which has relatively higher contents of protein, carbohydrate and calories compared to other legumes [5]. It is the most desired crop because of its high average protein content and fast cooking characteristic in many lentil producing regions. It can be used as a main dish, side dish, or in salads. Seeds can be fried and seasoned for consumption but sometimes difficult to cook because of the hard seed coat those results from excessive drying. Its flour is used to make soups, stews, purees and mixed with cereals to make bread and cakes; and as a food for infants [6]. Therefore, the review was focused on research status and scientific prospect to minimizing yield gap of lentil (*Lens culinaris medik*) production.

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Cultivated lentil is thought to have been originated and first domesticated in western Asia and then introduced into the Indo Gengetic plain around 2000 BC. Lentil has also been rapidly spread to Egypt, central and southern Europe, the Mediterranean basin, Ethiopia, Afghanistan, India, Pakistan, China [7]. According to Cubero [8] fifteen lentil was first spread to the Nile from the near east, to Central Europe and then to the Indian Subcontinent and the Mediterranean Basin by the end of Bronze Age. It is now cultivated in most subtropical and also in Northern hemisphere such as Canada and Pacific Northwest regions. Lentil belongs to the genus Lens of the Viceae tribe in the Leguminosae (Fabaceae) family, commonly known as the legume family. The plant was given the scientific name Lens culinaris in 1787 by Medikus, a German botanist and physician. The cultivated lentil, *Lens culinaris* spp. culinaris, has two varietal types: small seeded (micro-sperma) and large seeded (macro-sperma). It is an annual bushy herb with slender stem and having many branches with erect, semi-erect or spreading growth habit.

Lentil plants are typically short, but can range from 20 to 75cm in height, depending on growing conditions [9]. The cotyledons remain under ground after germination. The first two nodes on the stem develop below, or at the soil surface and are known as scale nodes. Plants can have single stems or many branches depending upon the population in the field. Lentil plants have an indeterminate growth habit. Flowering begins on the lowest branches, gradually moving up the plant and continuing until harvest. Lentil continue to flower until they encounter some form of stress, such as drought, heat, frost, nitrogen deficiency, mechanical damage, or chemical desiccation. This indeterminate growth habit is most predominant in late maturing varieties, but all current lentil varieties have indeterminate growth habit. Flowers of lentil are self-pollinated and first few flowers on the main stem may abort. This occurs if conditions favor excessive vegetative growth over seed production, such as good moisture combined with high nitrogen fertility.

Production and Consumption Status: Lentil is currently an important pulse crop grown widely throughout the Indian Subcontinent, Middle East, Northern Africa and East Africa, Southern Europe, North and South America, Australia and West Asia [10]. It is a primary component for farming systems of those areas. The total lentil cultivated area in the world is estimated around 4.34 million hectares with annual production and productivity of 4.457 million metric tons and 1260 $kgha^{-1}$ respectively [11]. Lentil is relatively drought-ending plants grown across the world [12]. The production of the crop is increased significantly from time to time through expansion of production area along its productivity. This increment was stimulated by greater improvement in demand of both domestic and international market of the crop. Even though lentil producing countries are striding in increasing of their production to fill domestic demand gaps and overpowering of the export market but still the supply gap remains wide which is aggravated by rapid population growth, ever changing client, demand and restricted in genetic improvement of the crop. Most of the production which reaches around 56% is consumed locally as a whole grain or in the form of decorticated and spilt kernels and only 44% of the production is supply to the global market [13].

The enrichment of lentil with high dietary protein makes it affordable edible seeds of leguminous crops to rural poor household in the world. Because of this nature, lentil is called poor man's meat due to its low price compared to meat. It efficiently complements the cereal rich food in making nourishing meal by balancing the amino acid and micronutrient content of the diet. Enhancement of productivity of lentil is very vital as most of the poor people in the world are depend on it for protein supply to meet their food, nutritional and healthy benefits. A dish of lentil soup may supply about half of the daily protein requirement for an adult individual [14]. Lentil flour is mixed with cereals to make breads, cakes, noodles and infants formula [15-17].The protein content in lentils is generally approximately twice than that in most cereals and similar in meat.

The mean days to flowering ranged from 43.5 days to 48.5 days for Hossana and Freeze stations. Our findings disagree with Erksine [18] who found days to flowering ranged from 118 to 162 days. Significant variations were observed among cultivars for plant height. Plant height was varied from 30 to 35.25 cm. It was determined that local variety was the shortest and Ada was the tallest among lentil varieties (Table 1). Piergiovanni [19] reported that plant height varied from 28 to 41 cm in their material. Sarker *et al*. [20] stated that plant height was record in 31cm. The mean number of pods per plant ranged from 36.8 to 44.3. The genotypes local check, Alemaya and Alematena had higher number of pods per plant than the other test varieties (Table 1). This finding is in line with Stoilova and Pereira [21] who reported that number of pods per plant was showed remarkable variation in their lentil lines. The results of on station trials revealed that differences among varieties were significant for yield, plant height, number of pods and hundred seed weight (Table 1).

Table 1: Mean number of pod per plant, hundred seed weight (gm), plant height (cm), days to flowering and days to maturity per Lentil varieties at Hossana and Freeze on station in 2004/05 meher season

	HSW(gm)			PH (cm)			PP			FD		
Lentil varieties	H	F	X	H	F	X	H	F	X	H	F	X
Alemaya	3.2^{ab}	2.9^{a}	3.1	38.3^{bc}	27.5^{b}	32.9	44^{a}	37.5^{ab}	40.8	44.5^{a}	50.5^{a}	47.5
Chekol	2.2^{c}	2.6^{b}	2.4	41.3^{a}	27.3^{bc}	34.3	45^{a}	35.5^{bcd}	40.3	44^{a}	51.5^{a}	47.8
Ada	2.2^{c}	1.8^{c}	2.0	40.3^{ab}	30.3^{a}	35.3	40.8^{b}	32.75^{cd}	36.8	44.3^{a}	50.3^{a}	47.3
Teshale	3.4^{a}	2.9^{a}	3.2	39.5^{ab}	30.3^{a}	34.9	41.5^{b}	32^{d}	36.8	45.5^{a}	51.5^{a}	48.4
Alem Tena	3.0^{b}	1.8^{c}	2.4	37.3^{cd}	31.3^{a}	34.3	43.5^{ab}	37^{abc}	40.3	45.5^{a}	50^{a}	47.8
Local	2.2^{c}	1.8^{c}	2.0	35^{d}	25^{c}	30	48.25^{a}	40.25^{a}	44.3	40.5^{a}	46.5^{b}	43.5
GM	2.7	2.3		38.6	28.6		43.83	35.83		44.04	50.04	
Cv	6.7	8.3		4.7	5.74		7.32	8.15		8.69	4.61	
LSD (5%)	0.27	0.28		2.7	2.48		4.84	4.4		5.77	3.48	

Source: Yasin Goa, 2015 [22]

Means within each column followed by the same letter are not significantly different at 5% as determined by Duncan's Multiple Range Test NB:-H=Hossana, F=Freeze, X=Mean , GM=Grand mean, PH=plant height , pp=pod per plant, HSW=Hundred seed weight, FD=Days to Flowering.

Agro-Ecological Condition of Lentil: Lentil is amongst the principal cool season food legumes. It is grown as a winter crop in Ethiopia and particularly important in Oromiya, Amhara and some parts of South Nations Nationalities and Peoples and Tigray regions [23]. It is one of the less selective legumes in terms of climate and soil features. It usually well adapted to various soil types ranging from sand to clay loam when there is good internal drainage [24]. It appears very sensitive to Water logged field conditions and even with short period of exposure it can cause the crop to die easily. It performs best on deep, sandy loam soils with high in phosphorus and potassium content. It is widely grown in areas having an altitude range of 1, 700-2, 400meters above sea level with annual rainfall ranging from 700-2, 000mm in Ethiopia [25]. High humidity with excessive rainfall during growing season promotes vegetative growth, which prevents finally, promising yield and seed quality.

Lentil is considered as drought-resistant crop that can tolerate low annual rainfall distribution even in the range of 280-300mm. In regard to temperature, lentil can grow in different environments from cool temperate steppe to subtropical dry zones. Different types of lentils are now grown in large areas of warm temperate, subtropical and high altitude of the tropics as a cool season crop.12 Lentil is capable of germinating at a temperature above freezing point but optimum germination occurs at the range of 18-21°C. Temperatures exceeding 27°C can harm the crop aggressively but optimum temperatures for growth and yields of lentil are around 24°C [26]. A soil pH of 6-8 is conducive for lentil production, but it can also tolerate a moderate alkalinity. Lentil is mainly grown in the highlands of Ethiopia where rainfall is usually high. It is highly susceptible to excessive moisture stress hence farmers grow lentil on sloppy fields or use ridge and furrow system to drain excess water from lentil field specifically from black soils (Vertisols). Ethiopian farmers plow lentil fields three to four times using traditional "Maresha"30 and the first plowing is done from March to May30 which is a period of short rainy season.

The second and third plowing operations are undertaken in mid-June and early August, respectively. Double yield advantage of lentil can be obtained by ploughed two to three times accompanied with twice hand weeding. Lentil planting date varies from place to place depending on the amount and distribution of rainfall, temperature, topography and elevation of the area. Previous research findings, recommended lentil planting time in Ethiopia should be late June to mid-July in both mid and high altitude areas.

Lentil and Nitrogen Fixation: Legumes have always been critical components of the agroeco-systems throughout the world because of their ability to fix atmospheric nitrogen into usable plant proteins. Their ability to grow in nitrogen poor soils and their contribution to the pool of soil nitrogen that can be used by succeeding crops [27]. Around 250million hectares of legumes are grown in the world and fix about 90 trillion grams of nitrogen each year. Nitrogen fixing legumes save approximately US $7-10 billions of nitrogen fertilizer each year. The fixed nitrogen is used directly for plant growth and provides an excellent source of protein for humans and livestock. The level of nitrogen fixation by legumes varies considerably both spatially and temporally in response to host of environmental and ecological factors. According to Carranca *et al*. [28] reported nature of distribution of

rainfall at vegetative growth stage affects the N_2 fixation capacity of lentil. Di-nitrogen fixation by lentil was influenced by crop rotation, being greater in highly diversified than in less diversified crop rotations [29].

Lentil plays a significant role in human and animal nutrition as well as improvement of soil fertility. The crop has great importance in crop rotation because of its ability to fix atmospheric nitrogen [30]. It has a capacity to fix up to 107 kg Nha^{-1}. This implies about 13, 238 tons of N can be fixed annually in Ethiopia. Moreover, it offers an indispensable additional advantage emanating from its unique property in restoring and maintaining soil fertility. Lentil can be used as a green manure crop and particular Canadian variety, Indianhead, provides a large amount of fixed nitrogen which is estimated about 22.4kg ha^{-1}).Moreover, high short-range spatial variability in N_2 fixation has been demonstrated and may have contributed to the overall variability in estimates of N_2 fixation [31]. The crop is generally grown in rotation with cereals to break cereal disease cycles and to maintain soil nitrogen, thus reducing the demand of other cereal crops for nitrogen fertilizers. Prakash *et al*. [32] reported that there was 23.4% increase of soil nitrogen in rice yields following lentil production compared to wheat.

Fertilizers affect the root development and biomass production of plants. This could have an effect on nitrogen fixation of legumes. Hence quantification of the effect of fertilizers on nitrogen fixation of legumes is essential and is given an attention. A study on the need for Rhizobium inoculation in lentil was carried in 1989 at two locations of Ethiopia (Ginchi and Dembi). The results showed no significant yield differences among the treatments due to the effect of nitrogen fertilizer application. There was no good nodulation at either of the location, which may be due to local soil factor. Similarly, results of an international inoculation response trial on lentil indicated that there were no significant differences among the treatments.

Production Gap of Lentil: Average productivity of lentil in West Asia, North and East Africa is low due to use of predominantly local cultivars. Local cultivars have the limited yield potential and are also vulnerable to an array of stresses. The yield limiting factors are lack of seedling vigor, slow leaf area development, high rate of flower drop, low pod setting, poor dry matter, low harvest index, lack of lodging resistance, low or no response to inputs and subject to various biotic and abiotic stresses. Lentil productivity particularly in Ethiopia remains low mainly due to cultivation of low yielding, disease susceptible landraces [33]. Low productivity per unit area and low grain quality (small seeded, undesired color, low plumpness) were typical features of Ethiopian lentils. Lentil has been under-utilized relative to other pulses. Breeders have developed very few improved varieties in Ethiopia, in addition the uptake of these has been limited and there has been little research outside breeding.

The production constraints include both biotic (insects, diseases and weeds) and abiotic (temperature, soil fertility and drought) stresses affecting the vertical or horizontal production of lentil [25]. There are about ten important lentil diseases in Ethiopia, among which rust, root rots and *Fusarium* wilt are the major ones. Usually rust causes about 25% yield loss in the normal year while 100% crop loss seldom occu-conditions). Coming up with resistant varieties, such as Alemaya for rust (Uromyces fabae) was a breakthrough in the breeding program and relieve to the subsistence farmer who have been suffering from losing their products of the whole field due to this particular disease. Pea aphids are an important insect pest threatening the crop starting from early seedling to maturity stage. Adzuki bean beetle (Bruchids) is the most serious post-harvest pest (under storage conditions). Coming up with resistant varieties, such as Alemaya for rust (Uromyces fabae) was a breakthrough in the breeding program and relieve to the subsistence farmer who have been suffering from losing their products of the whole field due to this particular disease.

Harvesting Method: Lentil usually matures in three and half months and harvested between mid-September and October. It should be harvested when 90% of the plants start to become yellow and the color of lower pods changed to brown or yellow-brown. The best time for harvest should be carefully monitored to avoid shattering of pods; harvesting should be done only during the fresh period of the day when there is sufficient air moisture [34]. The usual period of harvesting in Ethiopia is from mid- September to October. Most of the time harvesting is performed manually by pulling the entire plant from the soil and then drying and threshing by beating with stick or driving oxen on the heaps [35].

Foreword Plan for Minimizing Yield Gap: Lentil is an important legume crop and plays an important role in human nutrition, animal feeding and soil fertility improvement. Lentil has huge potential of reducing poverty and contributes to sustainable economic development in Ethiopia. Despite the country's potential and sustained development efforts to get the pulse

sub-sector moving, the competitiveness of lentil and hence its contribution to economic development is threatened by low productivity and inconsistent supply of products that does not met both export quality and quantity. Inadequate supply and limited popularization of improved seed sat farming household on a larger scale is the major limiting factor for adopting new varieties. Though, the proportion of farmers growing improved varieties has grown significantly, local varieties are still constituting the lion's share in the domestic and global market. On the other hand, the ever increasing population and ever changing client demand of lentil is the good opportunity for boosting production at farm level.

Improving through Research: Of the pulse growing in Ethiopia, the only crop that got little attention in research, development and external fund attraction was lentil. The release of only few varieties to date is a major indicator of how much the crop is ignored for improvement. Thus, the government must place lentil as a priority crop to receive funding pledges from donors. In addition, lentil should be given at least equal traction with other major pulse crops in terms of domestic research funding. Furthermore, manpower and facility investment should be increased to better enable research related to breeding, agronomy, mechanization, post-harvest handling and nutrition. In this regard, it is essential to involve the private sector in the process and development of new food products.

Using Newly Improved Varieties: The major bottlenecks related to improvement of lentil are availability, quality, sustainably emanating of seed technology and inadequate agronomic packages for production. Thus, it is essential to work with federal and regional seed enterprises, farmers' cooperatives, unions and seed producing farmers with involvement of private sectors in a coordinated manner to ensure adequate supply of locally certified suitable seeds. In addition, conducting on farm trials of improved lentil seeds across a nation in different agro-ecologies before broad distribution would ensure local and regional suitability. The main strategy to create enabling environment for popularization of improved varieties is to increase farmers' awareness and accessto inputs. Finally, putting in place mechanisms for lentil seed standardization, packaging, labeling and distribution that are capable of meeting farmers' demands would help to ensure a sustainable supply of high quality improved seeds.

Average grain yield for on-center and on farm trials range from 943.6 to 1239 kgha^{-1} and 921.4 to 1202 kg ha^{-1}, respectively (Table 2). Alemaya and Teshale had maximum mean grain yield (Table 2). In line with this finding Erksine [18] reported that grain yield had a wide variation (from 10 to 3257kg ha^{-1}) in his lentil materials. This result pointed out that seed yield potential in lentil may be varied from cultivar to cultivar. The grain yield was significantly different in varieties tested in this experiment and the maximum grain yield (1239 kg ha^{-1}) was recorded in variety Alemaya, while Teshale produced average grain yield of 1193.8 kg ha^{-1} (Table 2). The local check and Alemtena gave lower yield 943.6 kg ha^{-1} and 958.6 kg ha^{-1}. The results of on station and on-farm managed trials revealed the outshining and farmers preferred varieties Alemaya and Teshale showed chance of wider acceptance to the farmers in the study area. The superior yielding varieties Alemaya and Teshale produced 1165.1 kg ha^{-1}, 1202 kg ha^{-1} of grain yield, (26.4%) and (30.5%) more than the local check, respectively at on farm trials (Table 2). Similarly over two stations 31.3 % and 26.5 % more than local check was recorded by these top yielding varieties. The average grain yield from the three on farm sites ranged 921.4 kg ha^{-1} for local check to 1202 kg ha^{-1} for variety Teshale (Table 2). Alemaya and Teshale performed relatively better than others in all the villages exchangeable. All the test varieties showed relatively lower performance in Freeze station than Hossana. This might be due to poor soil fertility status particularly Freeze on station and poor management for on farm trials.

At Bobicho on farm, varieties Teshale and Alemaya yielded significantly higher than local checks. The local check yielded significantly lowers (1029.7 kg ha^{-1}). The yields range from 1029.7 to 1352.7 kg ha^{-1} for this site. At wandara Boloso, varieties Teshale, Ada and Alemaya out yielded the local check whereas the differences among them were statistically at par. Similar, in Idiget village, significant yield difference was observed among varieties Alemaya, Teshale, Ada and the rest of varieties. These yields indicate with proper choices of varieties it is possible for farmers to achieve superior yields and improved production packages.

Using Blended (Mixed) Fertilizers: Currently, the sole supplier of fertilizer in the country is the government run Agricultural Input Supply Enterprise. Participating private sector in fertilizer supply and distribution may have great potential to increase competition in the fertilizer market along with supply and access. It is also necessary

Table 2: Mean grain yield (kg/ha) per Lentil varieties at Hossana and Freeze on station and at Wandara, Bobicho and Idiget villages on farm in 2004 /05 meher season

	Yield (kg/ha) of on station trials				Yield (kg/ha) of on farm trial				
Lentil varieties	Hossana	Freeze	Mean	Y.A	Wandara	Idiget	Bobicho	Mean	Y.A
Alemaya	1392.2[a]	1085.9[a]	1239.1	31.3%	1173.4[ab]	1010.94[a]	1310.94[a]	1165.1	26.4%
Chekol	1214.1[ab]	857.8[abc]	1036.0		996.96[b]	756.25b[c]	1093.75[b]	949.0	
Ada	1298.4[ab]	907.8[abc]	1103.1	16.9%	1232.8[ab]	851.56[abc]	1198.44[ab]	1094.3	
Teshale	1420.3[a]	967.2[ab]	1193.8	26.5%	1351.6[a]	901.56[ab]	1352.69[a]	1202.0	30.5%
Alem Tena	1232.81[ab]	684.4[c]	958.6		1170.3[ab]	842.19[abc]	1195.3[ab]	1069.3	
Local	1131.25[b]	756b[c]	943.6		1068.8[b]	665.63	1029.69[b]	921.4	
GM	1281.5	876.6	1079.01		1165.6	838.0	1196.8	1066.8	
CV	12.1	18.52			12.29	16.65	11.01		
LSD (5%)	233.6	244.7			216.1	1973.7	198.62		

Source: Yasin Goa, 2015 Note:-Y.A=Yield advantage

to develop recommendations for organic and inorganic fertilizers that are most suitable for lentil production. These recommendations will depend on soil maps and controlled trials of blended fertilizers to determine the optimal balance of macro- and micro-nutrients.

Farmer-Field Production: At farm-level, the most important problem in lentil production is its poor land preparation, input costs, disease and weed infestation. Providing of effective extension service is inevitable to break the existing resistance by awareness creation through demonstration at farmers training centers. Complementary lentil technologies including tillage frequency, seed treatment, planting techniques, genetically improve seed, disease and insects and weed management practices have to be provided to boost lentil production and to change the livelihood of Ethiopian farmers. In addition, the use of repetitive plough as an option in increasing frequency tillage costs should be further explored. In addition, mechanization research should focus on the development, testing and demonstration of intermediate technological developments to encourage changing farmers' use of traditional farm tools. Technologies from outside the country should also be considered, though with any necessary adaptations/modifications to local conditions. The crop can be grown in various agro-ecological zones and is useful for rotations with cereals. Therefore, its role in crop production systems remains important especially in Ethiopia.

Post-Harvest Loss Minimizing: Indeterminate growth habit of lentil makes not to mature at the same time and brought sever shattering problem before harvest. The timing of lentil harvesting is one of the mean of reducing lentil shattering lose. Harvesting lentil while it is still green is recommended as one option to reduce shattering. The promotion of multi-crop threshers would also help reduce post-harvest loss significantly, as well as increase lentil grain quality and reduce post-harvest costs. In addition, research on the development and promotion of tools (harvester) that would enable farmers to harvest lentil on time is important.

Make Cash Oriented: As noted earlier, lentil has wider market opportunity domestically with increasing and ever changing client demand. There is also an increasing export demand, which can be met with research and development efforts towards increasing yield, setting up seed supply schemes and improving quality through processing industries. Even though, the price of lentil is boosted both domestically and globally still farmers are not benefited much because of involvement of brokers in the process. Strengthening and promotion of farmers' organizations (e.g. cooperatives) and the introduction of warehouse receipt system would alleviate farmers immediate cash needs. This would enable farmers to protect from deceive middle men, which would result in increased revenues. The promotion of farmers' level grain marketing or ganizations/cooperatives would also provide an additional market outlet and options to farmers, thus increasing their bargaining power and making them less exposed to the possibility of price collusion and cheating by traders. Finally, increasing farmers' access to price information increase the transparency of the market and would enable farmers make better selling decisions and provide increased bargaining power.

CONCLUSION AND RECOMMENDATION

Lentil is an important legume crop and plays an important role in human, animal feeding and soil improvement. It is amongst the principal cool season food legumes and one of the less selective in terms of climate

and soil features. World lentil production has increased steadily over the past decade. It is one of the heavily consumed pulse crops in Ethiopia and is a popular ingredient of every day diet in the majority of households. Lentil is grown in Ethiopia by small holder farmers without mechanization. Ethiopia shows an increasing trend in lentil productivity through enhancing net cropped and productivity per unit area. Its productivity per unit area is still very low compared to other pulse crops cultivated in the country. Ethiopia was exporter of lentil 10years ago but domestic heavy demand and high price competes well with international market. These freeze supply of products to export market aggravated with low yielding potential of existing land races and limited research attention in Ethiopia. Thereby, increasing lentil production should be considered. Agronomical and breeding research should be done and its genetic characteristics should be illuminating.

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