

Assessment of Farmers' Crop Management Practices in Kano River Irrigation Project, Nigeria

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ABSTRACT: Surveys were carried out in Kano River Irrigation Project to document the crop production management practices of farmers. Primary data were collected through the use of semi-structured questionnaires randomly administered to 80 farmers within the study area. Descriptive statistics were used to analyse the data. The findings indicated that majority of the farmers in the study area were male (97%), aged between 31-50 years (91%) and fairly educated as most (56.5%) have attained post primary education. They practice farming as their primary occupation (78%) and lease the land (70%) they use for crop production. The agronomic/cropping patterns of the surveyed farmers indicated they cultivate less than 1 hectare (62%), practice mixed cropping and grow maize and tomato as major crops. They plant the crops at wide spacings, controlled weeds manually using hoes and applied both organic and inorganic fertilizers below the recommended doses. Crop water management indicated that majority of farmers practice the 5-day irrigation interval for most crops except watermelon where a majority indicated a 10-day irrigation schedule. Water conservation was also practiced by a majority of surveyed farmers. It is therefore concluded that consideration of the way to strengthen the farmers skills on improved farming practices would help to intensify their potentials for efficient production in the area.

Keywords: *Crop management, Farmer practices, Irrigation*

INTRODUCTION

The attainment of food security and improved livelihoods is an important challenge in Nigeria. Rapid population growth and increase demand for food have made rainfed production inadequate to meet food security needs of the country (Sani *et.al.*, 2013). Nigeria is blessed with abundant land for irrigated cropping, a total estimated irrigable land was put at 3.14 million ha (Oni, 2009). To address the challenge of food security and sustainable

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livelihoods, the Nigerian government made huge investments in the development of infrastructure for irrigated agriculture with the creation of River Basin Development Authorities. However, despite these interventions, output from the irrigation schemes has not been commensurate with the massive investments made (Sani *et.al.*, 2013). A number of reasons have been advanced for this and include poor scheme development, inadequate extension services, low adoption of technologies by farmers among others.

Some researchers (Machethe *et al.*,2004; Denison and Manona, 2007, Philip *et al.*, 2009) have identified limited skills in crop production among farmers as one of the constraints to improved productivity in irrigated agriculture. Tomato and maize are among the most important crops grown in the Kano River Irrigation Project (KRIP) in terms of number of growers and cultivated area. Studies on the poor performance of irrigation schemes in Nigeria tend to focus primarily on operation, maintenance and system design neglecting farmer production practices. With declining investments and good land for expansion of irrigation projects, significant increases in irrigation productivity will have to come from improved agronomic practices rather than increasing area under cultivation. In schemes where water is non-limiting, as in most sectors of the Kano River Irrigation Project (KRIP), farmers tend to over apply leading to rapid deterioration of soil and irrigation infrastructure. Studies on production practices by farmers are very few, in order to achieve increased crop productivity by farmers, there is a need to assess the cropping systems and their management by farmers and relate this to crop productivity. This study was therefore undertaken to assess crop production practices with a view to linking them to the observed performance on the scheme.

MATERIALS AND METHODS

The study area, Kano River Irrigation Project is located between latitude 11° to 12° North and longitude 8° to 9° East; about 35 kilometers South East of Kano City along Kano-Kaduna Highway. The project is

enclaved by four local government areas, namely Bebeji, Garun Mallam, Kura and Bunkure. The headquarters of the project is located in Kura town. The project is gravity operated with a planned area of 22,000 ha with out of which about 15,000 ha (HJRBDA, 2000) have been developed. The study area experiences three distinct seasons annually: the rainy season from June to September, the cool dry season from October to February, and the hot dry season from March to May. A multi stage sampling procedure was adopted to draw the sample for this study. In the first stage, all four Local Government Areas of the project site were purposively selected. Secondly, two sectors were selected randomly from each of the four Local Government areas; a sector is a farming village with complete irrigation network system (Tanko, 1999). Finally, 10 irrigation farmers were randomly selected from each sector to make up a sample size of 80. Primary data which included socio-economic (age, sex, gender, level of education, type of occupation and land ownership) and management practices (planting practices, weed management practices, fertility management practices, irrigation water management practices) were collected from the respondents through the use of semi-structured questionnaires. Data collected was analysed using SPSS 17 (SPSS Corp. USA). Descriptive statistics was used to achieve the objectives of this study.

RESULTS AND DISCUSSION

Socio-economic characteristics of farmers

The socio-economic characteristics of the respondents are shown in Table 1. Results indicated that the majority of the farmers (69.8%) are aged between 31 to 50 years.

This indicates that youths (21-40 years) and older people (> 50 years) are not involved in

agricultural production in the area.

Table 1: Socio-economic characteristics of surveyed farmers at Kano River Irrigation Project during 2014 Dry Season

Variables	Frequency	Percentage
Age (Years)		
Below 20	7	9.2
21-30	9	11.8
31-40	23	30.3
41-50	30	39.5
51-60	7	9.2
Gender		
Male	74	97.4
Female	2	2.6
Level of education		
Islamic literary education	3	3.9
Adult education	22	28.9
Primary education	8	10.5
Secondary education	21	27.6
Tertiary education	22	28.9
Primary occupation		
Fulltime farming	59	77.6
Part time farming	17	22.4
Land ownership		
Full ownership	53	69.7
Rented/leased	23	30.2

This has far reaching implications because the youths tend to shy away from farming instead preferring menial jobs. Only 2.6% of those interviewed were women. This is not uncommon in this area as most farming activities tend to be dominated by men while women are involved mainly with processing of agricultural produce. A greater majority of respondents have attained some level of education, and therefore literate and should be well informed as to the choice of improved farming practices which will increase adoption. Farming was found to be the primary occupation of the majority of respondents (77.6%), only 22.4% of the respondents consider farming as a part time activity. Land ownership in the surveyed

areas was mostly full ownership (69.7%) and rent/lease (30.2%) from other farmers under the control of the supervisory agency, Hadejia Jama'are River Basin Development Authority (HJRBDA).

Agronomic/cropping patterns of surveyed farmers

Table 2 summarises the agronomic/cropping patterns of surveyed farmers. Majority of the farmers (61.8%) had landholdings of less than 1 hectare, 31.6% had between 1-2 ha and only 6.6% had between 3-4 ha. The dominant cropping system practiced in the scheme is mixed cropping as indicated by 96.1% of respondents while only 3.9% of the respondents practice sole cropping. Majority

of the respondents cultivate maize and tomato and to a lesser extent onion,

watermelon, cowpea and sweet pepper in sole or mixed cropping.

Table 2: Agronomic/cropping patterns of surveyed farmers at Kano River Irrigation Project during 2014 Dry Season

Parameter	Frequency	Percentage (%)
Farmland		
< 1 ha	47	61.8
1-2 ha	24	31.6
3-4ha	5	6.6
Cropping system practiced		
Sole cropping	3	3.9
Mixed cropping	73	96.1
Major Crops grown		
Maize	48*	63.2
Tomato	70*	92.1
Onion	33*	43.4
Watermelon	15	19.7
Cowpea	5	6.6
Sweet pepper	3	3.9

*Multiple responses

AGRONOMIC/CULTURAL PRACTICES

Plant spacing

Table 3 shows the planting patterns of farmers in the area of survey. Majority of farmers (72.3%) planted maize wider than recommended (Appendix 1), while 17.1% followed the recommended spacing. For tomato (81.6), onion (77.6%) and

watermelon (92.1) farmers used plant spacings they felt were convenient for them and did not follow recommendation. For maize/tomato intercrop, 89.5 of surveyed farmers used spacings wider than recommended. Use of proper or recommended spacings increases farmers' yield and income.

Table 3: Planting patterns of surveyed farmers at Kano River Irrigation Project during 2014 Dry Season

Crop/mixture	Spacing (cm)		Frequency	Percentage
	Inter row	Intra row		
Maize	75	25	13	17.1
	75	35	55	72.3
Tomato	75	30	62	81.6
Maize/tomato	75	40	68	89.5
Onion	10	10	59	77.6
Watermelon	50	50	70	92.1

Weed management

Table 4 shows the weed management practices of surveyed farmers. Almost all the farmers surveyed (98%) practiced hoe weeding for all the crops evaluated in the area. Hoe weeding was done before planting for only onion and watermelon. All the

farmers practiced hoe weeding for all the crops during the post emergence period. Chemical weed control was used for maize, tomato and maize/tomato mixture only before planting. The dominant method of weed control therefore could be said to be manual weeding.

Table 4: Weed management practices of surveyed farmers at Kano River Irrigation Project during 2014 Dry Season

Method and Time of weeding	Proportion of farmers practicing (%)				
	Maize	Tomato	Maize/Tomato	Onion	Watermelon
Hoe weeding	98	98	98	98	98
Before planting	-	-	-	98	-
Post-emergence	98	98	98	98	98
Never	-	-	-	-	-
Chemical control	56	32	47	-	-
Before planting	56	32	47	-	-

Fertility management

Table 5 shows the fertility management practices of surveyed farmers. Farmers surveyed used both organic and inorganic fertilizers to supply nutrients to all crops covered in the survey. The degree of usage of each type of fertilizer however, varied from crop to crop. Onion recorded the highest usage of organic fertilizer (58%), this was followed by tomato (38%), maize/tomato mixture (21%), maize (12%) and watermelon

(12%). Almost all surveyed farmers (98%) used inorganic fertilizer on all the crops. Time of fertilizer application differed widely among farmers surveyed. At planting, fertilizer was applied only on maize (32%), maize/tomato mixture (17%) and tomato (2%). A majority of the farmers applied the first dose of fertilizer at 2 weeks after sowing of surveyed crops, 37% of farmers applied fertilizer to maize at 6 weeks after sowing and the second dose at 8 weeks after sowing.

The amount of fertilizer applied varied among crops applied. For maize/tomato mixture, 36% of surveyed farmers reported that they apply the recommended dosage, 24% for sole maize, 19% for onion, 13% for tomato and 11% for watermelon. However, 89% of surveyed farmers applied fertilizer

below the recommended rate for watermelon, 87% for tomato, 81% for onion, 76% for maize and 64% for maize/tomato mixture. The results indicated that majority of farmers apply fertilizer below the recommended rates (Appendix 1).

Table 5: Fertility management of surveyed farmers at Kano River Irrigation Project during 2014 Dry Season

Variable	Proportion of farmers practicing (%)				
	Maize	Tomato	Maize/Tomato	Onion	Watermelon
Type of fertilizer					
Organic	12	38	21	58	12
Inorganic	98	98	98	98	98
Time of application					
At planting	32	2	17	-	-
2 WAP	79	83	92	98	98
6WAP	37	-	-	-	-
8WAP	68	98	83	80	89
Amount applied					
Recommended	24	13	36	19	11
Below recommendation	76	87	64	81	89

Irrigation water management

Table 6 shows the irrigation water management practices of surveyed irrigated fields of the respondents in the area. An irrigation schedule of 5 days interval was used by a majority of farmers for all crops covered in the survey except watermelon where only 39% of respondents applied water every 5 days. Eighty nine percent of farmers who grow watermelon indicated that they irrigate every 7 days. However, 3% of farmers indicated that they irrigate maize at 10 days intervals. The results indicated that only few farmers follow recommended irrigation schedules (Table 7) with the highest proportion being 36% for

maize/tomato mixture. On the other hand, a majority of farmers indicated that they use the plant observation method as a criteria for irrigating their crops with the highest being 89% for farmers growing watermelon. Very few farmers indicated they employ the feel method as criteria for irrigating their crops with the highest respondents being farmers growing maize (6%). The results indicated that farmers practice water conservation with a majority indicating the practice for all crops surveyed except watermelon where only 39% practiced water conservation against 58% who do not.

Table 6: Irrigation water management of surveyed farmers at Kano River Irrigation Project during 2014 Dry Season

Variable	Proportion of farmers practicing (%)				
	Maize	Tomato	Maize/Tomato	Onion	Watermelon
Scheduling					
5 days	85	83	82	85	39
7 days	17	8	12	19	89
10 days	3	-	-	-	5
Criteria for scheduling					
Recommended	2	13	36	19	11
Plant observation	88	73	80	71	89
Feel method	6	2	4	2	4
Water conservation					
Yes	93	72	88	63	39
No	5	12	15	21	58

DISCUSSION

The results of this study indicate that youths (21 – 40 years) are not engaged in irrigated agricultural production activities in the study area. Similar results were reported by other researchers (Ofuoku *et al.*,2008). This has negative implications for irrigated farming as youths who constitute able bodied group of the society that can withstand the drudgery associated with agricultural production are not engaged in farming. Most youths prefer to do other less stressful jobs or engage in marketing of agricultural inputs and products. The results also indicated that few aged people (60 years and above) are involved in farming activities. The domination of farming activities by men in the study is not unfamiliar as this is what obtains in most areas of Northern Nigeria. Women are mostly concerned with harvesting and processing aspects of agriculture. The educational level of respondents indicated that majority of the farmers are literate and it should be expected that the farmers in the study area should be receptive to improved practices and technologies. The land ownership in the study area is solely the preserve farmers but with supervisory role of the agency, the Hadejia-Jama'are River Basin Development

Authority, which control what farmers can plant and provides water and other services. The majority of farms are less than a hectare in size. This might be an indication of the level of competition for irrigated land in the scheme and could also be due to the economic status of the farmers and their ability to source for capital to cultivate large fields. The cropping system is dominated by mixed cropping which is a dominant practice in the tropics. The advantages of intercropping have been widely documented. Tomato and maize are the major crops cultivated in the area. Tomato served as a major cash crop in the area and is transported to near and far away markets. The surplus are dried and used for home consumption and sale in the local markets. Maize grown in the scheme is normally consumed fresh as green maize and has a higher economic value than the grain maize.

Agronomic practices

The results indicated that a majority of farmers plant crops at wider spacing than the recommended (Table 7). Proper or recommended plant spacing is especially important as it translates to optimum plant population per unit area of land. Plant

population is invariably related to yield. Wider plant spacing may lead to less than optimal number of plants per unit area which may result in sub-optimal yield. Reasons for the use of wide spacings by farmers could be due to the inability of farmers to afford the usually high nutrient requirements of crops and also as a result of mixed cropping. Majority of farmers employed hoe weeding to control weeds on the farm, with minimal use of pre plant herbicides. Farmers also used

both organic and inorganic fertilizer for crop production. The synergetic effect of these two sources of nutrients could be beneficial for sustainable crop production if used in the right way. Farmers practiced 5-day irrigation intervals for most crops. These may be injurious to some crops, while being optimum for some crops. Water conservation was also reported to be practiced by a majority of farmers which sustains crop yields.

Table 7: Recommended Agronomic Practices for Selected Irrigated Crops*

S/No	Agronomics practices	Maize	Onion	Tomato	Water Melon
1	Growing period day	90-120+14-28 in nursery	120+21-28 in nursery	90-120+14-28 in nursery	80-100
2	Variety	SAMTOHA 1-5 UC 80539 (Heat tolerant)	SA; PH-4 Wuyan Bijimi, Maiduguri improved	Hybrid mazie – T2E-SR-W-T2E-RE-Y	Sugar baby
3	Spacing (cm)				
	a) Between rows	75	20	75	200
	b) Between plants	45	10	30	150
4	Seed rate kg/ha	0.25-0.5 kg/ha	5kg	15-20	1.0-1.5kg/ha
5	Temperature requirement (°C)	18-25	15-25	20-35	25-35
6	Day length requirement for flowering	Day neutral	Long day/day neutral	Day neutral/short day	Day neutral
7	Sowing/Transplanting date	Early: Sept - Oct Late: Jan/Feb	Oct - Nov	Early: Oct Late: March/April	Oct. II low
8	Soil requirement	Light loam, well drained PH 5-7	Medium textured soil PH 6-7	Well drained medium textured soil. PH 5-7	Sand loam PH 5-7
9	Fertilizer requirement kg	100	65	150	60
	N	50	40	50	30
	P	40	45	50	
	K				

10	Irrigation				400-600
	a) Amount	400-600	350-550	500-800	5-7
	b) Frequency (day)	5-7	5-7	7-10	15-20
	c) Number of irrigated	15-20	15-20	15-18	
11	Weed control	2HW at 3, 6 WAT or 0.5kg ai/ha Metrbu. Pretransplant.	3 HW @ 3, 6 & 9 WAT or 1.5kg a.i/ha Oxadiazon as pretransplant	2HW at 3, 6 WAS or Primagran 500FW 4, 1/ha as PE	2HW at 3 &6 wap
12	Pest and disease control	1.2 l/ha Cymbush EC regular irrigation	Rogo EC 1.2 L/ha use resistant varieties	1.2 l/ha Cymbush EC	Vetox 1.7kg/ha in 170lts of water
13	Yield T/ha	30-50	10-12	330-50	25-30

CONCLUSION

From the results of this study, it can be concluded that farmers in the Kano River Irrigation project practice mostly mixed cropping with maize and tomato being the predominant crops grown by farmers. Other major crops include onion and watermelon. The results indicate that the practices are not as efficient as should be and could be better. The production practices of the farmers need to be improved by adoption of more efficient irrigated crop production skills.

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