NARO – SAARI – DAP PROJECT

Impact Assessment of weeder technologies in the Teso Farming system (TFS)

By
Lucy Aliguma

Final Report

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1.0 INTRODUCTION

1.1 Background

The DAP[1] weeding project was designed primarily to investigate ways of alleviating labor constraints associated with weeding annual crops in the Teso farming System (TFS). It tested 5 different implements on farmers' fields and the research confirmed that hand weeding of annual crops in the TFS is a major constraint to agricultural production. Moreover, this task is associated with drudgery (particularly for women), withdrawal of children from school during the weeding season, high costs if labor is hired to undertake the task, reduced yields (in poorly weeded fields) and poor returns (gross margins). Further promotional work since October 2003 has been undertaken to popularize DAP weeding and to assist the private sector with commercial manufacture of appropriate implements. A participatory assessment of DAP weeder technologies was undertaken in November 2004. Participatory Budgets (PB) methods were used to compare use and non-use of DAP technology in weeding annual crops.

1.2 Objectives of the study

The objectives of the impact assessment were:

a) To gauge the social and economic impact of DAP weeding on farm households in project areas (Soroti, Kumi, Kaberamaido and Pallisa)[2].
b) To assess the role and sustainability of farmer trainers in promoting the technology (training).
c) To measure the update of the technology by those farmers receiving training from other farmers.
d) To assess the future potential demand for the technology.

2.0 METHODS

2.1 Participatory Budgets (PB) methodology

Participatory budgets were selected as the most appropriate for assessing the impact of DAP weeders because they allow poor households to examine resource use in enterprises in a simple and visual manner and are appropriate for use with semi-literate and non-literate farmers. They facilitate a simple financial appraisal of a particular enterprise where inputs and outputs are costed and a balance (margin) for the enterprise determined.

In each community, Participatory Budgets (PB) were developed with groups of DAP weeding farmers. Semi-structured interviews with men and women groups were conducted to explore the impact of DAP on the lives and livelihoods. Population figures were obtained from the LC 1 Chairpersons who also presented their personal opinions on the use of DAP for ploughing, weeding and heaping (potato ridging), as well as on the popularity of the technology and the impact on lives and livelihoods. Study sites visited for the impact assessment are presented in Table 1.

[1] This project has been supported by LPP and CPP (DFID funded research programmes).
[2] Katakwi district was excluded because of internal displacement of many beneficiaries during 2003.

Table 1: Location and attendance at study sites

Site / Village	Sub county	District	Men	Women	Total
Apapai	Otuboi	Kaberamaido	7	4	11
Akotodao, Abalang	Alwa	Kaberamaido	18	4	22
Amuria	Pingire	Soroti	8	2	10
Obule	Asuret	Soroti	5	2	7
Kibale	Kibale	Pallisa	6	1	7
Komadokima, Kaler	Mukura	Kumi	5	3	8
Kachede	Malera	Kumi	9	3	12
Total			58	19	77

2.2 Procedure

From each site, enterprises in which DAP technology had contributed were identified. A volunteer[3] was identified as an example to be studied while other members of the group participated by providing comments. A participatory budget was constructed by using the steps below;

Steps taken to develop the Participatory Budget (PB)

- *Timeframes were established (e.g. a season) and the size of the enterprise clarified, i.e. area of the garden.*
- *A large grid on the ground was drawn with the number of columns representing the number of months.*
- *Farmers were asked to symbolize the different months in the top row of the grid and to indicate the different activities involved in the enterprise in each month by placing symbols in the second row on the grid.*
- *Discussions were held with the farmers about which resources they considered important to be included in the budget.*
- *Different counters were identified to represent each of the resources.*
- *Farmers identified units to measure each resource (e.g. labour by number of people and days).*
- *Farmers indicated the quantity of each resource in each month.*
- *Outputs and income that the farmer received from the enterprise were indicated.*
- *Farmers were asked to work out the end balance by comparing resources used and products received (income)*
- *All outputs and inputs of the enterprise were included in the balance.*
- *The final balance was expressed as bags of harvest and/ or cash.*

Once the budget was completed, the situation before the introduction of DAP weeding was also considered as a comparison. The balances of the budgets were calculated and differences considered.

[3] A farmer who was happy to discuss his enterprise.

3.0 PRESENTATION AND DISCUSSION OF RESULTS

The primary purpose of Participatory Budgets (PB) was to compare the new technology (DAP weeding) with the existing practices and make informed decisions. It is important to note that PB are not used to convince farmers of something, nor should they be seen simply as tools to predict or record profitability.

3.1 Summary results of the Participatory Budgets (PB)

Both family labour and draught animal power (hire charges) were costed. Although the owners of the enterprises discussed owned oxen, DAP was costed to compare costs associated with weeding in both situations since majority of farmers do not own oxen. From all the sites, cash balances are higher for enterprises where DAP is used in weeding, Table 2 and the participants attributed this to:

a) The low costs associated with DAP weeding. A greater proportion in increase in total expenditure in situations where DAP technology is not used is attributed to increase in weeding costs.
b) The increase in yields which arises from improved soil water holding capacity[4] and in some situations, farmers indicated that, without applying DAP weeding technology, yields could reduce by half.

Table 2: Summary of the Participatory Budgets (PB) developed at study sites

Site / Village	**Apapai**	**Akotodao (Abalang)**	**Kachede**	**Amuria (Pingire)**	**Obule**	**Kibale**	**Kaler**
Type of enterprise	Maize	Groundnuts	Sunflower	Groundnuts	Groundnuts	Cotton	Cow peas
Estimated size of enterprise (acres)	1	1	1	1	1	1	.75
Cash balance with DAP (Ug. Shs)							
Direct Cash Expenditure	48,000	433,000	63,400	184, 800	184,000[5]	84,000	11,250
Family labour costed	62,000	51,000	9,400	50,000	31,000	3,000	13,000
Animals costed	40,000	162,000	40,000	79,000	62,000	91,000	8,000
Total Expenditure	150,000	646,000	112,000	313,000	277,000	178,000	33,000
Value of output	400,000	1,600,000	341,000	800,000	540,000	300,000	50,400
Cash balance	**250,000**	**954,000**	**228,000**	**487,000**	**263,000**	**122,000**	**17,150**
Cash balance without DAP (Ug. Shs)							
Value of output	300,000	1,000,000	210,000	600,000	360,000	240,000	360,000
Total Expenditure	200,000	743,000	76,000	458,000	241,000	220,000	39,500
Cash balance	**100,000**	**257,000**	**134,000**	**142, 000**	**119,000**	**20,000**	**8,700**

[4]DAP weeding increases infiltration of rainwater.
[5] Participants included the cost of seed although it was provided free.

It is important to note that, figures may not be accurate because they were based on recall and areas of enterprises were estimated, so there is a possibility of over or under estimating them.

3.2 Group discussion results

1. How has DAP technology affected labour inputs to crop production?

All the participants indicated that areas under cultivation had increased and farmers had started growing crops, which require a lot of labour because labour costs had reduced. With the introduction of DAP technology, there is more time to weed since the technology is faster.

2. Has the cropping pattern changed?

The cropping pattern has changed in many areas, because acreage under various crops has increased and more new crops are being cultivated. In Kachede, Kumi district, majority of farmers had adopted cultivating sweet potatoes on ridges due to introduction of DAP.

3. Have area cultivated increased? If so, by how much i.e. 50%, 100%

In most sites, areas under cultivation had increased by between 50% and 100%.

4. Is it possible for most households to expand their area of cultivation or not?

Yes, most households have been able to expand acreage under crops and in areas where there is a problem of land scarcity, hiring of land was common.

5. Have incomes/well being improved or not? (if yes, please give examples)?

Household incomes have increased resulting in better nutrition because some households were able to purchase dairy cows for milk, while others can afford three meals daily from the high yields. Households are able to meet the basic household necessities like clothing and medical care and can afford to pay school fees and dowry from sale of crops. Households are able to save money from crop sales and some have managed to purchase oxen. Animals are only sold under pressure like to get money for dowry and to purchase land.

7. What has been the impact on children?

Children feed and dress better and have been relieved from weeding so can attend school even when it is critical time for weeding. Children do only intra-row weeding.

8. Have yields increased? How does this affect labour for harvesting?

Yields have increased and it takes more money to harvest crops like sorghum and millet. Harvesting crops planted in rows is easier and some money saved from weeding is used for harvesting. Some crops like groundnuts are harvested using oxen.

9. Is it possible to sell surplus produce? Or is marketing an issue?

The market is always available but in most cases prices are very low.

10. Any problems created by DAP technology?

Some weeders are difficult to get and some are not stable. The cost of implements is high[6] and weeders are sold in far places like in Soroti. Planting is expensive because one has to plant in rows in order to weed using DAP. Harvesting, transporting and storage of produce is a problem due to increased harvests. After training the oxen, they are sometimes attacked by the Foot and Mouth Disease (FMD) and die. Oxen trample on crops if not handled properly. Men pointed out that training women to use oxen is hard.

Source of income to people who used to weed has been reduced and yoke makers have also lost business. Oxen are not enough and sharing is problem especially during peak periods when everyone needs it at the same time and farmers are distant. Because of selfishness, some farmers have to complete weeding all their gardens before others use the animals.

11. Is it possible to earn money hiring out oxen for weeding? (What are the rates)?

It is possible to earn money because it is cheaper to weed using DAP than hands[7]. Hiring out oxen can fetch money, Ug. Shs 15,000 per acre.

12. How many farmers have been trained in this village (how many have adopted)?

Many farmers had been trained, however it was difficult to establish the exact numbers because most farmers could not recall them. In addition, these farmers had also trained others[8].

Table 3: Number of households in study sites using DAP

Site / Village	Sub county	District	Population size	Estimated number of households in village	Estimated number of households using DAP
Apapai	Otuboi	Kaberamaido	360	70 (4-5)	50
Akotodao, Abalang	Alwa	Kaberamaido	489	86 (6)	43
Amuria, Pingire	Pingire	Soroti		300 (10)	40
Obule	Asuret	Soroti		100 (10)	50
Kibale	Kibale	Pallisa			10
Komadokima, Kaler	Mukura	Kumi			6
Kachede	Malera	Kumi	1,200	415	40

13. Differences with use of DAP and without use of DAP

[6] A pair of oxen costs between Shs. 300 - 400,000/=, weeder costs 80,000/=, chain costs 20,000/= and the ox-plough costs 100,000/=

[7] Weeding one acre of cotton using DAP costs Shs.15,000/= while using hands can cost Shs. 20,000/=

[8] Needed more time to obtain these numbers to establish the adoption rates.

- **How are these differences explained?**

DAP controls soil erosion because ridges retain water and this increases rainwater infiltration leading to high yields. It is cheaper and time saving to use DAP.

- **Is this a true reflection of what has happened in most households?**

The enterprises discussed were a true reflection of what is happening in most households.

- **What has been the impact on women and children?**

Oxen does work quickly so women and children have time to do other things. DAP reduces labour burden for weeding on women and children and also oxen saves family money.

A few women have been exposed to DAP technologies and can handle animals on their own and are able to select the best for traction. Women can select trees for the best yokes and also make them.

- **Who uses the technology (men or women)?**

Most men use this technology because more men are trained and women tend to be more involved in housework like cooking for people who have come to help on the farm. Most women fear the animals and cannot go to other homes to drive oxen without permission. The rate of adoption of the technology is low for women.

Annexes: Participatory Budgets (PB) developed at the study sites

1. Apapai village, Otuboi sub county – Kaberamaido district
Name of farmer Ochana Joseph
Enterprise selected for evaluation Maize (I acre)

Months		**February**		**March**		**April**		**May**		**June / July**		**July**		**August –Feb.**	
Activities		Land clearing 1st ploughing		2nd ploughing Planting		1st weeding using DAP		2nd weeding using hand hoe		Harvesting Transporting home		Threshing		Marketing	
Labour		Land clearing		Planting				2nd weeding		Harvesting & transporting					
	Type of labour	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	No. of people	2	13	4				2	5	4		3			
	Labour days	1 (2hrs)	1 (2hrs)	3				2 (4hrs)	2 (4hrs)	6 (3hrs)		5			
		First ploughing		2nd ploughing		1st weeding									
Draught Animals		**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
Expenditure	**Labour**	2,000	13,000	18,000				4,000	10,000	24,000		15,000			
	Draught Animals	15,000		15,000		10,000									
	Seed [9]			25,000											
	Empty bags[10]													9,600	
Output														16 bags [11](400,000)	

A-Calculating cash balance (Using DAP for weeding)	**B-Calculating cash balance (Without using DAP)**
1. Direct Cash Expenditure = 48,000/= 2. Family labour costed =62,000/= 3. Draught animals costed = 40,000/= 4. Total Expenditure = 150,000/= 5. Value of output = 400,000/= **6.** Cash balance 250,000/=	1. Labour for weeding increases by 50,000/= 2. Total expenditure increases to 200,000/= 3. Yield reduces to 12 bags 4. Value of output reduces to 300,000/= 5. The cash balance reduces to 100,000/=

[9] Used 10kg @ kg costed Ug.shs 2, 500/=.
[10] Bought 16 empty bags @ bag costed Ug shs 600/=.
[11] Each bag of maize weighed on average 125kg, @kg was sold at Ug.shs 200/=.

2. Akotodao village, Abalang Alwas sub county – Kaberamaido district
Name of farmer Engulu Alex
Enterprise selected for evaluation groundnuts (3 acres)

Months		**Oct-Dec**		**February / March**		**April /May**		**June / July**		**August - January**	
Activities		Land clearing 1st & 2nd ploughing		Planting		1st weeding & 2nd weeding Spraying 2 times		Harvesting, Plucking Transporting home		Marketing Transporting to market	
Labour		Land clearing		Planting		Spraying		Harvesting		Transporting to market	
	Type of labour	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	No. of people		2	3	3	3		3	15 per acre		
	Labour days		3 (3hrs)	6(5hrs)	6 (5hrs)	6					
		1st & 2nd ploughing		Planting		Spraying 1st and 2nd weeding		Harvesting, Plucking & Transporting home		Transporting to market	
Draught Animals		**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
Expenditure	**Labour**		12,000	18,000	18,000	30,000		3,000	91,000		30,000
	Draught Animals	84,000				60,000	18,000				
	Seed [12]	225,000									
	Spray chemical					9,000[13]					
	30 Empty bags[14]										15,000
	Market dues										15,000
Output											30 bags[15] (1,600,000)

A-Calculating cash balance (Using DAP for weeding)	**B-Calculating cash balance (Without using DAP)**
1. Direct Cash Expenditure = 433,000/= 2. Family labour costed =51,000/= 3. Draught animals costed = 162,000/= 4. Total Expenditure = 646,000/= 5. Value of output = 1,600,000/= **6.** Cash balance 955,000/=	1. Labour for weeding increases by 120,000/= 2. Total expenditure increases to 743,000/= 3. Yield reduces to 10 bags 4. Value of output reduces to 1,000,000/= 5. The cash balance reduces becomes 257,000/=

[12] Used 3bags @ bag costed Ug.. Shs. 75,000/=.
[13] Used 6 tins of Fenkil @ costed 1,500/=
[14] Each empty bag costed Shs 500/=
[15] Sold 10 bags (Indiana variety @40,000/= and 20 bags of Serenut @ 60,000/=

3. Kachede village, Malera sub county Kumi district
Name of farmer Nora Ebukalim
Enterprise selected for evaluation Sunflower (I acre)

Months		**February/March**		**April / May**		**June**		**July**		**August**		**September**	
Activities		Land clearing 1st & 2nd ploughing		Planting and Gap filling		1st weeding Thinning, Rouging				Rougimg		Harvesting, Cutting heads Threshing	
		Land clearing		Planting		Thinning & Intra row weeding							
Labour	**Type of labour**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	No. of people		2	5	4		2			2			
	Labour days		1	1	1		2			1			
	Rate per day		1,000		2,000		1,500			500			
		1st & 2nd ploughing				1st weeding							
Draught Animals		**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
Expenditure	**Labour**		2,000	2,400	8,000		7,500			500			39,000
	Draught Animals	33,000				7,000							
	Seed [16]		2,600										
	Strings **Bags**												650 6,500
Output													**13 bags**[17] **(341,250)**

A-Calculating Cash balance (Using DAP for weeding)	**B-Calculating Cash balance (Without using DAP)**
1. Direct Cash Expenditure = 63,400/= 2. Family labour costed =9,400/= 3. Draught animals costed = 40,000/= 4. Total Expenditure = 112,800/= 5. Value of output = 341,250/= **6.** Cash balance 228,200/=	1. Total expenditure increases to 76,000/=[18] 2. Yield reduces to 8 bags 3. Value of output reduces to 210,000/= 4. Cash balance reduces becomes 134,000/=

[16] Used 2kg @ kg costed Ug.shs 1,300/=.
[17] Each bag weighed 75kg and @ kg costed Shs 350/=
[18] Without DAP, weeding costs 13,200 (400 per row and in one acre there are 33 rows)

4. Amuria village, Pingire sub county – Soroti district
Enterprise selected for evaluation Groundnuts (I acre)
Name of farmer Dina Okurut

Months		**Nov. -February**		**March**		**April**		**May**		**June**	
Activities		Land clearing 1st & 2nd ploughing		Planting		1st Weeding		2nd Weeding		Harvesting Transporting	
Labour		Land clearing		Planting						Harvesting & transporting	
	Type of labour	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	No. of people		4		8					8	
	Labour days		2		2					5	
		1st & 2nd ploughing								Transporting	
Draught Animals	**Type of labour**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
Expenditure	**Labour**	6,000	8,000		16,000					50,000	
	Draught Animals	40,000		15,000		12,000	6,000	12,000			
	Seed			150,000							
8 Bags @ 600/=										4,800	
Output											**8 bags[19] (800,000)**

A-Calculating cash balance (Using DAP for weeding)	**B-Calculating cash balance (Without using DAP for weeding)**
1. Direct Expenditure = 34,800/= 2. Family labour = 50,000/= 3. Draught Animals costed = 79,000/- 4. Seed costed = 150,000/= 5. Total Expenditure = 313,800/= 6. Value of output = 800,000/= **7.** Cash balance = 486,200/=	1. Yield reduces to 6 bags 2. Value of output = 600,000/= 3. Cost of seed increases to 224,000/= 4. First weeding = 74,000/= 5. Second weeding = 64,000/= 6. Cost of weeding increases to 138,000/= 7. Total expenditure increases to 368,800/= **8.** Cash balance reduces to 231,800/=

[19] Each bag costs 100,000/=

5. Obule village, Asuret sub county – Soroti district
Enterprise selected for evaluation Groundnuts Serenut (I acre)
Name of farmer Edyeu Raymond

Months		**March**		**April**		**May**		**June / July**	
Activities		Land clearing 1st & 2nd ploughing		Planting 1st weeding		2nd Weeding Spraying		Harvesting Transporting	
		Land clearing		Planting					
Labour	**Type of labour**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	No. of people	1		5	7				
	Labour days	1		5	3				
		1st &2nd Ploughing		1st weeding		2nd weeding		Lifting and plucking	
		Family	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
Expenditure	**Labour**	1,000		15,000	22,000	5,000		10,000	9,000
	Animals	27,000		10,000		10,000		15,000	
	Seed (1 bag)			150,000					
6 Bags @ 500								3,000	
Output									**6 Bags 540,000**

A-Calculating cash balance (Using DAP for weeding)	**B-Calculating cash balance (Without using DAP)**
1. Direct Cash Expenditure = 184,000/= 2. Family labour costed =31,000/= 3. Draught Animals costed = 62,000/= 4. Total Expenditure = 277,000/= 5. Value of output = 540,000/= (6 bags @ Shs 90,000/=) **6.** Cash balance 263,000/=	1. Yield reduces to 4 bags 2. Weeding is done once at 35,000/= 3. Harvesting (uprooting) costs 20,000/= 4. Total expenditure increases to 241,000/= 5. Value of output reduces to 360,000/= 6. Cash balance reduces to 119, 000/=

6. Kibale village, Kibale sub county – Pallisa district
Name of farmer Ochuli Alex
Enterprise selected for evaluation cotton (I acre)

Months		**March**		**April/May**		**June**		**July**		**August**		**Sept.**		**Nov.**	
Activities		Land clearing		1st & 2nd ploughing		3rd ploughing Planting		Thinning 1st & 2nd weeding 1st spraying		3rd & 4th weeding 2nd and 3rd spraying		4th spraying 5th weeding		Harvesting Transporting Selling	
Labour		Land clearing				Planting		Thinning		2nd and 3rd spraying		4th spraying		Harvesting	
	Type of labour	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	No. of people		3				4		2				1		
	Labour days		3				1		1				1		
				1st & 2nd ploughing		3rd ploughing		1st &2nd weeding		3rd& 4th weeding		5th weeding		Transporting	
Expenditure		**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	Labour	3,000	30,000				4,000		2,000		2,000				30,000
	Animals			27,000		10,000		22,000		12,000		10,000			2,000
	Spray chemical							2,000		4,000		2,000			
	10 empty bags @ 600/=														6,000
Output															**10 Bags (300,000)**

Cotton seeds were given free (Planted 28kgs)
Each bag weighed 50kg and each kilogram was sold at shs. 600/=

A-Calculating cash balance (Using DAP for weeding)	**B -Calculation of cash balance without DAP**
1. Direct Expenditure = 84,000/= 2. Family labour costed 3,000 3. Draught Animals costed 91,000/= 4. Total Expenditure = 178,000/= 5. Value of output = 300,000/= **6.** Cash balance is 122,000/=	1. Without DAP, the yield reduces to 8 bags 2. Total weeding costs becomes 108,000/= 3. Total expenditure becomes = 225,000/= 4. Value of output reduces to 240,000 **5.** Cash balance reduces to 14,600/=

7. Kaler parish, Kamodokima village, Mukura sub county – Kumi district
Enterprise selected for evaluation Cow peas (.75 acre)
Nmae of farmer Okalebo Francis

Months		**April**		**May**		**June / July**		**August**	
Activities		1st ploughing Planting Thinning		Spraying (3 times)		Harvesting (Plucking)		Transporting to market Selling	
		Planting & thinning		Spraying		Plucking			
Labour	**Type of labour**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	No. of people	3		2,000		1	3		
	Labour days	1				2	2		
		1st ploughing		Weeding					
Expenditure	**Draught Animals**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**	**Family**	**Hired**
	Labour	5,000		3,000		5,000	7,000		
	Draught Animals	4,000		4,000					
	Seed*	1,125							1,000
	Spray Chemical			1,500					
	Bags								500
Output									**56 kilograms[20] (50,400)**

*** Seed (1.5 kg each kilogram costed shs. 750**
Value of output = (Harvested 56kg each kilogram costed each 900kg = 50,400/=

A-Calculating cash balance (Using DAP for weeding)	**B-Calculating cash balance (Without using DAP for weeding)**
1. Direct Expenditure = 11,250 /= 2. Family labour and draught animals costed = 21,000/= 3. Total Expenditure = 33,250/= 4. Value of output = 50,400/= **5.** Cash balance = 17,150 /=	1. Without DAP, the yield reduces to 40 kg 2. Value of output = 36,000 3. Total expenditure increases to 27,300 4. Cash balance to 8,700/=

[20] Yield was very low because much of the cow pea leaves were consumed fresh.