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## **Report of a mission in South Africa**

### **Technical assistance to the implementation of a socio-economic survey in the Makhatini Flats**

March 14-25, 2003

Cotton fate under serious threat in the Makhatini Flats

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# 1. Introduction

During our mission devoted to back-stopping the implementation of the socio-economic survey being launched, in addition to carrying out the technical assistance in keyboarding the survey data and prepare the data processing, we visited the Makhatini Flats. During the stay there, we visited cotton plots of commercial farm-holdings as well as those of smallholders. This report aims at reporting some striking images we got in the Makhatini Flats, sharing some thoughts regarding the fate of the smallholder cotton production in this region, and providing the information about the advancement of the socio-economic survey. In the framework of the close connection with the University of Pretoria in implementing the socio-economic research launched this campaign, we decided to write this report in English to overcome the language barriers between the two teams involved although the command in English is far from being correct.

## 2. Some striking images during the visit to the Makhatini Flats

### 2.1. *A land of youngsters attending school*

Moving around several communities in the Makhatini Flats during several full days, we encountered plenty of young people, male or female, in rather neat uniforms, going and coming back from school. It was a conspicuous feature for someone who is more familiar with the rural situation in some Western African countries.

In spite of the fact that farmers are declaring that their children are taking part to the field works, there does not seem to have any serious competition that prevent these children attending school on a regular basis.

### 2.2. *A despairing state of the cotton plots resulting from severe drought*

The Makhatini Flats has suffered a lot from drought. This drought led to delay a lot the cotton sowing as regard to the usual period. This drought occurred again at the flowering and fruiting stages and it is responsible of a very despairing state of the crops. The few plots of maize crop will not produce anything. The cotton plants are tiny, bearing few bolls and recording a high level of shedding or abortion, whatever variety they may be. Cotton production will be a disaster and many if not all of the smallholders involved will not recover the cash expenses they engaged.

### 2.3. *Few crops and few field activities observed*

The most striking fact was the small number of crop species we encountered. Except the cotton plots, we saw a small number of maize plots. We saw no other cereal crops, no beans. In the opposite to many African countries where farmers privilege producing a major part of the food crops they consume, it does not seem to be the case in the Makhatini Flats. Likely as a consequence of that, we hardly observed any field work in operation and we realized that there is only a partial use of the available land. Certainly, what we encountered may be very contextual and the severe drought that occurred has for sure impacted negatively on the land use. Nevertheless enlarging the species to be grown and selecting those which are more adapted to reduced rainfalls deserve attention.

#### **2.4. *An elder woman and her grand-child***

One of the cotton plots we visited belongs to an elderly woman who told us that she is cultivating the plot with her husband and her grand-daughter, an orphan, of around 8 year old. She invested part of the pension she gets with her husband, in particular to have a tractor coming and prepare the soil before sowing.

Owing to her limited means, she did not ask for the soil disking to finalize the seed bed preparation. We observed that the soil preparation was badly implemented, at the point to have been detrimental to the water retention and to the plant growth. Certainly, having paid for the soil preparation has costed money (Rand 450/ha), not only it did not induce any positive effect but it impacted negatively on the yield. It is striking to realize to what extent farmers remain attached to some cultivation practices disregarding the conditions and the periods they are implemented and whose outcomes could be very different.

#### **2.5. *Signs of wealth reversion in the countryside***

In most of the farm small-holdings we visited, we observed wrecks of tractors, ploughing and disking devices, witnessing a former period of general implementation of conventional and mechanical agriculture as well as of wealth accumulation. Such an accumulation seems to belong to the past. Owing to the negative income from the cotton production, there is no way to expect this accumulation process resume this year if not in the short run. One can doubt that poverty alleviation is currently taking place.

### **3. Some major thoughts from exchanges and observations**

#### **3.1. *Abrupt disruption of input credit***

For the current campaign, no input credit took place. Such a situation resulted from the fact that a major proportion of the cotton farmers did not pay back the credit they got from Vunisa SA by selling their production to the newcomer Makhatini Cotton Gin. The repayment default leaded the Land Bank to refuse allocating credit again, except to the farmers who actually repaid their credit last campaign, although new modalities for credit allocation were under discussion to have the financial risk (associated to non-repayment) being shared between the various stakeholders involved. Since rains settled very lately, it was anticipated that conditions were not favourable to ensure credit repayment and it was finally decided not to allocate any credit to anybody.

The rainfall pattern that followed confirmed the financial risk associated with the input use. This could confirm the soundness of not providing credit this campaign. Nevertheless, an intermediate solution would have been sounder by reducing the intensification package which takes into account the decrease of the yield expectation (it is well established that later is the sowing, lower is the yield expectation).

#### **3.2. *Few sprays of insecticides***

What happened was that farmers either did not use insecticides or paid a small amount by cash, from the money they get from the pension payments or remittances they received from parents working in urban areas. It resulted few sprays not necessarily implemented on times. Close observation of the cotton plants showed actual attacks from bollworms which damaged significantly the expected yield.

By having bought ourselves a can of 5 litres of insecticides, we can conclude that the price of this input is astonishingly high. We paid 444 Rands, which corresponds to 89 Rand/litre or around US \$ 12/litre. This is very expensive for an insecticide whose active ingredient felt

into public domain long ago (monocrotophos) and for which there is an actual competition between providers in the world. As a matter of comparison, farmers in Mali, a landlocked country where state coordination of the cotton sector remains conspicuous, are paying only US \$ 5/litre. This fact is a serious contradiction to the common assumption according to which freer is the market, lower is the prices farmers get in buying inputs.

### **3.3. *Un-adapted cultivation techniques to address***

We pointed out already the astonishing attachment to the implementation of soil preparation disregarding the conditions and the periods of its execution. The un-adaptation of the plant stand relatively to the late sowing appears also obviously. It is well established that later is the sowing, more reduced is the growth and therefore higher could be the plant stand. We actually observed limited plant canopy, leading to anticipate that a higher plant stand would have helped to expect a higher yield level. Clearly, no-one assisted farmers in adjusting cultivation techniques to the rainfall pattern.

### **3.4. *Is there sufficient rationale for promoting GMC to smallholders?***

This is questionable although more information is needed to provide a full picture of the situation. Adoption of Genetically Modified Cotton, one form of which is the well-known Bt-cotton, makes sense where insecticide cost is heavy and where resistance of some pest to some chemical insecticides have become real. In the USA, insecticides account for 2/3 of the total chemical costs, the launch of GMC may be regarded as a progress to help reduce production costs and overcome ineffectiveness from chemical insecticides. There is still little evidence that such an extrapolation to many countries in Africa is founded<sup>1</sup>.

Through our discussion with some farmers, we have little indications that they are so much aware of what Genetically Modified Cotton is (GMC), they often point out that they have been told that the new varieties are good, and that's all. In what sense it's good did not come out clearly from the discussions.

We took notice of the farmers' reluctance in conducting a refuge plot to be sown with non-Bt cotton and which should not be chemically sprayed. It seems that reasons to sustain such a recommendation do not sound so much convincing for the farmers: they are told that it is positive for the environment in doing so. Lessons learnt from projects to promote Integrated Pest Management point out that smallholders do not comply to environment-friendly techniques for reasons of environment sensitiveness but for economic rationale.

In the opposite, farmers argue the technical recommendation that Bt cotton promoters seem to disregard or to fail to respond properly. Farmers argue they see no reason in breeding worms in a non-chemically protected plot and to have these worms come later attacking their main field. Of course, the farmers' statement is wrong, but it is illustrative of the limited extent of the technical information they get regarding the launch of GMC.

Furthermore, farmers' reaction to the recommendation of refuge plot appears also to be associated to their perception of the player who diffuses it. They say they see no reason of relying on such a recommendation from a player who is not present at the field level, who refuses to provide credit and who is limiting itself in selling seeds. It comes out that, and this is a lesson worthwhile for many other countries, the fate of a recommendation is linked to the perception of the credibility of the player who disseminates it. Clearly, player perceived as moved only by mercantile mood could hardly expect for such a credibility.

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<sup>1</sup> Fok, A. C. M., Djouara, H. and Tomas, C., 2003. Progress margin in productivity of cotton production by smallholders in SSA. In: (Ed.) 'World Cotton Research Conference 3'. Proceedings of an International Symposium, Cape Town, South Africa, March 9-12, 2003. pp.17

### **3.5. A crucial period for the rainfed and irrigated agriculture equilibrium**

Rainfed and irrigated agricultures co-existed so far in the Makhatini Flats. Some extent of irrigation, for which we lack information to assess properly, is running through a public-managed network of channels. Some individual farmers have access to irrigation by sprinklers and they must pay for the water they use, we think however that these farmers are the happy few in this regard.

The severe drought that occurs this campaign reinforce the rising conviction that rainfed cotton production has little future. Likely this is at the basis of the project destined to set up an agricultural estate being proposed by the Makhatini Cotton Farming (Pty) Ltd (MFC) which proposes around Rand 70 millions of investment in arranging pivot irrigation on 50 ha-blocks in a total area of 5100 ha and to be implemented in two phases. The management of the agricultural estate should be run by the stakeholder already involved in the Makhatini Cotton Gin which intervened since last campaign. Some pivots for irrigation are already in place but the project is still under debate.

The implementation of such a project requires the transfer of the land right from tribal authorities to the MFC which contemplates to transfer later on the various 50-ha block to farmers under conditions and deadlines which are not clear. The financial viability of the project is questioned by many people who examined it, pointing out that the production cost were down-sized, while the output was up-sized (by retaining an expected yield of 4500 kg/ha and by estimating that the whole production will be of Grade A quality). There is so far no certainty that the project will go through. What is most striking to us is that, neither in the project nor in the reports analysing it, no attention is paid to assess what would be the financial impacts for the farmers around the project. At first glance, this project will induce kind of exclusion of some farmers from the use of the land, transform many of them into casual workers in the agricultural estates and will enable to upgrade a limited number of them to be the managers of the 50-ha blocks and who can expect to become later on the real proprietors of these blocks.

In Africa, there is not so many successful experiences of cotton production through agricultural estates following an intensification production mode. For sure, detailed viability deserves to be analysed. Nevertheless, an indirect impact of the current project examination process is already taking place as it deviates totally the attention from rainfed agriculture which is regarded to be of no future. This is an implicit assumption which could be debated. Probably the current performance of the rainfed agriculture in the Makhatini Flats is disappointing, but had all relevant actions been conducted? Through our short and incomplete observations, we doubt that it was the case.

## **4. About the implementation of the socio-economic survey**

The socio-economic survey launched this year appears to be very helpful in knowing more about the production system, in assessing the farmers' command in cotton growing and in capturing their knowledge about the GMC use. The survey method was described in the former mission report. The late rain settlement and uncertainty regarding input credit provision reduced dramatically the number of cotton producers. The survey achieved nevertheless a sampling size of 86 farms in 8 communities. It was firstly imagined having a sample of 3 groups of 9 farmers in each community, corresponding to one group of non-cotton grower, and two groups of cotton growers but distinct by the variety types they use. In

addition, around 70 farmers were interviewed only on the social features of their farm-holdings

We noticed a good will and commitment of the staff involved in the survey implementation although this is an activity little familiar to this people whose background is basically technical. It will nevertheless be difficult to claim an optimal conduct of the survey without permanent staff assigned in the Makhatini Flats and with people who did not have background in conducting interviews. In addition, the obligation of conducting interviews in Zulu led to implement the translation of questions from English to Zulu which encompasses a risk of misunderstanding. By retaining a gradual process of interviewing farmers 4 to 5 times, with the possibility of controlling the fulfilled questionnaire forms meanwhile, we should reach a satisfactory consistence of the answers we obtain. In spite of the fact that corrections pushed to go back to the enumerators and farmers in the communities, the survey execution does not suffer from significant delay as regard to the schedule retained.

The implementation of the survey gives rise to an actual partnership between Cirad and the department of Economics of the University of Pretoria. Professor Johann Kirsten of this Department assigned his assistant Mr Marnus Gouse to take part to the survey activities and outcomes from the survey will be jointly reported. It is expected that data collection will be completed by June 2003 and that a specific joint report on the survey results could be a first outcome of the partnership that took place. Such a report could help in implementing a comprehensive assessment of the Bt cotton introduction by integrating the results from the previous research works to which the Prof. Kirsten's team took part.

The data capturing is now engaged. A student has been trained to carry it out as well as Mr. Marnus Gouse himself. The data processing is prepared at a detailed level (cf. annex 1). A listing of hypothesis related to the survey was proposed at the end of the former mission. This listing has been further detailed during this mission in order to identify the queries to implement and to retrieve information from the data base. We retained the option of recuperating basic and processed data in Excel data sheets which are grouped in as many folders as there are hypothesis. In view to adapt to a large variety of software in implementing statistical analysis, we carry out a two-fold approach of data retrieval and processing in Excel data sheets. The first fold consists in recuperating data in column sheets that could be exported to any statistical analysis software. The second fold pertains to building pivot tables that allow crossed analysis of variables and which could be very informative and guide further statistical analysis. We have succeeded in preparing all the queries in the data base and the data retrieval in Excel data sheets as listed in Annex. These data retrieval and processing could be mobilized already while the data keyboarding is still underway. Of course, the listing we have so far is not exhaustive and should not be fully relevant. It is expected that the interaction between the two partners will help to amend it in order to retrieve as much relevant information as possible from the survey.

In order to make easier the data save-guard and their communication between France and South Africa, we modify a little bit the data base architecture in splitting the existing data base into two articulated ones. Tables containing data are grouped within a new data base of only hundred of Kbits, such a data base is the only one to save-guard and to communicate. Through using the same sets of data and the same sets of Excel folders mentioned above, both teams in France and in South Africa should arrive to the same results to sustain their exchanges and to achieve a common reporting of the information obtained.

## **5. Trying to show some distance with the work engaged**

Although the survey engaged is not yet completed, we can be optimistic that it will help to know more about the farming systems operating in the Makhatini Flats and the farmers' reaction to the biotech introduction as well as to the current unfavourable institutional context. This knowledge will not be sufficient because there are limitations attached to the survey procedure in general and to the specific modalities in implementing the survey this campaign. For reason of adaptation to the staff involved (not experts in implementing surveys and interviews) and to the limited means engaged, the survey was built upon questions with predetermined sets of possible answers ("closed questionnaires"). Such a procedure does not enable an actual interaction between the enumerators and the interviewees in order to catch the farmers' visions on various issues.

Such an interaction could only be achieved through patient and time-requiring exchanges between scientists and farmers. It is time demanding and also competence demanding, it is further difficult to have people with the needed competence in cotton production and in farming system to be available for a significant duration to implement the desired interviews/exchanges with the farmers.

Such a constraint has to be overcome in the future. Otherwise, the common procedure will carry on ineffectively and which consists in firstly figuring out in one's side new actions and then to try to have them be appropriated by smallholders. It seems that such a procedure is under way with the Makhatini Cotton Farming Project we mentioned above.

It makes sense to commit oneself in interacting with farmers, hear them about crucial issues like the economic and social roles of keeping on agriculture, the use and preservation of natural resources they manage, the associative process already launched and the ambition of going further in view of better defend their revenues or be more involved in managing the fate of the cotton sector or any new cash sector that may emerge. Only such an approach can help to identify actions to carry out that would benefit to farmers, even if funding them will remain an issue.

## **6. Conclusion**

During the last three years, there was a kind of excitement regarding the re-launch of the cotton production by smallholders in the Makhatini Flats along with the introduction of Bt cotton in the zone. Furthermore, such a re-launch was somewhat associated to the technological introduction. Since we have not yet access to the time series of the production in the M. Flats, we cannot go further discussing the so-called re-launch. The fact is that the introduction of Bt cotton tends to be presented as a success story and an illustration of the soundness of biotech outputs even to smallholders.

The picture we catch this campaign is far more balanced. Cotton production should come back to a level of little significance and its fate in the near future is far from being bright. Causes of such a situation are mainly institutional and climatic. The competition between ginners resulting from the installation of the Makhatini Cotton Gin, in addition to the long established Vunisa SA, jeopardized the input credit system in place. Many farmers who obtained credit from the Land Bank via Vunisa SA sold their production to the new ginner in order to escape from having to reimburse their credit. Such a phenomenon leads to the disappearance of such a credit at the expense of all the players involved. This is an illustration of the free-rider process which occurs in many cotton countries. As a result, those farmers who cannot afford paying input on cash basis are pushed out of the cotton business. Those who benefit from regular incomes (pensions or remittances by family members) may remain

in the business but at a cost that appears to be high: we hardly encountered such a high level of insecticide cost.

The erratic rainfalls that prevail this campaign will not enable farmers in reaching a better financial situation. We anticipate that most of the farmers will suffer from negative income even though they limited their production costs.

Most farmers will be worse-off as compared to the former campaign. The institutional framework will likely remain unchanged so that the issue of input credit remains. For sure, the fate of the cotton production by smallholders is under serious threat. Even if the introduction of biotech output had to do with some positive trend of the cotton production during the last two campaigns, what we observed reminds how a technical innovation alone cannot be sufficient to ensure a sustainable production increase.

We even doubt that the biotech introduction impacted so much positively on the cotton production. What is clear is the seek for cash crop opportunity in an area where remunerative activities are scarce. As a consequence, farmers are open to capture any opportunity that helps them obtaining more cash. What is also clear is that farmers are suffering from high input costs and biotech seeds are making these costs further heavy. Whether better profitability won't derive from alternative technical innovation at lower cost is an open issue that deserves attention.

With some distance, we observe that the survey we are conducting makes sense in helping to provide information on farmers' realities and perceptions. This survey is executed so far rather in a satisfactory way with the reservation that we cannot rely on a permanent staff located in the M. Flats. Data capturing is engaged. Data processing is prepared in detail. The technical support of the data base has been adjusted to facilitate the joint use by both partners involved, Cirad and the University of Pretoria.

The survey conducted will help catch a more complete and updated picture. Such a picture will not suffice by itself. It has to be associated to what was capture through previous research works. There is nevertheless rationale to go beyond implementing a survey and to move towards an actual interaction with farmers in view of identifying what may be the actions they are desiring and what should be the modalities if their implementation so that they could benefit really.

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
H1	Women ensure frequently the head of the farmholds in connection with the specific history in South Africa	Clarify what is the womens share as farmholdiiing head	R1_1	Hypo_1	Gender&head	should be correct
		Clarify the womens share among the respondents	R1_1		Gender&respondent	
		Clarify the womens share in decision-making	R1_1		Gender&decision	
		clarify the relationship between gender and education	R1_1		Gender&education	
		Clarufy the womens share in implementing field works and its evolution	R1_1		Wom&workdegree1 and 2	
		establish the possible relation between this evolution and the importance of off-farm income for the farmholding	R1_1		Wom&offarm	
		clarify the relationship between womens role and the call for extra-labour and the payment mode	R1_1		Wom&labourhire1 and 2	
H2	The current cotton situation is reducing the possibility for a significant part of smallholders to get into cotton growing					correct
▪ H2a	In spite of the current unfavourable situation, famers are not giving up totally the cotton production because alternative cash crops is lacking	Clarify what is the proportion of smallholders keeping on producing cotton	R2a_1	Hypo_2	You&cotton	correct
▪		What is the mean cotton acreage	R2e_2		data_cot_ha	
▪		clarify what is the perception of the evolution of the cotton in the related communities	R2a_1		village&cotton	
▪		clarify what are farmers' reasons in	R2a_2		distri_cot_reasons	

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
		growing cotton				
▪		establish any link between the first reason given and the fact the respondent actually grow cotton or not	R2a_2'1		cot2003&1st_reason	
▪		clarify what are the constraints farmers felt as associated to cotton growing	R2a_3		distri_cot_diff	
▪		establish any link between the first constraint given and the fact the respondent actually grow cotton or not	R2a_3'1		cot2003&1st_diff	
▪ H2b	The late setting of the rains was particularly detrimental to cotton growing this campaign	Check whether the rain setting is actually put forward as a constraint associated to cotton growing	R2a_3 et R2a_3'1		cot2003&1st_diff	correct
▪		The level of yield achieved is very low	R10b_1_2		data_H10b_1_2 Yield level	
▪ H2c	Food security is of major concern and farmers prevent themselves getting into an excessive specialization in cotton growing because of imperfect food markets	Check the level of concern regarding food security	R2c_1		foodsecure_concern; foodsecure_no_issue; foodsecure_mustproduce; foodsecure_canbuy; foodsecure_ferti; foodsecure_ferti_thisyear	incorrect, this is quite opposite to what occurs in many other African countries
▪		assess the mean cotton acreage and the cotton share in the cropping system	R2c_2		Check_data_H2c_2	
▪		Clarify what is the farmers' perception about food markets	R2c_1		foodsecure_canbuy;	
▪		Establish the relation between the perception about food market and the cotton share in the cropping system	R2c_4		Foodsecure_scot	
▪ H2d	Constraints being felt pertain more to the lack of service provision in a context of liberalization without public intervention	clarify what are the constraints identify as associated to cotton growing	R2a_3		distri_cot_diff	should be correct

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
▪ H2e	The current unfavourable context leads farmers to produce by reducing production costs	Few Farmers actually chemically treat their seeds before sowing	R23_3		seed_treatment	correct, anyway farmers are not getting any financial support
▪		No fertilizers used on cotton crop	R23_3		ferti_use	
▪		No herbicide use on cotton crop	R23_3		herbi_use	
▪		Small number of insecticide sprays, and reduced dosages	R23_1 R23_2 & R23_2_1		Nber_applica_insec mean_insecti_dosage	
▪		Insecticides represent the main part of cash expenses	R2e_1 R2e_2 R2e_3 R2e_4		inputcost_ha data_totalcost_ha	
H3	Farmers are converging on poverty indicators that do not totally comply with those usually retained in analysis on poverty alleviation	Clarify what are the criteria farmers retain as poverty indicators	R3_1	Hypo_3	distri_poor_indik	?
			R3_1'1		indik_poor&mat indik_poor&mat	
			R3_1'2		indik_poor&_animal	
		identify what is the state of material accumulation by farmers	R3_2		check_data_H3_2	
		Identify what is the state of animal accumulation	R3_3		Nber_animal	
H4	Farmers consider that adopting GMC is costly and even more and more. Continuation of the increase of the technology fees, even though at a limited scale, might lead farmers from no longer using the related	Clarify whether farmers have consciousness of any constraints related to GMC use	R4_1	Hypo_4	Infosource&pbheard	Realistic although farmers do not seem to have a clear idea of what they for

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
	varieties					
		Clarify what are the disadvantages the farmers heard about GMC use, and what is their source of information in this regard	R4_2_1		GMCpbheard&rank	
		Clarify what do farmers regard as disadvantage and in what extent the expensiveness is felt to be a constraint	R4_2_2		GMCpbfelt&rank	
		Clarify what are the advantages farmers heard, what are their information source in this regard and to what they pay special attention	R4_3_1 R4_3_2		GMCadvheard&rank GMCadvfelt&rank	
		Clarify to what extent farmers' feeling regarding advantages and disadvantages are consistent	R4_4		GMCpb&adv_consistent	
	▪ H4a	In the process of reducing their production costs, farmers are attempting to move back to conventional varieties	clarify what is the share of the farmers growing non Bt cotton	R4a_1	NberVar&Maintype	realistic
	▪ H4b	Coming back to conventional varieties is nevertheless made difficult by the lack of availability of the needed seeds within a context of promotion of GMC	No specific question to address this assumption			realistic but there is no specific questions to capture this point
	H5	Farmers do not respect their commitment in setting up refuge plots as it is stipulated in the english or afrikan agreement they signed without understanding it.	Verify if farmers are declaring using only one variety	R4a_1	NberVar&%UP	realistic
		Check whether farmers are aware of the technical constraint of having refuge plots	R5_1	Hypo_5	info&>1 var techrecom&refuge	

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
		Clarify whether farmers have been controlled for complying or not to the condition of refuge plot	R5_2		Recom&follow_1 Recom&follow_2 Recom&follow_3 Recom&follow_4	
			R5_2'1		1strecom&check	
		Clarify what are the areas covered by the technical information related to GMC	R5_3		techrecom_area	
		Identify what were the sources of technical information related to GMC	R5_4		techrecom_source	
	▪ H5a Farmers are not checked for the installation of refuge plots which in return encourages farmers in not complying with this measure	Identify whether there is a relationship between the farmers' answers regarding the fact they follow recommendation and the fact they were checked or not	R5_2		Recom&follow_3	correct.
H6	Farmers who adopt GMC tends to invest more in complementary inputs in order to maximise their profitability which encompasses a higher financial risk	Is there any difference in the extent of input use with regard to the type of cotton varieties being used ?	R23_2_1 R6_2 R6_3	Hypo_6	mean_insecti_dosage ferti_use&cotype Nber_weeding&cotype	Incorrect this campaign owing to very late sowing that reduces tremendously the yield expectation
H7	Call for extra-labour is of limited scale and restrained to some cultural operations and some crops	Clarify the crops and the cultural operations for which external labour is hired	R7_1	Hypo_7	labour4crop_ope	Somewhat relevant except that farmers did not grow any alternative crop ! This is quite opposite to any other African country
	▪ H7a Recourse to extra-labour pertains more to mutual aid so that the labour market in the concerned zone is little developed and that the labour	Clarify the ways by which one is paying extra-labour	R7a_1		labour_paymode	Actually cash transaction prevails. This is another specific trait

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
	opportunity cost (useful to assess the labour productivity) is weak.					
▪ H7b	The cash constraint and the suppression of cash credit are reducing the possibilities to hire labour for cultural operations which are labour-intensive, implying then yield decrease	clarify the extent of the appeal for extra labour	R7b_1		check_data_H7b_1	Debatable since the pensions allocated to the elderly people alleviates cash constraint. The drought and the resulting bad performance of the cotton crops reduces make hard to establish any relationship
▪		reveal the possible relationship between the extent of recourse to extra-labour and the yield achieved	R7b_2		data_7b_2'1	
H8	Farmers are perceiving the same rationales and constraints related to cotton growing the way farmers in Francophone Africa do	what are the advantages farmers point out in growing cotton	R8_1	Hypo_8	cot_justifi	probable
		what are the disadvantages farmers point out in growing cotton	R2a_3		distri_cot_diff	
H9	Farmers do not have a clear perception of the impacts of cotton production on environment in the opposite of the human health	Do farmers perceive any impact of cotton production on environment	R9_1	Hypo_9	cotfeel_environ	probable
		what are the environmental impacts farmers perceive	R9_2		environ_felt	
		Do farmers perceive any impact of	R9_1		cotfeel_yourhealth	

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
		cotton production on health			cotfeel_publichealth	
		what are the health impacts farmers perceive	R9_4_1 R9_4_2		cot&myhealth cot&publichealth	
▪ H9a	Farmers have a pretty good knowledge of the damaging pest in cotton but the perception of the related negative impacts is unclear and diverging	What is the farmers' perception about pests	R9_1		know_cotpest	Relevant but level of the farmers' knowledge appears to be questionable
▪		What are the pests farmers regard as important	R9a_2 R9a_2'1		pest_genrl_importt Nber_importantpest known	
▪		What is the feeling about the evolution of the pest pressure	R9_1		feel_cot_pressure	
▪ H9b	Farmers do not observe any recent evolution of the damaging pests	What are farmers perceptions about the recent trend of pest pressure evolution	R9b_1 R9b_2		recent_importtpest recent_less_importt pest	Probable
▪ H9c	Farmers have little consciousness of the beneficial fauna	What is the farmers' perception about beneficials	R9_1		know_beneficial	Probable
▪ H9d	Farmers show a great confidence in chemical control and do not have non-chemical pest control methods	What is the balance between chemical and non-chemical pest control	R9_1		control_balance	Probable
▪ H9e	Farmers are lacking command in controlling pests and rely mainly on the advice from the extension network which is disappearing	who is having the final say in deciding pest control	R9_1		pestcontr_dmaker	Probable
H10	Farmers do not benefit from various sources of information to assess the advantages and disadvantages associated to GMC. They are only talked	What are the information sources respectively regarding the advantages and disadvantages of GMC, are there more sources regarding the advantages than for the disadvantages	R10_1 R10_1'1 R10_1'2 R10_1'3	Hypo_10	GMC_adv_infosour ce mean_GMC_adv_in fosource GMC_disadv_infos ource	Probable

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
	about the advantages and little about the disadvantages				mean_GMCdisadv_infosource	
		What are the advantages heard and the one felt to be important	R10_2 R10_2'1		GMC_adv_heard GMC_adv_felt	
		What are the disadvantages heard and the one felt to be important	R10_3 R10_3'1		GMC_disadv_heard GMC_disadv_felt	
▪ H10a	Farmers did not benefit from any accompanying action to help them achieve good command in using GMC	Have farmers been informed and trained in using GMC ?	R4_1		Get_GMC_training	Probable
▪ H10b	The adoption of GMC induces a yield gain from a better pest control as resulting from escaping from the jeopardy in getting needed chemicals on time	is yield better for the GMC users	R10b_1_1 R10b_1_2		yield&cotype	Late sowing and drought make hard to establish this relationship
▪ H10c	Chemical pest control is exclusively targeted at sucking pests as a result of the assumption that GMC can help to prevent from combatting boll worms and that the needed products against boll worms are not available	Clarify the types of insecticides used on cotton, GMC or not	R10c_1_1 R10c_1_2 R10c_1 R10c_1'1		data_H10c_1_1 data_H10c_1'1 insectdosage_cotype Nbermax_insect	Correct
H11	Few farmers have their own sprayers which are relatively costly, this is a constraint that impedes from spraying on time	Clarify whether farmers have their own insecticide sprayers	R11_1	Hypo_11	Nber_sprayers Nber_sprayers&const	Likely Incorrect, farmers do have sprayers
		Clarify whether farmers feels constraints in spraying the day they want	R11_2		sprayer&constraint	
		identify what are the reasons related to the constraint of not being able to spray the day farmers want	R11_3		reason_spray_constr	

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
H12	Cotton production demands womens participation to field works	What is the degree of women participation to field works and its trend	R12_1	Hypo_12	women_partici_1	Likely correct
		What is the womens role in decision-making in the farm activities, and what is the implication in the womens participation to field works	R12_1		women_partici_2 women_partici_3	
▪ H12a	The womens participation to field works is not specific to cotton crop	Is women's participation specific to cotton	R12a_1		women_crop_oper	Not relevant since there are no other crops than cotton
▪		to what cultural operations women are participating	R12a_1		women_crop_oper	
▪ H12b	The children participation to field works is concentrated at the harvest period	Are children participating to field works (according to the age categories of the people going to the field works)	R12b_1_1 R12b_1-2 R12b_1_3 R12b_1_4		agender_workers	Children participate to field works but no specific question to clarify to which operations they contribute
▪		What is the degree of children's participation to field works, what are the ages of the children involved	R12b_1_5		agender_family_cop %agender_working	
▪ H12c	Cotton production induces a higher rate of children going to school	what is the degree of the children's schooling according to their ages	R12c_1		Nber_agender_toschool %agender_toschool	Hard to clarify, a specific trait is a high level of children attending school
H13	Provision of extension service is lacking and farmers' expectation in this area is not satisfied which induces to limit the yield level achieved	What is the technical backup farmers get : which sources, pertaining to what technical areas	R13_1 R13_1'1 R13_2	Hypo_13	tech_source_got data_H13_1'1 tech_info-get	Likely correct
		What do farmers think about the backup they get or not	R13_3		satisf&techinfo	
		What do farmers expect about a	R13_4		techinfo_wanted	

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
		desirable back up				
H14	As manual farming is dominating, lack of labour is crucial in setting the level of the yield achieved	How the labour constraint is being felt among the various constraints?	R14_1	Hypo_14	familylabour_constr extralabour_constr	Likely correct although the relationship will be hard to establish owing to late sowing and drought
		what is the level of labour availability in the farms	R14_2 R14_2_1		famlabour_availa	
		Is there any relationship between the labour availability and the yield achieved	R14_3		data_H14_3	
▪ H1 4a	Weed control is insufficient and delayed which is a limiting factor for the yields achieved	How is felt the constraint for weeding	R14_1		weeding_constr	Of little relevance owing to the conditions of this campaign
▪		what was the delay for the first weeding	R14a_1		delay_1stweed	
▪		What are the numbers of weedings	R14a_2		nber_weeding	
H15	There is no action to induce a production of good quality, either by technical support nor by a price policy and adapted trading practices	Clarify whether there are technical recommendation for ensuring seedcotton quality production	R15_1	Hypo_15	sort_cotton	Likely correct
		Clarify whether there is application of price differential in order to encourage seedcotton quality production	R15_2		appli_pricediff	
		Assess the level of price differential to promote quality production	R15_3		level_pricediff	
▪ H1 5a	The introduction of the GMC did not lead to distincting the types of seedcotton (conventional and Bt cotton) at the trading stage	Clarify whether there is distinct trading operation for GMC and non-GMC	R15_1		Not_mix_GMC	Probable

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
H16	The concentration of the service provision at Jozini implies that villages remote from this centre could be a handicap for gaining in productivity	Is there a negative relationship between the village distance to Jozini and yield?	R16_1	Hypo_16	distance&yield	Late sowing and drought make this relationship hard to establish
H17	The associative process in the communities is allowing to only addressing a limited number of functions, in particular to ensure the evacuation of seedcotton to the collecting centre	how common is the associative process	R17_1	Hypo_17	in_farm_org in_farm_org_2	Probable
		What are the activities ensured by the associations in the communities?	R17_2		asso_purposes	
H18	Farmers do not have a clear vision of the factors that may induce limitation to their cotton crop profitability	Do farmers perceive any factor impacting negatively on the profitability of the cotton crop this campaign	R18_1	Hypo_18	lhappy_profitability	Probable
		What are the factors farmers perceive as limiting the profitability of the cotton crop this campaign	R18_2		factor_nonprofita	
H19	Farmers tend to reduce their adoption of GMC in the future	What is the farmers' intention regarding GMC use in the future	R19_1	Hypo_19	will_be_moreGMC	Probable but the lack of alternative cash crop is so crucial
H20	Farmers do not have clear ideas about the impacts of GMC on environment and health	What are the Farmers' perception on the impacts of GMC on environment and health	R19_1	Hypo_20	think_posit_env think_negat_env think_posit_health	Probable
H21	Lack of labour lead to a rate of the land use	What is the use ratio of the farm land available	R21	Hypo_21	land_use_ratio	correct
H22	The frequency of elderly people benefiting pension payments help to alleviate cash constraint	What is the number of elderly people in the farms	R22	Hypo_22	Nber_elderly	likely correct
H23	Disruption in providing input credit lead to a very low input	What is the number of insecticide applications	R23_1 R23_2 and	Hypo_23	Nber_applica_insec mean_insecti_dosag	correct

	Hypothesis	Queries to carry out	Queries names	Excel Folder	Excel sheet names	Hypothesis Relevance?
	use this campaign		R23_2_1		e	
		Aren't farmers stop using herbicides?	R23_3		herbi_use	
		Were farmers used to chemically treat their seeds and did they continue the last campaign	R23_3		seed_treatment	
		Aren't farmers stop using fertilizers if they had ever used	R23_3		ferti_use	
H24	Farmers are suffering from high input costs	What are input prices farmers obtain	R24_1	Hypo_24	input_prices	Correct
H25	Farmers are suffering from low prices for their seedcotton	What are seedcotton Prices farmers obtained	R25_1	Hypo_25	seedcot_price	Probable
H26	Cotton production is not at all profitable this campaign	What is the cotton gross income	R26_1 R26_2	Hypo_26	data_H26_2	
		What is the cotton income net of cash expenses for inputs What is the cotton income net of all cash expenses (input, extra-labour, tractor)	R26_3 R26_4 R26_5		data_H26_5	
H27	Cotton production is further non-profitable for GMC this campaign	Is there is any income difference between farmers according to the varieties they grew	R27_1 R27_2	Hypo_27	var_income	
H28	GMC is more imposed than freely chosen by farmers	Do farmers have clear and converging ideas about GMC and their advantages?	R4_3_1 R4_3_2	Hypo_28	GMCadvheard&rank GMCadvfelt&rank	Probable
H29	In spite of limited means, farmers remain attached to mechanized soil preparation which is costly and detrimental if badly implemented	What is the frequency of farmers asking and paying for mechanical soil preparation	R23_3 R29_1	Hypo_29	soil_prepare machine_cost_ha	Probable