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EFFECT OF REHABILITATION TECHNIQUES ON COCOA BEANS YIELD IN SOUTHERN NIGERIA

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Abstract

The study investigated effects of rehabilitation techniques on Cocoa bean yield in Southern Nigeria. Three hundred cocoa farmers were selected using multistage sampling procedure. Data generated were analyzed with descriptive statistics and inferential statistical tools such as chi- square and t-test were used to determine the relationship between dependent variable and independent variables. The study revealed that 84.7% of the farmers were less than 50 years of age, majority (81.3%) was male, 89.3%, while, 87.3% of the farmers participated in one social organization or the others. The mean yield of cocoa beans reduced from 334.16 kg/ha in 2004 to 303.69 kg/ha in 2006 before cocoa rehabilitation techniques; while, there was an appreciable increase from 411.13 kg/ha in 2014 to 518.95 kg/ha in 2016 after cocoa rehabilitation techniques. The result of t–test table revealed a significant difference in the yield of cocoa beans before and after rehabilitation techniques (t=22.3; p<0.05). The yield of cocoa beans decreased before rehabilitation and an increased was observed after adoption of cocoa rehabilitation techniques. Efforts should be made to encourage youth to view farming as a carrier option through provision of soft loans and transfer of techniques that are easy to implement on their farms.

Key words**:** *rehabilitation techniques, appreciable increase, Cocoa improvement, on-farm*

INTRODUCTION

Cocoa production under agrarian agriculture in Nigeria is very low as the production per hectare ranges between 250 and 450kg/ha; this is less than 25% of the yields obtained in an ideal situation. In spite of the fact that Nigeria, especially Southern Nigeria is naturally blessed with vast areas of soil, physical and climate features that favoured cocoa production, the yield gap is the result of many production factors, such as old age of cocoa trees old age of cocoa farmers, size of cocoa farms, poor agronomic and pest /diseases management practices [3] and inadequate fund to acquire inputs [15]. Others are problems of land management, non-availability of inputs, scarcity of labour and management, farm capital and financial constraints between the grower and industries [7]. These aforementioned predicaments made cocoa production dwindling over time and Nigeria is currently the fourth world producer which is 367,000 tonnes after Cote d'Ivoire, Ghana and Indonesia [19].

However, the situation worsened since the discovery of Crude oil in commercial exportable quantity in 1968 and Oil boom of 1974 which made oil sector virtually dominated the Nigeria economy and consequently brought neglect in agriculture and abandonment of many cocoa farms [12]. Though, the neglect has negative impact on the growth of the agricultural sector and according to the International fund for Agriculture Development (IFAD) [11], Nigeria has about 73.8% rural population of which majority (about 60%) engaged in agriculture. Federal Government in an attempt to save the industry from collapse promoted adoption of cocoa rehabilitation techniques which were developed by Cocoa Research Institute of Nigeria (CRIN) through the National Cocoa Development Committee

(NCDC) in all cocoa producing states in 1999. Obviously, the predominance of the smallholding cocoa farmers who do not rehabilitate their cocoa farms in either of the techniques contributes in no small measure to the reduction of cocoa production. This reduction in cocoa yield/tree as a result of moribund trees in many cocoa farms has reduced the productivity of farmers and this has consequently affected the cocoa production output. There was need to carry out this research to have empirical information on the effect of these techniques on the yield of cocoa. Hence, this study which addressed the effects of cocoa rehabilitation techniques on cocoa beans yield before and after adoption of cocoa rehabilitation techniques was carried out to ascertain the socio – economic characteristics of cocoa farmers and determine level of cocoa beans yield before and after rehabilitation techniques. The hypothesis tested was that there is no significant difference in the yield of cocoa bean before and after adoption of rehabilitation techniques by respondents.

MATERIALS AND METHODS

Study Area

The study was conducted in cocoa producing States of Southern Nigeria which comprises of three geo-political zones; these are South-West, South-South and South-East. In exception of North-West that the climate and soil does not support cocoa production, the cocoa growing areas of the country lies between 5.09^0 - 8.49^0 North latitude and 2.78^0 - 12.16^0 East longitude with varying vegetation between tropical rain forest in the extreme South-West and South-East to derived savannah in the North Eastern Nigeria.

Sampling procedure

The population of this study was made up of cocoa farmers in Cross-River, Ondo and Oyo States. Cross-Rivers State was selected in South- South, while, Ondo and Oyo states were selected in South- West. These farmers practiced cocoa rehabilitation techniques which was an intervention of Federal Government in 1999. A multi-stage sampling procedure was used for the selection of respondents from the 10 States producing cocoa in Southern Nigeria. Cross- Rivers and Ondo States were selected as high producing states, while Oyo State was selected as medium producing state.

Two Local Government Areas (LGAs) where there is high level of participation in cocoa rehabilitation programme in each of the three states were purposively selected; these LGAs were Idanre and Ondo East in Ondo State, Ikom and Etung in Cross-Rivers States, and Ona-Ara and Iddo in Oyo State. This was followed by purposive selection of two communities where farmer's organizations participated in cocoa intervention programme. These communities were Owena and Alade in Idanre, Bolorunduro and Soko in Ondo East, Amosun and Alagba in Ona-Ara, Akinware and Idi-Iya in Iddo, Yaunde and Etom in Ikom, Ajassor and Akumba in Etung LGAs for Ondo, Oyo and Cross-Rivers States respectively.

Data collection

Data was collected in 12 communities where 25 small holder cocoa farmers were randomly selected using table of random numbers among the farmers that belonged to Cocoa Farmers Association of Nigeria. Thus a total of 300 respondents were selected and interviewed in this study.

Data Analysis

Descriptive statistics such as frequency count, bi-charts and percentages were used to analyze the socio- economic characteristics of the respondents, while chi-square and regression analysis were used to test relationship between dependent variable and independent variables. The independent variables are age of cocoa farmers, sex, level of education and marital status. Cocoa rehabilitation techniques practiced by the farmers were also considered as independent variables in the study.

The dependent variable of this study is cocoa bean yield, this was measured in kilogram (kg), and farmers were classified on the basis of their cocoa production in their farms. Average farmers' yield was determined by asking the farmers to give their farm yield for the past three years consecutively before and

after cocoa rehabilitation. The values obtained were divided by three to determine the average yield, while each of the farmer's yearly production was divided by his/her farm size to determine his/her production per hectare. The productions of the farmers were further subjected to recommended production level of 503 kg/ha. A cocoa tree with 15pods/year in 1hectare containing 1,040 cocoa trees will give about 503 kg/year of dried cocoa beans, 11 pods/tree/year will give about 392 kg/year, while, below 11 pods/tree/year will give less than 393 kg/year [4]. Any farmer scoring 503 kg/ha and above was considered high producer; a farmer who scores between 392 kg/ha and 502 kg/ha is at medium level, while below 392 kg/ha is considered a low producer [10].

RESULTS AND DISCUSSIONS

Data presented in Figure 1 showed that 84.7% of the respondents were less than 50 years of age, and this indicated that cocoa farmers in the study area were still in their active age. The result supports the finding of [18] in a study of Edo cocoa farmers that farmers are still in their active farm age. The result of this study disagrees with the finding of [3] in a study carried out in Oyo State that cocoa farmers are not in their active farm age. This implies that young people are now coming into cocoa production.

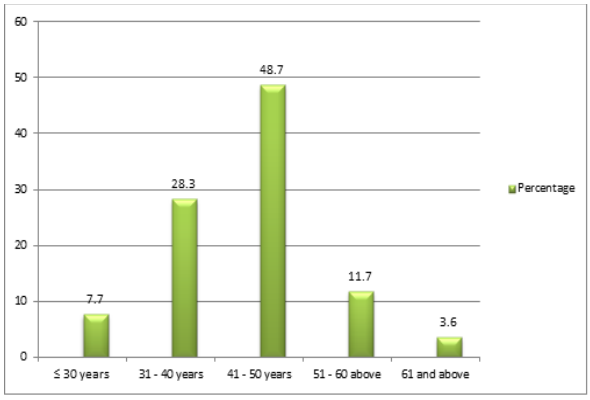

Fig. 1. Distribution of the Respondents according to their age
Source: Field Survey, 2017.

Figure 2 revealed that 81.3% of the respondents were males while 18.7 were females. This implies that there is dominance of male gender in farming activities among farmers that adopted cocoa rehabilitation techniques. This is supported by [15] that in Cross Rivers State, there were more male cocoa farmer. [9] and [5] stated that male headed households usually out-number female headed household in most communities in Nigeria. [17] supported that farming occupation in rural area was dominated by male as means of livelihood in Nigeria. This can be attributed to the fact that cocoa farming is a tedious job that requires more strength that can only be provided by male [16].

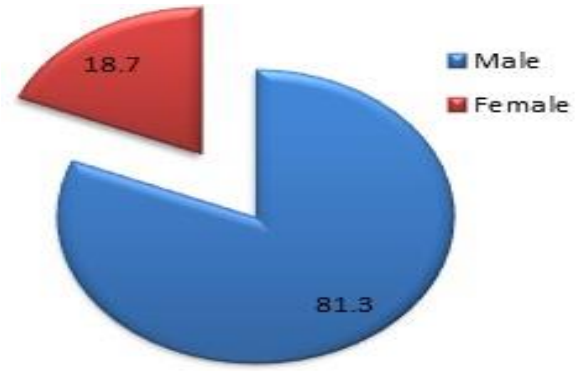

Fig. 2. Distribution of the Respondents according to their sex
Source: Field Survey, 2017.

Figure 3 showed that 89.0% of the respondents were married, 7.0% were single, and 3.3% of the respondents were widowed while 0.7% was divorced. Majority of the farmers were married (89.0%) which is an indication that marriage is highly cherished in the rural areas. This agrees with the finding of [20] who noted that most farmers in Nigeria are married. It was also an indication that most of the farmers were responsible and had a family who assisted them in their farm work. This might be the reason why they grower permanent crops like cocoa in order to have a sustainable income to feed their family and possibly invest in other small scale business. The significance of marital status can influence the household size and number of those participating in community development projects [13].

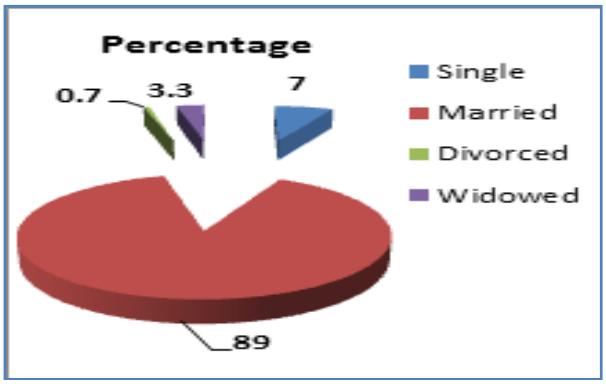

Fig. 3. Distribution of the Respondents according to their marital status
Source: Field Survey, 2017.

The presentation in Figure 4 showed that majority of the respondents 78.7% had Secondary School Education and below. Few of the respondents (10.3%) completed tertiary school while, 11.0% had no formal education. The result shows that majority of farmers can read and write which has facilitated their adoption of some cocoa rehabilitation techniques introduced to them. This is in line with [8] that ability to read and write by the respondents has greater effects on the practice of agricultural activities.

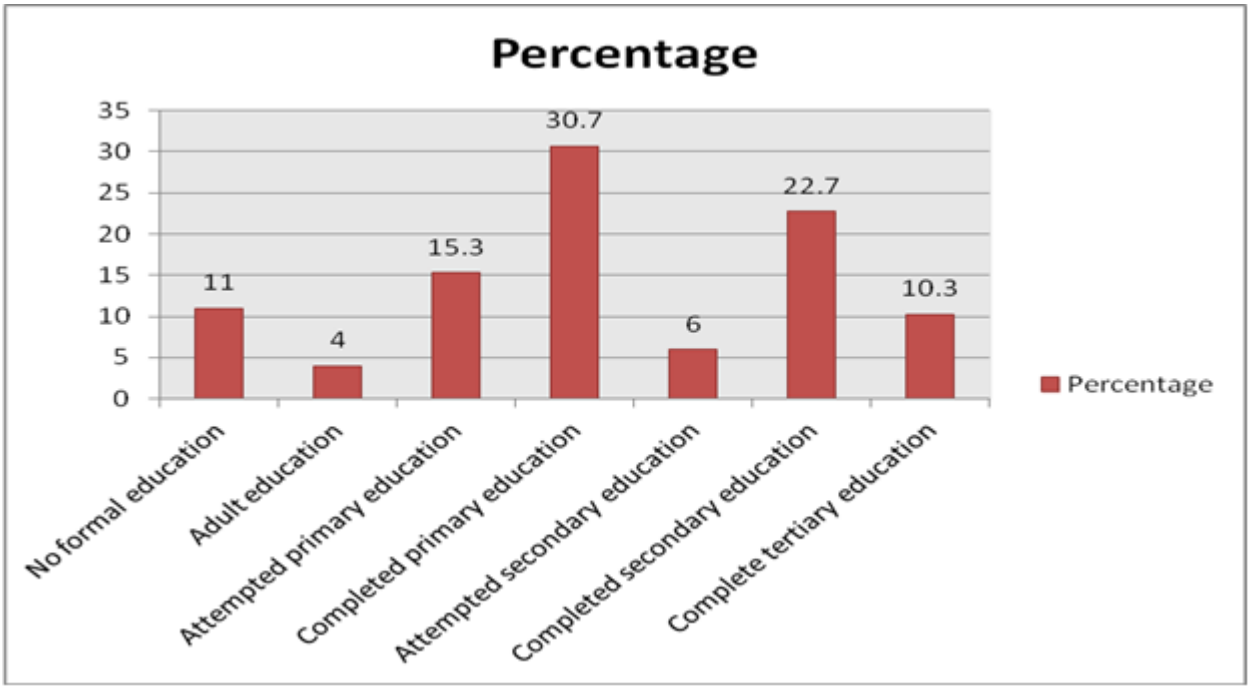

Fig. 4. Distribution of the Respondents according to their level of education
Source: Field Survey, 2017.

Table 1 shows the distribution of respondents according to their participation in social group. The finding revealed that majority of the farmers (68%) belonged to farmer organization such as Cocoa Association of Nigeria (CAN) and Cocoa Farmers Association of Nigeria (CFAN). Also, 65% of the farmers belonged to cooperative society, 28.7% of them belonged to community based organization while few (14%) belonged to religion organization. This is an indication that farmers have opportunities for skills acquisition, social and economic opportunities as a group with more responsibilities and enlightens to participate in innovation techniques. The social group also serves as a source of morale booster, linkage to source of credit, planting materials, agricultural inputs, capacity building and medium of information dissemination.

[4] In a study of farmers in adopted village observers that farmers' organization gives farmers an edge over non participated farmers. This was equally supported by [6] that group membership helps members to become better informed about the world and new technologies.

Table 1. Distribution of Respondents by farmer's participation in social group

Social group	Frequency	Percentage
Religions groups	42	14.0
Community based groups	86	28.7
Cooperative society	195	65.0
Farmers groups (CAN/CFAN)	204	68.0

Source: Field Survey, 2017.
Multiple responses

The results in Table 2 reveals that 24% of the cocoa farmers sourced their credit from cooperative society, 14% from friends and relatives while, few 4.3%, 2.7%, and 1.0% sourced their credit from commercial bank, money lender and agricultural credit institutions respectively.

The result clearly showed that very few sample respondents received loan or credit from financial institution (Commercial Banks and Government). [14] opined that collateral requirement, administration and bureaucratic process serve as strong bottle-neck to obtain loan from commercial banks.

Loan or credit from cooperative society is easily accessible because it does not require collateral or high interest rate as required in other financial institution. Also, members of cooperative society can access loan from commercial bank without collateral through Cross Guarantee for their members.

[2] supported this finding that loan from cooperative is the most accessible credit to farmers in the rural area.

Table 2. Distribution of the Respondents according to their source of credit facilities

Source of credit	Frequency	Percentages (%)
Friends &relatives	42	14.0
Money Lender	8	2.7
Agric. Credit Institutes	3	1.0
Cooperative Society	72	24.0
Commercial Bank	13	4.3
Total	300	100.0

Source: Field Survey, 2017.

The results in Table 3 showed that gapping up (84.3%) and growing young cocoa under old trees (78.7%) had the highest adoption, this was followed by complete farm replanting (59.7%) and the least practice were coppicing (27.7%) and phased farm replanting (12%). The high percentage recorded for gapping up and growing young cocoa under old trees may be attributed to the ease of implementing the techniques and the fact that many of the farmers practice it as a routine activity on their farms. Nevertheless, complete farm replanting was considered as a technique to maintain optimum population per hectare.

Table 3. Distribution according to the cocoa rehabilitation techniques practiced

Techniques	Frequency	Percentage
Planting under old free	236	78.7
Gapping up	253	84.3
Phased farm replanting	36	12.0
Complete farm replanting	179	59.7
Coppicing	83	27.7

Multiple responses
Source: Field Survey, 2017.

Table 4 showed the distribution of respondents according to their cocoa bean yield in kilogramme before and after cocoa rehabilitation techniques. The table revealed that 12.0% of the farmers had mean yield of 334.16 kg/ha in 2004 before rehabilitation and this was reduced to 8.6% with the mean yield of 303.69 kg/ha in 2006 before rehabilitation. The reduction in the output of cocoa production before rehabilitation was as a result of continuous degradation of cocoa trees due to old age. This concurs with [3], that cocoa trees in farmers' farms are old and moribund. In the same vein, 31.7% of cocoa farmers had the mean yield of 411.33 kg/ha in 2014 after cocoa rehabilitation, this yield was increased to 518.93 kg/ha in 2016 as 54.3% of the farmers adopted the techniques. The increase in output witnessed by the farmers was as a result of impact of cocoa rehabilitation techniques adopted by the farmers.

This is in consonance with [1] that cocoa rehabilitation techniques have impact on cocoa output.

Table 4. Distribution of respondents by cocoa yield (Kg) before and after rehabilitation

	Before						After					
	2004		2005		2006		2014		2015		2016	
Yield	F	%	F	%	F	%	F	%	F	%	F	%
≤ 100	16	5.3	27	9.0	45	15.0	20	6.6	9	3.0	17	5.7
101-300	112	37.4	120	40.0	86	28.7	87	29.0	42	14.0	34	11.3
301-500	136	45.3	122	40.7	143	47.7	98	32.7	136	45.4	86	28.7
≥ 501	36	12.0	31,	10.3	26	8.6	95	31.7	133	37.6	163	54.3
Mean	334.16		315.02		303.69		411.33		483.96		518.93	
S D	143.22		119.22		105.91		215.48		226.92		246.03	

F= Frequency
%= Percentage
Source: Field Survey, 2017.

Table 5 shows the difference in yield of cocoa beans before and after cocoa rehabilitation techniques in the study area. The result shows that there was a significant difference in cocoa bean yield before and after rehabilitation techniques ($t = 23.3$, $p \leq 0.05$). The implication for this is that, the yield of cocoa bean differs significantly with a mean difference of 175.7 before and after rehabilitation techniques. It could therefore be deduced that the practice of rehabilitation techniques has effect on the yield of cocoa. The result supports the findings of [4] who found out that rehabilitation through coppicing of moribund cocoa trees had positive effect on the yield of cocoa farm.

Table 5. T-test result showing significant difference in the yield of cocoa bean before and after rehabilitation technique

Variable	Mean	Mean Difference	T	Df	p-value
Yield before rehabilitation	336.2	175.7	22.3	298	0.0001
Yield after rehabilitation	511.2				

Source: Field Survey, 2017.
Significant at $P < 0.05$

CONCLUSIONS

Cocoa farmers in the study area are young and still very active in farm work. Gapping up (84.7%) and planting young cocoa under old cocoa trees (78.7%) were the techniques mostly practiced by the farmers. The yield of cocoa beans decreases over the years before rehabilitation while there was an appreciable increased in cocoa yield after adoption of rehabilitation.

The intervention of Federal Government to bring back the lost glory of cocoa production has encouraged youth to see cocoa farming a profitable venture. It is recommended that, Government should embark on the programme such as provision of soft loan mechanism and transfer of techniques that are easy to practice on their farms; this will encourage youth to engage in cocoa farming and view cocoa farming a profitable career option, which will bring an improvement to the practices of their forefathers.

REFERENCES

[1]Adebiyi, S., Oluyole, K. A, Oduwole, O. O., Famuyiwa, B. S., 2013, Farmers' Attitude Towards Government Initiative on Cocoa Rehabilitation Promotion in Oyo State, Nigeria. American Journal of Rural Development (1) 1: 15-18.

[2]Adebiyi, S., Oluyole, K.A., Agbongiarhuoyi, A.E., 2006, Adoption of CRIN improved cocoa varieties in Nigeria. Proceedings of the fifteenth Annual Congress of the Nigerian Rural Sociological Association held at University of Ado-Ekiti, Ado-Ekiti, Ekiti State, Nigeria, 123-127.

[3]Adebiyi, S., Okunlola, J. O., 2009, Factors Affecting Adoption of Cocoa farm Rehabilitation Techniques in Oyo State, Nigeria. Proceedings of the Eighteenth Annual Congress of Nigeria Rural Sociological Association held at Federal University of Tech. Akure, Ondo State; 35-44.

[4]Adebiyi, S., Uwagboe, E. O., Agbongiarhuoyi, A. E., Famuyiwa, B. S., Abdulkarim, I. F.,William, A.O., 2018, Effects of coppicing on yield of cocoa pods in Cocoa Research Institute of Nigeria (CRIN) Demonstration plot. International Journal of Development Research. (8) 6: 20944 - 20944.

[5]Adedokun, A. A., 2010, Knowledge, attitudes and Practices about Malaria in Urban Community in a

South West Nigeria. Journal of vector Borne Disease, 47(3):155-159.
[6]Adeleke-Bello, O. O., Ashimolowo, O. R., 2015, Beneficiaries' perception of selected rural women empowerment project in Ogun State, Nigeria. African Journal of Agricultural Research 10(44): 4108 - 4116.
[7]Akinwale, O., Opeke, K., 2003, Cocoa Association of Nigeria occasional publications (2) 30.
[8]Akinnagbe, O. M., Umukoro. E., 2011, Farmers' perception of the effects of land degradation on Agricultural activities in Ethiopia East Local Government Area of Delta State, Nigeria.
[9]Alfred, S.D.Y., 2001, Socio-economic and psychological factors affecting the adoption of agricultural innovation by farms household in Kogi state, Nigeria. Unpublished Ph.D Thesis; Federal University of Technology, Akure, Nigeria.
[10]CRIN, 2010, Scientist Survey Report of the Cocoa Production Hectarage in Nigeria .Unpublished report submitted to the National Cocoa Development Committee.
[11]IFAD, 2007, Rural Poverty in Nigeria, http://www rural poverty portal.org/web/guest/ Country/home/tags/Nigeria, Accessed on March 5, 2019.
[12]Ihimodu, I. I., 1993, The Structural Adjustment Programme and Nigeria's Agricultural Development; Ibadan: National Centre for Economic Management and Administration (NCEMA) Monograph Series, No. 2.
[13]Okunlola, J. O., Adesida, I. E., 2015, Effects of community participation on the sustainability of rural infrastructure in Ondo State, Nigeria. Asian Journal of Agricultural Extension, Economics and Sociology 7(1): 1 - 9.
[14]Okunlola, J.O., 2019, Transforming Nigeria's Agriculture. Agricultural Extension in the saddle. Inaugural Lecture of the Federal University of Technology, Akure.
[15]Oluyole, K. A., Sanusi, R. A., 2009, Socio-economic variables and cocoa production in Cross-Rivers State, Nigeria. J. Him. Ecol. 25(1): 5 - 8.
[16]Opeke, L. K., 2005, Tropical Commodity Tree Crops. Spectrum Book Ltd. Ibadan.
[17]Torimiro, D. O., Olubode, A. A., 2006, Exploring socio-economic correlations of production needs for Southwest Nigeria. J. Appl. Sci. Res., 5: 248 - 255.
[18]Uwagboe, E.O., Ndagi, I., Agbongiarhuoyi, A.E., Adebiyi, S., Adeogun, S.O., Aigbekaen, E.O., 2010, Assessment of Crop Protection Management in Cocoa Farms in Edo State, Nigeria: bulletin of Science Association of Nigeria. (29): 59 – 67.
[19]World Atlas, 2018, Cocoa production by countries www.worldatlas.com/corrections-policy, Accessed on March 12, 2019.
[20]Yakubu, B., Bulama, S., James, H. L., 2015, Off farm activities and its contribution to household income in Hawu Local Government Area, Borno State, Nigeria. OSR Journal of Agriculture and Veterinary Science (10SR - JAVS). (8) 1: 9 - 13.