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Major Crops Production Diseases/Pests Affecting them and their Controlling Methods in Debub Omo Zone

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Abstract

Agricultural production and productivity growth require fostering the linkages between the agricultural and nonagricultural sectors that is growth in agriculture does not occur independently of that in nonagricultural sectors. The production and productivity of the major crops in Debub Omo Zone is very low in relation to the land coverage due to poor agricultural technology utilization by the end users and low skill on farm management practices. To solve these problems and increase production and productivity, strong research extension system is important. The study was conducted in Debub Ari, Malle, Bena-Tsemay, Hammer and Dasenech Districts. The major crops grown in the area are Maize, Sorghum, Teff, Finger millet, Haricot bean, Ground net, Sesame, Sun flower, Sweet potato and cassava.

Keywords: Production; Productivity; Agricultural inputs; Production constraints

Introduction

Ethiopia is heavily reliant on agriculture as a main source of employment, income and foodsecurity for a vast majority of its population[1]. Agriculture generates 40% of gross domestic products (GDP)[2], and accounts for 85 and 90% of total employment and exports, respectively [1].Agriculture is the most important determinant of Southern Nation Nationality and peoples' Regional state ofEthiopia economy and it will continue toplayimportantroleinthe overalleconomydevelopmentoftheregion. However, an agricultural system in the region is at subsistence level.The livelihood ofover93%ofthepeopleoftheregiondependonit, levelandfoodinsecurity problemisincreasingat shocking rate. Moreover, rapid natural resource degradation is prevalent [3].Also, Agricultural activities in the country as whole have been taking place under widely varying dynamic contexts such as physiographic, agro-ecology, climate and soil conditions. The success in the sector is then strongly influenced by topographic settings, degree ofhuman interferences and underlying biophysical features [4,5].

EconomyofEthiopialargelybasedonagriculturewhich accounts for 46.3% of the gross domestic product, 83.9% of exports, and 80% of the labor force in 2006/2007, compared to44.9%, 76.9% and 80% in 2002/2003, andagriculture remains the Ethiopian economy'smost importantsector [6].

Agricultureisa key factor inSouthern Nation Nationality and peoples Region economy and it will continuetoplaytheleadingroleintheoveralleconomic development of the region. Thefoodinsecurityproblemsintheareacausedby complex factors ranging from natural ones such as recurrent drought, degradation of natural resources, lack of appropriate technologies, weakinstitutional supportandlackof alternative employment [7]. Also farmingpracticesbroughtdisturbancestothe ecosystemsparticularly on soilsby disruptingthestable naturalbiogeochemicalprocessesofnutrientcycle,causing rapid nutrient depletion [8], and attributing to changes on the landscape characteristics [9,10]. This paper highlights the major crops production, challenges and controlling methods of farming system. Hence this study was conducted in farming system based six districts (Debub Ari, Malle, Bena-Tsemay, Hammer and Dasenech) of Debub Omo Zone with the following objectives:

a. To assess the area coverage production and productivity of major crops.

b. To identify the major crops production diseases and pests.

c. To differentiate the mechanisms to manage diseases and pests.

Methodology

The study was conducted in Five Districts (Debub Ari, Malle, Bena-Tsemay, Hammer and Dasenech) of Debub Omo Zone. The districts were selected purposively based on crop production from eight districts found in the Zone. From these eight districts one agrarians from two agrarian districts and two pastoralist districts from four pastoralist districts were selected by probability sampling respectively, whereas the two semi-pastoralist districts were taken as they are purposively. The study was conducted by Socio-economic researchers of Jinka Agricultural research center. Before starting the study, the socio-economic researchers' team made short discussion on the preparation of checklist that helps to cover the study areas in accordance with the objective of the study.

A total of five districts were selected according to the aim of the study from those one agrarian, two pastoralist and two semi-pastoralist districts were covered. Based on the checklist in collaboration with each district Agricultural and natural resource management office data were collected from previously documented hard and soft copy materials with the help of crop extension and protection experts as well as from Zonal office from the year (2005-2010) on wards.

Results and Discussion

Crop production and productivity

Since agriculture constitutes a large share of national output and employs a majority of the labor force in most developing countries the sector has been the base for development. Agriculture has been seen as a low productivity, traditional sector that only passively contributed to development by providing food and employment. In the agriculture sector, major crops are the main source of food staple to most of people and provision of foreign exchange earnings and raw material to the industrial sector of the country as a whole and the zone in particular. It also enhances the food security of the society. According to these the major types of crops cultivated in the zone include cereals crops (maize, sorghum, Teff, Wheat, Barley, Finger millet) Pulses crops (Haricot bean, Field Pea, Mug bean) Oil Crops (Ground net, Sesame, Sun flower) and Root or Tuber Crops include (Sweet Potato, Potato, Cassava, Taro Inset). Farmer's whose livelihood depends on crop production produces the crops for consumption as well as for income generation and as a seed for further production. The type of cropping system they use in the zone is intercropping, sole cropping, crop rotation, fallowing. The area coverage of each type of crop, production and productivity recorded in the last five years from the year 2005-2009 E.C.

The table illustrates the major crops produced in the Zone according to their type, in which they are categorized as cereal crops, pulse crops, oil crops, root and tuber crops and vegetables. Also, the type of crop, name of crop, area in hectare, production and productivity of major crops in each district was identified. Based on this study words like area in hectare, production and productivity are explained below depending on the result of the study.

Area in (Ha): According to this study area in hectare shows the total amount of area covered by each major crop in each production year from 2005-2009 E.C for each district.

Production: Is the process of combining various inputs in order to get output. Based on this study production of the major crops indicate the output produced from the total amount of land in each five consecutive production year for each district by using inputs like chemicals, fertilizer seed land labor etc.

Productivity: Describes various measures of the efficiency of production. A productivity measure is expressed as the ratio of output to inputs used in a production process, i.e. output per unit of input. Following this principle, the study calculated productivity as; the total amount of output produced in each production year divided by the total amount of land used. Figuratively the data was arranged based on their importance in the table form below (Table 1).

Input utilization to increase production and productivity

Agricultural inputs are defined as products permitted for use in production system. These include seed and fertilizer which used to increase the crops production and productivity.As indicate in the table above the agro pastoralists or agriculturalists in the study area uses the well-known inputs like seed and fertilizer in which some of the seeds they utilized were from government source while majority of the seed were from local or farmers themselves. Most of the time they used improved seed for cereal crops(Table 2).

Major diseases and pests that affects production and productivity and the controlling methods

Several insects/pests groups attack the flowers, fruits, leaves, steams, roots and branches of different crops. Diseases/ pests affecting the major type of cereal crops are MLD, armamo, cut worm, rust and wilt, pulse crops leaf miner, pod borer, pizzeria root rot, leaf spot, aphids, alternaria and tuta, oil crops mile bug, sting bug, green bug, cricket, fruit fly and root rot, Vegetables Root rot, Whitefly and Trips, powdery mildew, damping off, late blight, Root and tuber Crops, Moosic (virus) Leaf miner and wireworm, Powdery mildew, alternaria species, Mole rat, fungi and Cutworm whereas Fruits are affected by Powdery mildew, Trips (Pest), fruit fly and mango hoper(Table 3).

According to the table above producers undertake many activities to enhance production and productivity and to control diseases and pests that affect the crops they produce in their areas. Among the mechanisms they have used were using improved and disease resistant seed, increasing frequency of tillage, Crop rotation and shifting cultivation, Mechanical and chemical and that of cultural methods.

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Table1: Area coverage production and productivity of each type of major crop.

District	Type of Crop	Name of Crop	2005 production year			2006 production year			2007 production year			2008 production year			2009 production year		
			Area(Ha)	Production	Productivity	Area(Ha)	Production	Productivity	Area(Ha)	Production	Productivity	Area(Ha)	Production	Productivity	Area(Ha)	Production	Productivity
South Ari	Cereal	Maize	12061	535201.8	44.37	12716	646154.8	50	2856	128520	45	8829	308232	34	12580	534691	42
		Sorghum	963	20119	20.9	1366	22127	16	1510	24160	16	5400	118800	22	465	7905	17
		Teff	2079	31074.3	14.95	1903.5	19564.7	10	640	5120	8	212.5	1275	6	516	1808	3
		Wheat	2914	64108	22	1841	56965.5	30	1005	31155	31	161	8855	55	617	6178	10
		Barley	2703	75114	27.8	1228	26244	21	891	10694	12	582	5820	10	751	7510	10
		Finger millet	529	6245.5	11.81	563	6577	11	333	3330	10	325	3575	11	498	4239	8
	Pulse	Haricot bean	1034	10931.6	10.57	1141	16850	14	1044	12006	11	2135	17590.5	8	3100	28680	9
		Field pea	710	7100	10	499.88	5008.1	10	946	8514	9	1600	19200	12	1542	13878	9
	Oil	Ground net	402	3216	8	474	8892	18	375		0	9.5	238	25	348	2959.5	8
		Sesame	385	3010	7.82	318	2169	6	1020	4080	4	287	1435	5	9	36.5	4
		Sun flower	264	2904	11	242	2420	10	85	850	10	99	990	10	142	1420	10
	Root and Tuber	Sweet Potato	644	97080	150.75	638	119600	187	348	50460	145	743	144885	195	1565	250402	160
		Potato	286	33300	116.43	362	43250	119	100	17500	175	454	79450	175	866	138670	160
		Cassava	-	-	-	-	-	-	90	6750	75	255.5	19162.5	75	460	36800	80
		Taro	-	-	-	-	-	-	45	4950	110	421	46310	110	344	75680	220
		Inset	-	-	-	-	-	-	324	113400	350	501	175350	350	469	91455	195
Bena -Tsemay	Cereal Crop	Maize	9080.5	199416	21	7117	273630	38	5596	180452	32	5341.43	170925.76	32	5520	176640	32
		Sorghum	7520	120448	16	5872	105696	18	5192	88264	17	3877.38	65915.46	17	4353	74001	17
		Teff	581.625	4857.75	8	558.75	7025.25	12	28.5	315	11	27.625	303.875	11	119	1309	11
		Finger millet	767.25	5708.25	7.44	156	1248	8	93.5	935	10	352	3520	10	429	4290	10
	Pulse Crop	Haricot bean	2722	19054	7	1617	2102	1.3	1486	14860	10	1978.9	19788.75	10	2209.5	22094.5	10
	Oil Crop	Ground net	30.91	247.28	8	10.5	84	8	15.875	142.875	9	35	315	9	82	738	9
		Sesame	200	800	4	2438	12247	5	1334.75	5836.3	4	572.375	2289.5	4	383	1532	4
		Sun flower	83.5	584	6.99	59	354	6	49.5	495	10	98.875	988.75	10	50.5	505	10
	Root Crop	Sweet potato	-	-	-	55	110	2	9	2025	225	98.875	22246.9	225	142	31950	225
	Fruit	Tomato	-	-	-	9.75	180	18	1.5	225	150	2	300	150	13	1950	150
	Vegetable	Cabbages	-	-	-	19	225	11	2.5	532.5	213	149	31737	213	681	145053	213

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Dassenech	Cereal	Maize	559	15374	27	557	14663.25	26	103.53	2898.75	28	560	7240	12	144.254	1803.2	12
		Sorghum	1220	35906.25	29	1232	35180	28	175	2380	13	830	10100	12	644.254	14179.66	22
	Pulse	Mug bean	167	763	4	158	692.5	4	29	68.5	2	67.5	258.8	3	92.51	370	4
	Oil	Sesame	200	800	4	2438	12247	5	1334.75	5836.3	4	-	-	-	-	-	-
Malle	Cereal	Maize	6953.1	229847.7	33.1	4569.51	166790.7	36.5	7103.63	212157.5	29.87	9994.14	222654.1	22.3	12679	135503	10.69
		Sorghum	7472.6	116987.2	15.66	5023.5	70759.63	14.09	5739.65	102203.93	17.81	6789.63	63462.9	9.4	7881	72356	9.18
		Teff	296.9	5641.1	19	-	-	-	-	-	-	-	-	-	2967	5934	2
		Finger millet	162.5	1218.75	7.5	-	-	-	139.5	720.72	5.17	643.875	3612.75	5.61	1323	4406	3.33
	Pulse	Haricot bean	452.86	4009.94	8.85	356.1	3583.25	10.06	602.84	4614.4	7.65	1053.38	4382.925	4.16	4783	15113	3.16
	Oil	Ground net	89.86	359.5	4	157.48	1258.25	7.99	4074.1	9200.8	2.26	230.45	1954.05	8.48	238	1899	7.98
		Sesame	10495.5	67269.1	6.41	6797.58	27017.3	3.97	40.5	283.905	7.01	865.152	1393.455	1.61	154	634	4.12
	Root and Tuber	Sweet Potato	310	27900	90	247	39520	160	103.63	13314.38	128.48	280.75	31516.25	112.26	847	30775	36.33
		cassava	37.75	4934.25	130.7	20.25	3280.5	162	102.25	818	8	266	46340.8	174.21	391	14064	35.97
Hammer	Cereal	Maize	2873.25	40225.5	14	4610	59072	12	1597	30235.9	18	1616.6	30667.5	18	821.48	11103.62	13
		Sorghum	3203	40037.5	12.5	7019	93871.25	13	1434.2	25385.73	17	2031.35	30852.1	15	1292.51	15237.7	11
	Pulse	Haricot Bean	560.5	2702.5	4.82	921	5717.4	6	297.15	1515.47	5.1	148.8	744	5	468.4	2425.3	5
	Oil	Sesame	-	-	-	84	288.25	3.43	282	992.64	3.52	361.23	1078.4	2.99	9.23	32.4	3.5

Source: Woreda and Zonal Agriculture and Natural Resource Management Office.

Table 2: Inputs used to increase production and productivity.

Type of Crop	Name of Crop	Type of Seed	Name of Variety	Seed Source	Fertilizer Used in (Kg)	
					NPS	Urea
Cereal Crops	Maize	Improved	BH140/MELKASA2 / MELKASA4	Gov't	100	100
	Sorghum	improved	Gubiye and Abishire	Gov't	100	100
	Teff	Improved	Kunicho	Gov't	100	100
	Wheat	Local/Improved	Damip	Farmers/Gov't	100	100
	Barley	Local	Local	Farmers	No	No
	Finger millet	Local	Local	Farmers	No	No
Pulse Crops	Haricot bean	Improved	Nassir	Gov't	No	No
	Mug bean	Local	Local	Farmers	No	No
	Field Pea	Local	Local	Farmers	No	No
Oil Crops	sesame	Improved	Humera	Gov't	100	50
	Sun flower	Local	Local	Farmers	No	No
	Ground nut	Local	Local	Farmers	No	No
Vegetables	Cabbages	Local	Local	Farmers	50	50
Root and tuber	Potato	Local/Improved	Local/Hawassa 84	Farmers	No	No
	Sweet potato	Local/Improved	Local	Farmers/Gov't	50	50
	Cassava	Local	Local	Farmers	50	50
	Taro	Local	Local	Farmers	50	50
	Banana	Local	local	Farmers	No	No
Fruits	Papaya	Local	Local	Farmers	No	No
	Avagado	Local	Local	Farmers	No	No
	Mango	Local	Local	Farmers	No	No

Source: Woreda and Zonal Agriculture and Natural Resource Management Office.

Table 3: major type diseases/pests and their controlling methods.

Type of crop	Name of crop	Diseases/pests affecting them	Controlling methods
Cereal Crops	Maize	MLDandArmamo, cut worm , weeds and fall army worms	Mechanical, chemical and cultural
	Sorghum	Armamo	Mechanical and chemical
	Teff	Rust	Cultural or chemical
	Wheat	Wilt	Mechanical and chemical
	Barley	Wilt	Mechanical and chemical
	Finger millet	Rust	Crop rotation and shifting cultivation
Pulse Crops	Haricot bean	Leaf miner, Pod borer, Pizzeria and Root Rote	Mechanical and chemical
	Mug bean	Leaf miner, Pod borer, Pizzeria, Root Root	Mechanical and chemical
Oil Crops	sesame	Mile Bug, Sting bug, Green bug andCricket	Mechanical and chemical
	Sun flower	Fruitfly	Mechanical and chemical
	Ground nut	Root rot	Mechanical and chemical
Vegetables	Cabbages	Root, rot , Whiteflyand Trips, powdery mildew , damping off, late blight	Using improved disease resistant seed and Crop rotation
Root and tuber Crops	Beet root	Moosic(virus)	Increasing frequency of tillage Crop rotation
	Onion	Leaf miner and wireworm	Mechanical and chemical
	Potato	Powdery mildew, alternaria species	Mechanical and chemical
	Sweet potato	Mole rat and fungi	Crop rotation and shifting cultivation
	Cassava	Cutworm	Crop rotation

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Fruits	Banana	Anthracnose(Fungi)	Mechanical and chemical
	Papaya	Powdery mildew	Mechanical and chemical
	Mango	Trips (Pest), fruit fly, mango hoper	Mechanical and chemical

Source: Woreda and Zonal Agriculture and Natural Resource Management Office

Conclusion and recommendations

Agriculture remains the key sector for food security, employment, growth, despite improper land use, agro-ecological zones, production and consumption patterns. Agriculture lead growth has the largest impact on reducing the depth of poverty. ThelivelihoodofOver93%ofthepeopleofSouthern NationNationalityandpeoplesRegionalstateofEthiopia dependent on agriculture; however, agricultural system in the regionisatsubsistencelevel.Much effort has been needed to Produce or adapt agricultural technologies that would help to boost production and productivity but only few technologies adopt by the end users. There are a number of production problems which occurs at different section of production like input utilization (seed and fertilizer), land fragmentation pests and diseases. Producers in the study area do not uses production inputs in a recommended amount for all of the crops listed at a right time to enhance the production and productivity. To enhance production and productivity of the major crop's introduction of packages of modern inputs like improved seeds, fertilizers, pesticides and chemicals that dramatically increases crop production is important at recommended amount and right time to enhance food security. To address the packages to the small holder farmers, public interventions were crucial, so there should be strong relationship between research, extension, and the small land holding farmers involved for alleviating these production, and technologicalproblems. Finally, adoption of improved technologies which helps in production and marketing of these agricultural products are very essential in the studied area as a result all of the crops and others are recommended based on amount of land, market demand and other natural and manmade factors which affects productivity.

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