International Journal of
Inclusive and Sustainable Education

ISSN: 2833-5414
Volume 2 | No 9 | Sep-2023

Practicalities in the Production of Maize by Persons with Visual Impairment (PVI) in Cameroon

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Abstract: After a field survey we carried out to know the practical processes involved in large scale production of maize by farmers with blindness in Cameroon, a number of hitches were identified. This paper studies and proposes technical solutions to these difficulties with a surmounting objective to improve upon the economic, and hence, social prosperity of all persons with blindness. The surveys involved field observations of the farmers with blindness, buttressed with interviews, while they were actually at work in the farm cultivating the maize.

INTRODUCTION

In the current ongoing drive to promote inclusion of persons with disabilities, it is no secret that the best means to ensure their inclusion is to promote their economic inclusion. In actual fact, renowned 21st century professors in the field of Special Education (cf. Kochung E., 2014 and Ihenacho J., 2014) profess that inclusive education and social inclusion are wasteful, if they do not guarantee economic inclusion. Thus, a lot of researches have, and are being carried out in prospective economically lucrative areas for persons with disabilities, such as researches in vocational rehabilitation. This paper first elaborates on the difficulties identified by the research through field observations, and secondly, proposes practical solutions to overcome the difficulties.

To ease understanding, the observation checklist utilized by the researcher and collaborators is first presented, followed by explanations of the processes involved in the cultivation of maize, the difficulties which the farmers with blindness go through, and the realistic solutions proposed. Last but not the least, a synthesis of the paper is provided at the end of the article to cement comprehension.

OBSERVATION GUIDE FOR PVI PRODUCING AND MARKETING MAIZE

NB: In addition to observation of the PVI at work, the PVI are asked specific questions with respect to the difficulties encountered in performing each task. The following activities are observed:

A. Pre-planting operations: treatment of the maize seeds

B. In the farm

1. Land preparation:
   a) Clearing
   b) Making of ridges
   c) Determination of length of ridges
2. Planting:

a) Determination of spacing
b) Determination of depth of planting
c) Determination of seeds for each hole
d) Determination of whether the maize seed is good or bad
e) Determination of whether the seeds have germinated or not
f) Determination of the period to weed
g) Distinguishing weeds from maize crops
h) Weeding proper
i) Determination of whether the maize is mature and ready for harvesting

C. At home:

3. Harvesting and transportation to the house
4. The drying process and storage

Challenges Faced by PVI in Cameroon during the Cultivation of Maize as Identified by the Researcher through Direct Observation in the Field.

1) Pre-planting operations: Treatment of the maize seeds

The major difficulties encountered by the PVI farmers at this level are lack of knowledge on how to treat maize seeds before planting and difficulty in getting good seeds for planting. They also complain of insufficiency of finance to buy the pesticides and fungicides to treat the seeds.

2) Land preparation

Clearing: Clearing and weeding the farm by PVI is a difficult task, and even for sighted farmers, especially when the farm is large. Weeding was done by the PVI farmers mostly using the bare hands and sometimes, a hoe. Farmers with visual impairment do not have the luxury of using gloves to weed like some sighted farmers because their lack of sight necessitates them to feel the grass so that they do not uproot the maize mistakenly.

Making of ridges: Making ridges is considered by the PVI farmers as the second most tedious stage in planting maize, after the weeding. This is because it has to deal with bending the waist for long periods of time.

Determination of length of ridges: Due to their lack of sight, the PVI farmers find it difficult to make shorter ridges. As noted above, the PVI tend to make very long ridges and there is no common standard and scientific way of determining the length and width of the ridges.

3) Planting

Determination of spacing: The PVI do not have any scientific way of maintaining the spacing for planting. They use the lengths of their arms and legs to determine the spacing during planting. While bent over to plant the maize, they take short steps with their legs, about half a meter, either usually backwards, but it can be forward, depending on the direction which they are planting and this determines the spacing between the planted corn seeds. The researcher observed that the farmers used any spacing of their choice such as 90cm by 30cm, 90cm by 20cm and 75cm by 50cm.

There is therefore a definite need for a scientific, standardized, readily available and affordable device or instrument that can be used by the PVI farmers for this task in order to avoid them having to improvise by playing gymnastics with parts of their body which differ from one farmer to the other given that their build is not the same. Such a device or instrument would be based on the recommended spacing that is conducive for optimum growth and yields.

Determination of depth of planting: The researcher realized that due to their lack of sight, the farmers used a lot of their sense of "feel" in planting. They could feel the depth of the soil while

planting by measuring the depth of the hole with the middle finger. The recommended depth is three centimeters. The problem here is that the physical build of persons varies, so does the length of their middle fingers. There is, therefore, need for some sort of standardized instrument for the PVI farmers to use. If the hole is too deep, the seed takes a much longer time (more than eleven days to germinate above the soil). If the hole is too shallow, the seeds are exposed to birds or other preys scratching or picking them out of the soil and for heavy rains to easily wash the top soil layer and expose them.

Determination of seeds for each hole: Most of the time, the farmers insert one seed per hole, but sometimes, two or even three depending on the viability of the seeds. However, due to their lack of sight, there is no way for the PVI to accurately determine the viability of all the seeds.

Determination of whether the maize seed is good or bad: The researcher noticed that due to their visual impairment, the farmers could not determine if the seeds were good or bad, so, they had to trust that the seeds were good since they were hybrid seeds from research institutions like IRAD. However, the farmer who got the seeds from the Delegation of Agriculture usually inserted two seeds per hole because a friend had said the seeds were not too good.

Determination of whether the seeds have germinated or not: The researcher noticed that the farmers with visual impairment had to manually touch the seedlings to determine that they had emerged. They usually go to the farm after two weeks when they are sure that the seedlings are supposed to have germinated. What makes the process difficult is that it is difficult to distinguish using touch, the newly germinated maize seedlings from the grass at this stage. It takes the experienced hands to do this. Even so, how do you touch all the germinated seeds for a large plot?

Determination of the period to weed: This can constitute a major problem for the PVI farmers if they have not fully developed an acute sense of timing (keeping an accurate count of the number of days from when the seeds were planted) to know when the seeds have germinated and when weeds have started competing with the germinated seeds for nutrients. Weeding the farm is important because the weeds will retard the growth of the maize if not weeded. The farms are usually very bushy.

Distinguishing weeds from maize crops: During the first three weeks to one month it is very difficult for the PVI to distinguish the newly germinated maize from the weeds using touch.

Weeding proper: Again, as mentioned above, and as indicated by the PVI farmers engaged in the cultivation of maize, this is the most tedious stage in maize cultivation. Weeding is done by the PVI farmer mostly using the bare hands and sometimes, a hoe. Farmers with visual impairment do not have the luxury of using gloves to weed like some sighted farmers because their lack of sight necessitates them to feel the grass so they do not uproot the maize mistakenly. What also makes it so tiresome is because it involves bending the waist for long. Weeding poses this same problem even to sighted farmers. Abroad, they have “high powered” and “low powered” weeders. The high powered weeders are machines like tractors which are highly automated, driven, and not only weed the grass, but are equally capable of gathering the grass, ploughing and even planting. The low powered weeders are pushed manually and some of them are capable of gathering the weeded grass as well. These weeders prevent the farmer from bending down.

Application of fertilizers: Today, fertilizer application is a necessary and important operation in modern and commercial maize cultivation in order to increase yields per hectare and consequently profits. The PVI farmers must therefore possess the skills required to carry out this operation. The two main fertilizers used to fertilize maize are ammonium sulphate and NPK, and this is done three to four weeks after planting. The fertilizer is placed in bands or rings within 5 centimeters of the maize seedlings to allow better targeting of the nutrients.

For the application of ammonium sulphate in large farms, it is recommended to dissolve 1 to 3 tablespoons per gallon of water. The leaves of the maize are then sprayed with the ammonium sulphate solution, making sure not to over apply the solution and to only spray it when it is cool outside and not in direct sunlight because that could burn and damage the maize plant easily. However, this method is less effective than band or ring application. With respect to the application

of NPK in large farms, it is recommended to broadcast it (i.e. scatter it evenly) on the beds. This method is not also as effective as the band or ring application.

The skills and attributes therefore required of the PVI farmers for this operation are the ability to measure quantities accurately, a keen sense of touch to feel and distinguish the different types of fertilizers (ammonium sulphate is like salt and NPK is in the form of grains), a keen sense of timing to know when to apply the fertilizers, and the skills of mobility and orientation around the farm. The PVI really have difficulties distinguishing and measuring the quantities of the different types of fertilizers accurately.

4) Determination of whether the maize is mature and ready for harvesting

As indicated above, PVI engaged in the cultivation of maize require a lot of the skills of time consciousness and sequencing. Just as with the case in determining whether the seedlings have emerged, and in the case of determining the best time to weed, the period for maturity of the maize is determined by time.

Also, for the PVI farmer to really determine whether the maize is mature or not, again, the sense of touch is needed. The farmer needs to manually feel the maize cob in the hand and sometimes even peel it to be able to feel the grains. But since the PVI farms are very large, it is tedious and not feasible to go round the whole farm touching all the maize cobs to determine whether they are really mature.

Proposed Solutions to PVI Engaged in the Cultivation and Marketing of Maize following the Field Observation

Pre-planting operations: Treatment of the maize seeds

In order to acquire the knowledge on how to treat maize seeds, it is necessary for the PVI farmers, who up to now do not possess such skills, to seek help from an Agricultural Extension Worker.

An Agricultural Extension Worker is an employee of the Cameroon Ministry of Agriculture whose salary is paid by the government. He/she provides services to farmers free of charge. Some of these services include the following:

- Training farmers on the proper application of agricultural practices.
- Disseminating new technologies to farmers and training them on how to use such technologies
- Informing farmers about available markets for their produce.
- Helping farmers in networking with other farmers, other farmers' cooperatives, Non-Governmental Organizations (NGOs), etc.
- Assisting farmers' cooperatives in various ways.

It is necessary to point out here that while in principle agricultural extension workers are expected to render services to farmers individually, in practice this is not always the case. In practice, the extension workers work through the farmers' cooperatives and in very close collaboration with them. For instance, the farmers' cooperative draws up a roster of its members and the schedule of the extension worker to visit the members' farms, carrying out training sessions, etc. This underlines the importance and need for the PVI farmers to belong to farmers' cooperatives in order to benefit fully from these services.

In order to solve the problem of lack of knowledge on how to treat maize seeds, it is necessary, in the short run, for the PVI farmers to contact the agricultural extension worker of their area to provide them with the necessary training. In the long run, the PVI farmers should endeavor to register with and belong to a farmers' cooperative in order to benefit from the many other services and advantages provided through the cooperatives.

The process of treating maize seeds goes thus: First, the farmer should dry the seeds in the sun until there is no moisture left on them (that is, until the farmer cannot feel any moisture on the corn grains). This may last from an hour to several hours, even up to five hours, depending on the amount

of sun or smoke in the kitchen. The farmer should take care not to dry them on a surface which can scorch them. Then, the farmer dresses the seeds (mixes the seeds with pesticides and dries again, until the grains are dry, but sticky (that is, the grains stick slightly together and to the fingers).

This also depends on the amount of heat applied to the grains from the environment like the sun and may also last for an hour to five hours depending on the environmental conditions. Finally, the farmer mixes the seeds with fungicides and again dries them until they are dry, before planting. At this stage, the grains are no longer sticky, but have a coarse surface due to the coating of the fungicides. The measuring and mixture containers for this process are readily available in the local markets where some agricultural or farm implements are sold. Empty peak milk containers can also be used as measuring containers while mixture basins are very available in the local markets.

2. Land preparation

a). Clearing

The farms were all very bushy before planting. A lot of grass, even with the uprooted maize stems, was all over the farms. The only solution to this is weeding. Weeding was done mostly using the bare hands and sometimes, a hoe. Farmers with visual impairment do not have the luxury of using gloves to weed like some sighted farmers because their lack of sight necessitates them to feel the grass so they do not uproot the maize mistakenly. Also, the researcher observed two of the farmers actually clearing with a cutlass some “elephant grass” which had grown in the farm, then using the hands and a hoe to uproot it.

Weeding and clearing the farm by PVI is a difficult task, and even for sighted farmers. However, if the PVI is slow in grasping this skill, patience should be exercised because with time and more practice, the PVI will become very good at this. Also, using the hybrid maize seeds treated with pesticides and fungicides equally helps a great deal because it helps the maize to at least still do relatively well even with the grass.

b). Making of ridges

The weeded grass is piled in small heaps and left in the furrows to rot. This acts as a source of manure. Making beds for farmers with visual impairment is important because they also use the beds as land markers for their orientation in the farm. All the farmers make ridges using hoes. The maize itself does not need the beds, but other vegetables which need loose soil need beds. In two of the cases observed, the farmers did not make new beds but just used the old ones. Other sighted farmers in the South West Region of Cameroon do not usually make farm beds, but just use something like a half broken knife to soften the soil before planting the maize.

To overcome the difficulty of the toilsome nature of making ridges, the farmer simply needs to do the work over and over and with time, the farmers will gain resistance and it will no longer be a problem.

c). Determination of length of ridges

The researcher noticed that farmers with visual impairment make very long farm beds. In fact, a bed may even extend from one end of the farm to the other end. This is due to their visual impairment. They find it easy to just follow a farm bed to the end and then move to the next when making the bed and planting the maize, rather than making many shorter beds. Also, farmers with visual impairment have different means of determining the width of the beds. The researcher noticed that the width of the beds are measured using the gap between their legs while hoeing. In addition, the hoe also helps to determine the width of the beds. For instance, while making the bed, one farmer kept on tilling the soil by hitting it with the hoe, sequentially, 5 times from left to right and this amazingly formed a straight bed. Two other farmers said they just determine the width of the beds instinctively.

As it can be clearly observed from the above, the PVI engaged in maize cultivation do not have a common standard and scientific way of determining the length and width of the ridges. The researcher gathered that this is not a problem, or at least, not a major one, for the PVI. Trainers need

not compel trainees to construct ridges with particular lengths and widths. This will be determined by the PVI's structure (length of arms and legs).

3) Planting

a). Determination of spacing

The ideal scenario for the farmers to determine the most appropriate spacing is that experiments should be done to determine the appropriate breed and spacing for the plots. This can be done by demarcating the plot into smaller plots, then planting different maize breeds using different spacing and then observing and identifying the breed with the highest yield given a particular spacing.

b). Determination of depth of planting

A good tool to use in planting maize which skips this depth problem is a trowel, which builders use when plastering houses and which the PVI farmer can easily buy from any building materials store at 2000 francs at most.

c). Determination of whether the maize seed is good or bad

It is worth noting that the difficulty of determining whether the maize seed is good or bad is equally faced by sighted farmers. Normally, the viability of maize seeds is determined in the laboratory or by planting a sample trial of a hundred seeds. Then, the percentage germination rate is determined before the whole farm is planted. If the germination rate of the sample is between 80% and 100%, then the viability of the seeds is considered good. So, the wide practice is that farmers simply trust the agricultural and research bodies responsible for distributing planting materials since they are expected to ensure the viability of the seeds before distributing them.

d). Determination of whether the seeds have germinated or not

One of the farmers explained to the researcher that to bypass this hurdle, the seedlings must emerge by two weeks, so there is no need to even do this, though another option will just be to ask someone.

Another thing which the researcher noticed which may be skipped in this stage is the importance of the farm beds once more. Since it may take the farmers sometimes more than two weeks to cultivate the whole farm, they can estimate the time they planted on each bed. So, they know that, from this bed to that bed at that end, the corn will have started growing by now. Also, what normally happens is that the entire farm is not weeded first before planting commences. Instead, large sections of the farms are weeded, then maize is planted, the other sections are then weeded and planted later on. This is because the farms are relatively large. The farmers just approximate the time they planted on each section so as to know when to commence weeding.

e). **Determination of the period to weed**

The researcher noticed that unlike their sighted counterparts who weed their farms twice or more before the maize is mature, farmers with visual impairment bypass the hurdle of weeding by usually weeding their farms just once, roughly at two months after planting. The time is carefully noted by the farmers. This is due to their lack of sight. At this time, it is easier to distinguish the maize from the grass since the maize stems are hard and bigger than the grass.

However, another thing noticed was that farming, unlike other vocations, is a communal affair. The farmers with visual impairment usually made helpers to help them in the farm and sometimes, these sighted helpers do the weeding even before the maize stems mature. Weeding the farm is very toilsome, even for sighted farmers, talk-less of being visually impaired. But, the researcher observed that mastery, due to doing the same thing over and over again, makes the farmers to do this easily. Two of the farmers have developed a strategy to ease the weeding process. First, the entire section is thoroughly weeded. Then, the furrows are weeded next, so as to give the maize stem some time to harden so that distinguishing the maize from the weeds is easy. Then, roughly at about two months, the beds are weeded. At this time, it is easy for the PVI to weed the grass without uprooting the maize.

As a sustained solution in order to avoid the difficulty of distinguishing the maize plants from the

weeds at the early stage, and in order to avoid having to wait until after two months to be able to distinguish the maize stem from the weeds during which time the weeds would have adversely affected the growth of the maize, it is strongly recommended that the PVI farmers should engage work assistants on a temporary basis specifically for this task and the weeding proper. It should be noted that controlling weeds is a crucial task in maize cultivation given that weeds can drastically reduce the yields of the produce per hectare.

f). Distinguishing weeds from maize crops

The advantage which maize has is that it is easy to distinguish it from other crops, whether grass, groundnuts, yams or whatever, when planted together, roughly two months after planting. This is because the maize stem grows vertically upwards above the other crops. This growth characteristic of maize is useful to PVI especially during weeding because they weed very fast and do not lose time to differentiate the maize from grass. At roughly two months, when the maize stems are hard and taller than the other vegetation, they do not need to spend time determining if it is maize or not. Also, good mastery of the approximate space between each maize plant helps a lot to make weeding easier since the hand becomes accustomed to the distances.

g). Weeding proper

Since it is difficult to acquire and maintain mechanized weeders in Cameroon, the methods which the PVI use to weed can help to make the task less stressful, that is, weeding a section first, then waiting for the maize stems to harden before weeding again. Without the beds, the farmers with visual impairment will easily lose their orientation during weeding. The weeded grass is left in the furrows to rot.

The strong recommendation has already been made above that work assistants should be engaged on a temporary basis to handle the tasks of determining the ideal time to weed, distinguishing weeds from the maize and weeding proper.

h). Determination of whether the maize is mature and ready for harvesting, then harvesting and transporting it to the house

The farmers know that three months after planting, the maize is mature. Anytime shorter than this will be extra ordinary. In addition, a colour identifier (usually installed on phones, to identify and say the colour of objects it is focused upon). The colour identifier could indicate green, to signify that the maize is mature or will soon be, or brown, to indicate that the maize cobs are dry.

But for a farmer with visual impairment to really determine if the maize is mature or not, again, the sense of touch is needed. The farmer needs to manually feel the maize cob in the hand and sometimes even peel it to be able to feel the grains.

The PVI farmers must therefore keep practicing until they fully master the ability to be able to know if the corn is mature just through touch and not only from the size but from the hardness of the maize itself. They must also keep striving to further develop and perfect their skills of orientation and mobility to harvest and transport the maize to the house.

Synthesis of Challenges Faced by PVI in Cameroon during the Cultivation of Maize

Tasks	Challenges	Solutions
1. Treatment of the maize seed	➢ Lack of knowledge on how to treat the maize seed ➢ Difficulty in getting good seeds for planting ➢ Insufficient finance to buy pesticides and fungicides	➢ Seek knowledge of seed treatment from agricultural extension workers and join farmers' cooperatives ➢ Join farmers' cooperative, Seek pre-financing from major clients, get loan from njangi, credit union, financial institutions or commercial banks
2. Clearing	➢ Very difficult ➢ Very tedious ➢ PVI farmers cannot wear gloves since they need to feel the grass	➢ Use hybrid maize ➢ More clearing practice makes clearing easier ➢ Use bare hands

		➢ It may be helpful to get work assistants for this task
3. Making ridges	➢ Very difficult, very tedious and waist breaking	➢ More practice makes this task easier. ➢ It may be helpful to get assistants for this task
4. Determination of length of ridges	➢ Difficult to make shorter ridges due to lack of sight	➢ Make long ridges ➢ Practice how to use arms and legs to measure ridge lengths
5. Determination of planting spacing	➢ PVI do not have any scientific way of maintaining the spacing of planting	➢ Tests need to be done on the land for cultivation to determine best plant spacing
6. Determination of depth of planting	➢ No standardized instrument for the PVI farmers to use, so they improvise and approximate the depth	➢ Improvised cheap instruments such as trowels can be used.
7. Determination of seeds for each hole	➢ No way to accurately determine the number due to no knowledge on the viability of the seeds	➢ Viable seeds should be gotten from trusted sources like agricultural research organizations like IRAT ➢ If seed viability cannot be trusted, plant 2 seeds per hole
8. Determination of whether the maize seed is good or bad	➢ No way for the PVI farmers to determine this. So, they simply have to trust that the seeds from the bodies supplying them are good	➢ Get viable seeds from trusted sources like agricultural research organizations like IRAT.
9. Determination of whether the seeds have germinated or not	➢ It is difficult to distinguish using touch the newly germinated maize seedlings and the grass at the early stage	The seedlings emerge after 2 weeks- ➢ Alternatively, sighted people should be asked
10. Determination of the period to weed	➢ A major problem if the PVI farmer has not fully developed an acute sense of timing to know when the seeds have germinated and when weeds have started competing with the germinated maize for nutrients	➢ If work assistants are available, weed every month. ➢ If work assistants are not available, weed after 2 months ➢ Mastery of time consciousness of the time beds were cultivated is useful.
11. Distinguishing weed from the maize plant	➢ At the early stage during the first few weeks it is very difficult for the PVI to distinguish the newly germinated maize from the weeds using touch	➢ Wait after 2 months then it will be easy to distinguish the maize from grass
12. Weeding proper	➢ The most tedious stage in maize cultivation ➢ Tiresome ➢ Waist-breaking	➢ The services of work assistants should be employed ➢ Join farmers' cooperative
13. Determination of whether the maize is mature and ready for harvesting	➢ The challenge is time consciousness and proper sequencing ➢ It is tedious and not feasible to go round the whole farm touching all the maize cobs to determine whether the maize is really mature or not	➢ All the maize must mature after 90 days.

CONCLUSION

As a last word, the difficulties which farmers with blindness face in their work are many, diverse, and in different degrees. Overcoming these hurdles depends on the individual aptitude of the farmer.

For, nothing good comes easy. With some effort from the farmers with blindness and stakeholders concerned, the farmers will attain true self-actualization.

REFERENCES

1. Cassman, K. (2007). "Food and Fuel for All: Realistic or Foolish?". Biofuels Bioproducts and Biorefining, 1 (1): 18-23
2. Gowing, J. W. & Palmer, M. (2008). "Sustainable Agricultural Development in sub- Saharan Africa: the Case for a Paradigm Shift in Land Husbandry".
3. Ihenacho, I. (2014). West and Central African Association of Special Inclusive Education [Seminar]. University of Buea
4. Kochung, E. (2014). Vocational Rehabilitation for Persons with Visual Impairment [Lecture Notes]. Retrieved from University of Buea VIP 701
5. Law No. 90/053 of 19 December 1990 on Freedom of Association
6. Law No. 92/006 of 14 August 1992 Relating to Co-operative Societies and Common Initiative Groups
7. MINEPAT (2008). Growth and Employment Strategy Document. https://books.google.cm/books?isbn=6021504313
8. Suh, N. (2020). "Challenges in the Production of Maize by Persons with Visual Impairment (PVI) in Cameroon. University of Buea Library Publishing