MODULE 4: REDUCTION OF HERBICIDES

EDUCATIONAL OBJECTIVE:

Be able to propose improvements in agricultural mechanization in order to allow family farms to significantly reduce their use of herbicides.

TOPIC 1:

Know the history of herbicide use by farmers in your area.

As mentioned in the introduction to this guide, there has been a **substantial increase in the use of pesticides since the early 2000s,** mainly due to herbicides, whose prices have fallen sharply and which are increasingly available on rural markets. For example, in Africa, these herbicides represented 62% of the pesticides used in volume in 2015 *(sources: Haggblade et al and FAOSTAT 2018)* and their use has become widespread in many Sudanese and Guinean areas.

Such increased use of herbicides is also observed in developing countries in Asia and Latin America. However, their use is very limited in semi-arid areas such as the Sahelian regions of Africa where there is less weed competition that affects crop yields and where livestock is the main source of agricultural income (many crop weeds are forage for ruminants).

The use of total weedkillers (mainly glyphosate-based) has increased significantly, as has the use of specific herbicides (*or selective herbicides)* or cotton, rice, corn, sorghum, etc... Most of these are old active ingredients that are no longer protected by patents and whose prices have fallen sharply, such as atrazine, diuron, paraquat, alachlor, metolachlor... Because of their high toxicity, the use of these compounds has been banned since the early 2000s in most developed countries, including those of the European Union. Some EU countries unfortunately continue to manufacture them for export[34].

For glyphosate-based products, the active ingredient itself has come under fire *(classified as "probably carcinogenic" by the WHO)* and some co-formulants are said to pose significant, proven health risks, which, since 2016, has led the French health agency to ban many commercial products based on glyphosate [35]. Issues with co-formulants are also considered concerning for some glyphosate products from China and India.
Because of states' difficulties in implementing their national regulations and seriously monitoring where pesticides are sold, **many herbicides purchased by farmers are not registered** and, in many developing countries, some products may be counterfeit and do not contain the active ingredients

[34] Cf. https://www.lemonde.fr/planete/article/2020/01/28/pesticides-interdits-le-lobbying-des-industriels-pour-continuer-a-produire-en-france-et-exporter_6027530_3244.html
[35] Cf. https://www.anses.fr/fr/content/l%E2%80%99anses-annonce-le-retrait-de-36-produits-%C3%A0-base-de-glyphosate.

specified on the labels [36]. This problem also exists in the EU and every year, Europol agents intercept hundreds of tons of banned or counterfeit pesticides [37].

The problem briefly summarized above varies greatly from one agricultural region to another. Therefore, in order to adapt training, **ideally, the following questions should be discussed with participants***(indicative list)*:

- Does the above reflect your own experience?
- Which crops are frequently treated with herbicides and what are the names and active ingredients of the products most often used? (before sowing; after sowing and before emergence; after emergence)?
- What do women think about the use of these herbicides?
- Can they still practice intercropping, or the gathering of certain edible plants used for cooking or medicinal purposes?
- What effects do the herbicides have on young trees on the plots?

TOPIC 2:

Know how the use of animal traction has evolved in your region and identify the problems encountered with the maintenance and replacement of AT equipment.

Weeding of peanuts – Senegal
(Photo M. Havard-Cirad)

Weeding of corn – Northern Togo
(Photo V. Beauval)

From the 1960s to the 1990s, driven by government programs often supported by external aid and certain industries *(e.g., peanut and cotton),* the use of animal traction (AT) expanded greatly. For example, in sub-Saharan Africa, it has become dominant in many Sahelian and Sudanese areas *(on the other hand, trypanosomiasis, to which Zebu cattle are susceptible, has limited and continues to limit its growth in the Guinean areas).*

[36] Cf. https://www.scidev.net/afrique-sub-saharienne/cultures/actualites/afrique-herbicides-non-homologues.html and "Quality Comparison of Fraudulent and Registered Pesticides in Mali", February 26, 2019 - Author: Steven Haggblade, Amadou Diarra, Wayne Jiang, Amidou Assima, Naman Keita, Abdramane Traoré and Mamadou Traoré.
[37] https://www.lyoncapitale.fr/actualite/trafic-de-pesticides-une-question-prioritaire-pour-europol/.

Under the impetus of various innovators, including Jean Nolle [38], animal traction tools bearing the names Houe Sine, Ariana, Multiculteur, etc. were designed, and some of them, such as the Houe sine, the plough and the ridging body, were widely disseminated in rural areas of Africa.

Since the 1980s and 1990s, due to the withdrawal of the states demanded by the World Bank and the IMF, support for animal traction has diminished and today many family farmers still only have the AT equipment their grandparents had.

This has led productivity from working with these tools to stagnate. In terms of weed control, productivity is often less than half that of the same worker equipped with a backpack sprayer. Applying a total herbicide is much quicker than performing one or more runs using AT before seeding. To destroy weeds on the whole plot and not only between rows, it is also faster to use a specific herbicide than a hoe equipped with weeding teeth or a ridging body.

According to surveys conducted by AVSF at the end of 2018, the sharp increase in herbicide use in Kita, Mali can be explained in part by the horrendous condition of much of the AT equipment (*cf. photos V. Beauval below)*. It should also be noted that there is no longer any government support for replacing AT tools and that the Malian cotton company *(CMDT)* promotes herbicides instead, which are often sold unchecked on rural markets at much lower prices than in the past.

Toothed weeding tools

Single row seeder

After this presentation on topic 2, it is recommended that some time be taken for discussion:

- Does the above reflect your own experience?
- Which AT tools do you use most frequently?
- What are the main difficulties you encounter with respect to maintaining such AT equipment and obtaining spare parts?
- Do women have access to AT equipment to work their fields? If so, does such access allow them to complete their work on time?
- What AT equipment would be most motivating to keep rural youth from leaving [39]?
- Do you have any final wishes in regard to animal traction equipment?

[38] Jean Nolle is a farmer from Northern France who has spent his life creating and distributing animal traction tools for small farmers around the world. He later founded an association, PROMMATA, which inherited the four tools he considered to be the most successful: The Houe sine and the Kanol which evolved into the Kassine in PROMMATA's first years, the Polynol and the Ariana (refer to the PROMMATA site: https://assoprommata.org/).
[39] This is an important question. In many rural areas, many young people are abandoning agricultural activities in favor of gold mining or migrating to cities or even outside the country. Without a sufficient number of motivated rural youth, the future of agriculture is compromised.

TOPIC 3:

Analyze mechanization alternatives currently being proposed to farmers by governments.

Parallel to the decline in support for the manufacture, distribution and maintenance of agricultural technology, several African governments have subsidized the sale of tractors to farmers, most from Europe before the 2000s and presently from China and India. For instance, since 2015, the Malian government has set up a pilot equipment operation[40] with tractors sold to farmers at prices which are 50% subsidized prices (see Chinese Foton 654 shown in the photo on the left below).

In addition to these recent tractors, there are also old tractors imported from Europe, *(see photo on the right above of a tractor equipped with a tridisc plough)*, which are already doing a significant portion of the ploughing in African cotton areas and in certain rice-growing areas such as those in the Senegal River valley. For soil cultivation, these tractors are mainly equipped with disc tools *(ploughs and disc harrows or "covercrop")* perform shallow tillage *(<15cm)*. The use of discs that roll over obstacles avoids damaging them on tree stumps and stones which are present on many plots. On the other hand, these obstacles can damage the coulters and mouldboards of ploughs, the teeth of cultivators, weeders and hoes, as well as the sowing coulters of seeders.

The development of motorized tillage, often performed by **tractor drivers with little training and knowledge of fertility management**, gives rise to a variety of ecological problems:

- Significant risk of increased **erosion** due to the "pulverization" effect and crumbling of the soil caused by the disc action, a risk that increases when plot trees are cut down and plots are cleared beforehand to facilitate the passage of the tractor.
- Impact of motorization on the **replenishment of beneficial trees** in annual crop plots in the Sudano-Sahelian zones of Africa (a driver in a hurry will not see the very young trees such as karite and African locust bean trees, whose lack of replenishment is currently a genuine problem in these zones, and, as a result, he will irreparably harm them).
- Disc-caused destruction of **tree roots and shrubs** that facilitate the recovery of soil fertility when tractor-plowed plots return to fallow [41].

[40] This 1000-tractors operation has been the subject of controversy in Mali: Cf. https://malijet.com/la_societe_malienne_aujourdhui/actualite_de_la_nation_malienne/209395-magouille-dans-le-march%C3%A9-des-1000-tracteurs-au-mali-le-dr.-bocar.html.
[41] cf. Potentialités des ligneux dans la pratique de l'agriculture de conservation dans les zones arides et semi-arides de l'Afrique de l'Ouest (Potential of woody plants to conserve agriculture in arid and semi-arid zones of West Africa) (authors: Babou André, BATIONO Antoine, KALINGANIRE Jules BAYALA - ICRAF).

As a consequence of the above, land development activities (hedge planting, regeneration/maintenance of beneficial trees, water and soil conservation structures, etc.) and the training of tractor drivers are essential prerequisites that are often neglected by governments involved in plans to promote tractor-based mechanization.
Another cause for worry is the fact that these tractors are very rarely accompanied by **multi-row seeders and hoes**[42], which would make it possible to do without herbicides, as practiced by organic farmers in Europe (and their grandparents before them, who did not use herbicides but had animal-drawn multi-row implements that allowed them to control the removal of "weeds" in crops like corn, beets, etc.). However, in this case as well, such efficient sowing and hoeing tools require prior clearing of the plots, which is time-consuming and, as mentioned above, limits the natural regeneration of plot fertility during fallow periods...

Some studies observe that the use of tractors is not usually accompanied by an increase in yields[43], instead farmers claim that they are faced with increasingly short rainy seasons and find that early planting often yields better results. However, working the soil with a tractor, which is much faster than with oxen, allows farmers to sow more often at the right time.

In summary, in Sub-Saharan Africa, but also in other countries of the Southern Hemisphere (Madagascar, Central America), one encounters the three situations summarized above, the last two of which can be viewed together:

(1) the use of old animal traction tools perceived as unappealing by many young people;
(2) the growing use of herbicides, which certainly reduces the arduousness of the work but often endangers biodiversity, the environment and the health of rural people and consumers;
(3) the use of poorly equipped tractors that can degrade the soil and/or contribute to reducing biodiversity and limiting agroforestry...

Currently, none of these situations is truly satisfactory!

Other consequences, in this case socio-economic, of increased motorization: the use of tractors makes working the soil less arduous and increases the amount of area cultivated per worker. Coupled with the use of herbicides, **the increase in the use of tractors in the Sudanese and Guinean zones may encourage the "patronization" of agriculture, with farms that were initially family-run becoming increasingly large, employing a large number of workers to maintain and harvest the crops[44].**

[42] Using a single row seeder does not allow for efficient hoeing given that the distances between the rows vary excessively and the teeth or blades of the hoes cannot get close enough (5 to 10 cm) to the seed lines, as is the case with the hoes used in Europe, which go to 5 cm when they are well adjusted. As a result, there are still too many weeds that must be removed by hand along the sowing line...
[43] See the seminar "Les dynamiques de mécanisation de la production et de la transformation agricole en Afrique de l'Ouest - Accompagnement des innovations dans les systèmes agro-sylvo-pastoraux d'Afrique de l'Ouest" ("Mechanization dynamics of agricultural production and processing in West Africa - related innovations in agro-sylvo-pastoral systems in West Africa), February 2016, Korhogo, Ivory Coast.
[44] Marie Balsé, Michel Havard et al, "Quand innovations techniques et organisationnelles se complètent: les CUMA du Bénin" (When technical and organizational innovations complement one another: CUMAs in Benin) AFA's Revue AES -December 2015, and Sidé Claude and Michel Havard "Développer durablement la mécanisation pour améliorer la productivité de l'agriculture familiale en Afrique" (Developing sustainable mechanization to improve family farming productivity in Africa) - 2015 - Int. J. Adv. Stud. Res. Africa. 6 (1&2): 34-43 - Available from: http://www.ijasra.org/

Following the presentation of topic 3, it is recommended that some time is taken for discussion:

- What are your observations following the above presentation?
- Do any of you use a contractor equipped with a tractor to prepare some of your plots? Occasionally or regularly?
- What do you think about the consequences of disc tools on the fertility of your soil?
- What do you think about the consequences of using tractors for the young beneficial trees present in the plots?
- In your community or region, what are the main problems observed in regard to the maintenance of tractors and the acquisition of their spare parts?
- Could training for tractor operators reduce any of these drawbacks?
- If yes, how can the work of tractor drivers be organized and monitored?

TOPIC 4:

Identify and promote mechanization options that help to reduce the use of herbicides.

In areas where the use of herbicides has become very widespread *(in Africa, especially the Sudanian and Guinean zones),* what innovations should be proposed to farmers to improve mechanization and, in particular, the quality of sowing and weeding of crops, which would make it possible to greatly reduce the use of herbicides?

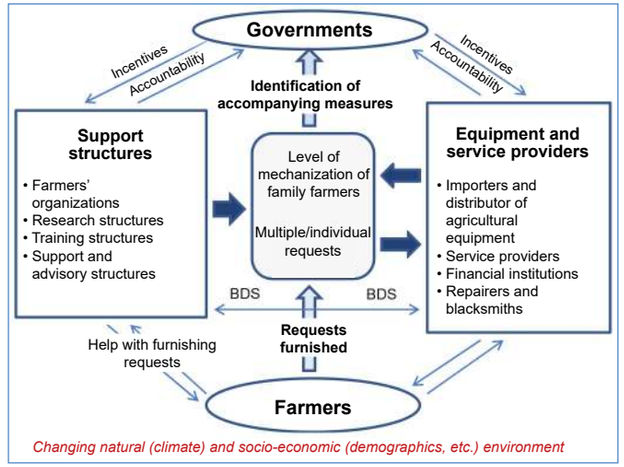
Some proposals:

1 - <u>Encourage states to promote animal traction again</u>

As mentioned by Side and Havard (2015): *"The major challenge facing Sub-Saharan Africa in the coming decade is equipping rural populations in order to meet the growing demands of production, conservation and processing of agricultural products necessary for the food security of a growing population, while ensuring that the environment is preserved. Governments have a key role to play in creating the economic, social and political conditions for the sustainable development of agricultural mechanization. Finally, public-private partnerships should be encouraged in this sector"* [45].

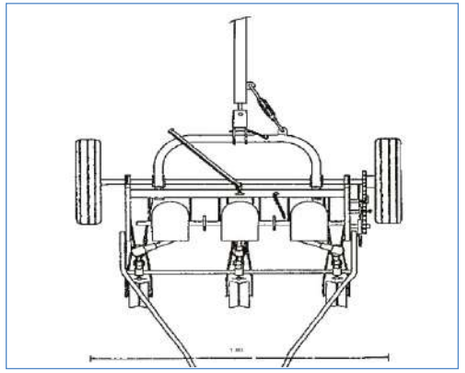
The following diagram (Side, 2013) summarizes the strategy that must be put in place to promote agricultural mechanization in Sub-Saharan Africa in a lasting manner. This diagram is valid in many other regions of the world.

[45] Cf. http://agritrop.cirad.fr/577133/. International Journal of Advanced Studies and Research in Africa, 6 (1): 34-43.).



2 - <u>Promote, where possible, multi-row seeders and hoes (2 or 3 rows) that can be used in AT,</u>

which could considerably improve hoeing precision thereby eliminating the need for herbicide application.



Schematic of the "polyculteur" (polycultivator) distributed in Senegal in the 1970s-80s [46]

AT tool for soil cultivation and subsequent seeding with constant row spacing

[46] The PROMMATA tool holder and those supplied in the 70-80s *(polycultivator that SISMAR is able to manufacture in Senegal, TROPISEM of Sulky, polynol of Jean Nolle, etc.)* were supplied with 3 rows for peanuts *(0.5 to 0.6 m row spacing),* and 2 functional rows for cereals *(sorghum, millet, corn)* and cotton *(and cotton (with row spacing between 0.8 and 1 m).* A few thousand copies of the polycultivator were distributed in Senegal, but farmers did not get behind it *(too expensive, not all farmers had pairs of oxen)* and it was mainly used in research stations ...

2-row animal traction seeder, Brazil (www.fitarelli.com.br/)

Very solid (but overly expensive) two row seeders allow uniform spacing between rows

Supplements proposed by Michel Havard[47], CIRAD agronomist specializing in agronomy, mechanization and production systems

To improve sowing and hoeing in Sudano-Sahelian zones and to reduce herbicide use, Michel Havard proposes that farmers classify their plots as follows:

- identify plots and relevant areas where **multi-row seeding and subsequent weeding would be possible:** plots without stumps, without shrubs with very few trees, without stones, etc.

- identify less adequately prepared plots [*(a few stumps, a few shrubs, a few stones, etc.)* **where seeding with an animal-drawn single-row seeder** is possible as the seed drill is guided during work by the operator who can lift it, move it, etc.; it is the same with the one-row weeding tool that is used afterwards. However, such conditions lead to irregular row spacing because farmers do not use a row marker and the distance between two rows can vary by 10 to 20 cm. Moreover, the lines rarely run parallel to one another from one end to the other.

- identify plots where mechanical seeding, even with a single row seeder, is not possible and **where only manual seeding is possible.**

In regard to the use of the multi-row seeder, he provides some usage recommendations:

- the need to be able to **lift the sowing units at the end of the line** so as not to sow while turning, nor to damage the sowing machine and **to have a system for disengaging the distribution system;**

- the importance of **sowing the rows in the same direction** *(no cross rows)* to facilitate passage of the weeding tools;

- the importance of working with the same number of rows and adopting **the same spacing between the seeding elements of the seeder and the weeding tools;**

- with a two-row seeder, in order not to have difficulties with irregular row spacing between two passes of the seeder, **have the weeding tool work in the middle of the two rows and at the same time the two half-rows on each side.**

In regard to past experiences with multi-row tool carriers promoted in certain Sudanian -Sahelian zones, he provides the following reminders:

- The seeders installed on these tool holders had a system for disengaging the distribution system at the end of the line.

- On these same tool holders, weeding and hoeing tines could be mounted for 2 or 3 rows depending on the crop with, to guide the weeding tool, a parallelogram unit-**steered by the operator behind the polycultivator.**

3 - Promote, under environmental considerations and for certain plots, moderate motorization (tractors from 20 to 60 hp) with seeders and 3 or 4-row weeders?

As mentioned earlier, many of the programs for improving tractor access have had very poor results in sub-Saharan Africa. However, there are some positive developments. For instance, members of "motorized associations" in the Koutiala and Kléla Cercles in Mali were trained to drive and maintain their tractors and then improved **their tillage practices and combined the use of AT and the tractor with the planting of living hedges.[48].**

The CARTO center farm near Dapaong in Northern Togo also provides that it is possible to avoid using herbicides in combination with agroforestry (specifically alley cropping), the use of AT equipment, tractors and multi-row hoeing and seeding equipment *(Centre d'Animation Rurale Tambimong Ogaro/Tambimong Ogaro Rural Animation Center - cf. https://cartogaro.org/).*
As shown in the following photos, these developments can be observed in other tropical countries.

Living hedges on plots worked with AT and a tractor - Ethiopie Photo V. Beauval

Cashew and mechanized bean association) Rio Grande do Norte - Brazil Photo V. Beauval

[47] See also this article by Claude Sidi and Michel Havard: "Trajectoires possibles vers une agriculture motorisée dans les pays cotonniers – Du cas du Burkina Faso vers des propositions pour l'Afrique de l'Ouest et du Centre" (Possible paths towards motorized agriculture in cotton producing countries - from the case of Burkina Faso to proposals for West and Central Africa) – 2014 - https://agritrop.cirad.fr/574344/1/document_574344.pdf.

[48] Cf. https://www.formad-environnement.org/YOSSI_haies_vives_au_sahel.pdf

4. Seek a balance between reducing the use of herbicides and controlling erosion

In fragile soils, which are very common in many tropical areas, particularly in West Africa, excessive tillage leads to several negative consequences in terms of erosion, leaching of essential crop nutrients and mineralization of organic matter.

Example in North West Togo:
In the northeastern part of the Savannah Region, the prevailing technical approach involves two passes of the animal-drawn ridger per year. This leads to an alarming amount of erosion, especially when such passes are not made along a contour line (cf. bottom left photo).

Erosion on a corn plot - Northern Togo V. Beauval

Ridging of corn - Northern Togo - V. Beauval

Nonetheless, as shown in the top right photo, these ridgers are very effective in managing weeds. Moreover, the use of herbicides is less frequent in the northeast of the Savannah region than in other Sudanese cotton-growing areas such as Northern Benin, Northern Cameroon or Kita Cercle in Mali, for example.

It has also been observed that such ridgers operate at a lower depth and are less disruptive to the soil when equipped with depth control wheels, which is unfortunately not the case for the many ridgers imported from Ghana.

Multiple steps can be taken to improve tillage practices:

- Train and provide material assistance to local blacksmiths to systematically equip ridgers with easy-to-adjust wheels and bearings.

- Train farmers to plant their crops more frequently on contours and reduce the depth of tillage when weeding-hilling.

- Encourage farmers, through farmers' organizations and ICAT (Togolese Extension Institute), to stop using the most toxic herbicides (e.g., atrazine and diuron, which are not authorized by the CSP, or glyphosate-based formulations that are not authorized in the EU). These herbicides are sold without any controls on the rural markets of Northern Togo and often come from Ghana and Nigeria.

- Cultivate the practice of direct seeding with a cane planter. This requires extensive modification of the technical procedures. ICAT tested this alternative for a few years in the Savannah region supplemented with the use of herbicides or passage of a toothed implement working at the surface between the rows. Presently, these tests have not changed farmers' minds. Moreover, without vegetation cover on these very sandy soils, which is difficult to achieve given the 7-month dry season and the practice of grazing, direct seeding would not effectively reduce erosion (it would not prevent sheet erosion).

Example in North Cameroon: Herbicides benefit farmers' income and soil conservation, but for how long?

In the savannahs of Northern Cameroon, as in all the cotton-growing areas of Africa, the cultivation of cotton has, for several decades, led to the introduction and expansion of the herbicide use. In the farmers' work schedule, cotton planting competes with the sowing and weeding of food crops *(corn, sorghum, etc.)*. The later the crop preparation and maintenance, the more weed problems increase and affect yields.

For instance, the introduction of herbicides in the 1970s was widely followed by farmers, with access facilitated through training, logistics and credit services provided by SODECOTON. Since the end of the 1990s and the entry into the public domain of several herbicides, in particular glyphosate, paraquat, atrazine and diuron, thousands of hectares of land in Northern Cameroon have been subjected to herbicide use[49]. The most common method is "chemical tillage" (glyphosate application in place of tillage) followed by direct sowing into the dead grass.

This technique offers undisputable economic advantages:

- Savings, depending on the crop, of 3 to 8 man-days per hectare in planting time compared to ploughing, which helps to accelerate the establishment of certain crops, and consequently to improve productivity and family income[50].

- Better control of perennial weeds due to the systemic mode of action of glyphosate *(otherwise, their elimination would require deep tillage and/or repeated hoeing).*

- In some soils, limitation of risks of erosion and an increase in rainwater infiltration through maintenance of the dead cover.

This technique is often combined with the use of selective herbicides such as atrazine and diuron and/or the use of animal-drawn implements for weeding and ridging the crops.

To meet the high demand of farmers, the National Confederation of Cotton Producers of Cameroon *(CNPCC)* now supplies herbicides on credit or for cash for both cotton and food crops. This service helps keep this umbrella organization [51] functioning and the system also benefits farmers in the sub-region, particularly in southern Chad where the cotton sector is not as well structured. According to surveys on farmers' perceptions of herbicide use *(Olina Bassala et al., 2015)*, **the vast majority of farmers are aware of the risks of using herbicides**, and most of them cite their harmfulness to humans and animals *(which may graze on freshly sprayed plots)*; all describe adverse medium-term impact on the fertility of the plots concerned and on biodiversity.

[49] **Martin José.** 2020. De la banalisation vox-populi des herbicides génériques au Nord-Cameroun et dans les zones cotonnières africaines. Bilan de communications 2019 en agro-malherbologie [Trivialization of public opinion regarding generic herbicides in Northern Cameroon and in African cotton-growing regions. 2019 Agro-weed science communications summary]. Montpellier: CIRAD, 10 p. https://agritrop.cirad.fr/595830/
[50] **Olina Bassala J.P, Dugue P., Granie A., Vunyungah** M. 2015 - Pratiques agricoles et perceptions paysannes de l'usage des herbicides dans les champs familiaux au Nord Cameroun [Farming practices and farmers' perceptions of herbicide use in family fields in Northern Cameroon]https://agritrop.cirad.fr/579836/1/Pratiques%20et%20perception%20des%20herbicides%20Olina%20et%20al%202015.pdf
[51] It is therefore in the interest of this OF to sell as much herbicide as possible...

Farmers with little animal traction (which is common in northern Cameroon), **note that these herbicides are the "oxen of the poor"**. Given the low cost of these generic active ingredients, using them costs much less per hectare than renting a hitch *(probably a third, which is very important for those who do not have a complete animal traction system).*

In this context, **the use of herbicides** can only be reduced in stages, within the framework of a transition and by seeking compromises, in particular between the issues of soil conservation and adverse effects on human health and reduced biodiversity:

- **Communicate incidents and chronic health problems** and better document the problems of **water pollution** due to the diffusion of herbicide residues in order to raise awareness of the risks associated with the widespread use of herbicides such as paraquat, atrazine and diuron which, given their high toxicity, are no longer authorized in most developed countries.

- **Advise farmers of significantly less toxic active ingredients** and encourage them to pay more attention to the hazard statements on the labels of commercial glyphosate-based products **(some co-formulants are more hazardous than the active ingredient itself).**

- **Financially assist farmers with the acquisition of equipment for tractor-assisted cultivation** *(weeders and ridgers)* to reduce the use of specific herbicides.

- Promote systems with cover crops that are more easily controlled with little to no herbicide, provided that land tenure security and land management are prioritized at the same time to regulate grazing rights for agro-pastoralists[52].

Following this presentation of topic 4, a discussion could be organized concerning this module as a whole and the above draft proposals.

[52] In this regard, the results of the AFD project implemented by SODECOTON regarding these matters: https://www.afd.fr/fr/carte-des-projets/reduire-la-pauvrete-et-les-conflits-lies-aux-ressources-dans-le-nord?origin=/fr/carte-des-projets

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