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Preface

We would like to present, with great pleasure, the inaugural volume-4, Issue-9, September 2018, of a scholarly journal, *International Journal of Environmental & Agriculture Research*. This journal is part of the AD Publications series *in the field of Environmental & Agriculture Research Development*, and is devoted to the gamut of Environmental & Agriculture issues, from theoretical aspects to application-dependent studies and the validation of emerging technologies.

This journal was envisioned and founded to represent the growing needs of Environmental & Agriculture as an emerging and increasingly vital field, now widely recognized as an integral part of scientific and technical investigations. Its mission is to become a voice of the Environmental & Agriculture community, addressing researchers and practitioners in below areas

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Each article in this issue provides an example of a concrete industrial application or a case study of the presented methodology to amplify the impact of the contribution. We are very thankful to everybody within that community who supported the idea of creating a new Research with *IJOEAR*. We are certain that this issue will be followed by many others, reporting new developments in the Environment and Agriculture Research Science field. This issue would not have been possible without the great support of the Reviewer, Editorial Board members and also with our Advisory Board Members, and we would like to express our sincere thanks to all of them. We would also like to express our gratitude to the editorial staff of AD Publications, who supported us at every stage of the project. It is our hope that this fine collection of articles will be a valuable resource for *IJOEAR* readers and will stimulate further research into the vibrant area of Environmental & Agriculture Research.



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Differential effects of glyphosate on germination and chlorophyll in *Zea Mays* plants

Hajar El Hendaoui¹, Khadija Boudarga², Mostafa Kandil³

Département de Biologie, Equipe des sciences anthropogénétiques et biotechnologie, Faculté des Sciences El Jadida Maroc

Abstract— We studied the glyphosate effect on the germination and chlorophyll content of two corn varieties. The first variety is local "beldi" not improved and the second is a variety selected and imported. Our analysis showed that the imported variety is more tolerant than local. The latter would have been affected by the direct effects of glyphosate by oxidative stress manifesting itself by a strong inhibition of germination and an increased degradation of chlorophyll. However, the imported variety behaved as capable of degrading glyphosate to aminomethylphosphonic acid resulting in improved herbicide resistance.

Keywords— Chlorophyll, Germination, Glyphosate, Maize, Morocco.

I. INTRODUCTION

Since the introduction of glyphosate-resistant plants, products derived from this herbicide have become the most widely used in the world. Glyphosate was considered one of the least toxic herbicides (Williams and al., 2000, Cerdeira and Duke 2006). Aminomethylphosphonic acid (AMPA) is the main degradation product of glyphosate by microorganisms and has been detected in soil and water (Cerdeira and Duke.2006). The Glyphosate effects on the plants physiological processes have been recently examined (Gomes and al., 2014) with deleterious effect on photosynthesis and germination. These effects are thought to be related to oxidative stress factors and it is known that the decrease in photochemical efficiency is associated with a decrease in chlorophyll content (Mateos-Naranjo and al 2009, Zobiolo and al.2011). Disruption of mineral nutrient uptake (Mn and Fe) by glyphosate has been shown to affect the biosynthesis of chlorophyll (Cakmak et al., 2009). However, studies on the effects of glyphosate and mineral nutrition are contradictory (Bailey and al, 2002, Rosolem and al., 2010). Reddy et al. 2004, showed that AMPA is responsible for the deleterious effects observed on the biosynthesis of chlorophyll in soybeans. It is important to note that the decrease in chlorophyll content has been observed in plants that do not degrade glyphosate to AMPA (Mateos-Naranjo et al 2009, Huang et al., 2012). Oxidative stress was observed in plants exposed to glyphosate (Ahsan et al 2008), as in many other plants exposed to herbicides. It is widely accepted that modulation of Reactive oxygen species (ROS) metabolism may affect plant physiology by inducing chlorophyll degradation and functional losses of chloroplasts (Pitzschke et al., 2006).

Due to the importance of maize crops in Morocco, its use in animal and human nutrition and the existence of an unimproved local "beldi" variety used by Doukkala's farmers, we studied the effects of glyphosate on germination and chlorophyll content in the local variety "beldi" and comparing it with another imported "paulina".

II. MATERIAL AND METHOD

2.1 Plants

To test the effect of glyphosate on germination and chlorophyll, we chose two varieties of maize. A first local variety produced and consumed by farmers in the Doukkala semi-arid region (Morocco), whose grains have an obvious heterogeneity in size and morphology. A second variety imported and marketed under the name paulina, it is characterized by size and morphology grains of uniform.

2.2 Experimentation

2.2.1 Germination

Germination studied by setting up the following experimental setup: for each variety, we made two replicates for the control and four for two glyphosate doses. One repetition corresponds to a basin containing 80 grains, making a total of 1600 grains for both varieties. We arranged the basins randomly. We used Glyphosate Herbicide marketed as 36% of isopropylamine salt (360g / l).

In order to highlight the effect of glyphosate on germination, we used two doses. The first is the one recommended by the providers of the product namely 42 mM, and the second is twice the recommended dose (84 mM). The control was treated

with distilled water. The germination was carried out with a photoperiod of 16 h and a temperature of 20 ° C. After two consecutive washes with distilled water, the grains were disinfected with 2% sodium hypochlorite and rinsed in distilled water.

For the control, we moistened the wattman paper with distilled water. However for the rest we used two glyphosate solutions at 42 mM and 84 mM for humidification. After depositing the grains, we covered them with another layer of wattman paper. Each day, distilled water and glyphosate solutions are sprayed onto the wattman paper for each basin to maintain moisture favorable for germination. The number of sprouted grains is noted after 4, 8 and 12 days of germination. The germination rate per basin is calculated according to the formula:

$$\% = \frac{\text{number of sprouted grains}}{\text{total grains}} * 100$$

2.2.2 Chlorophyll

2.2.2.1 Plant culture protocol

After seed germination, they are transplanted into 13 cm diameter pots filled with soil and peat (3/4 and 1/4). The test consisted of sixty pots, 30 pots for each variety distributed as follows: 10 for control, 10 for 42 mM and 10 others for 84 mM. The distribution of the pots in the culture chamber is random in two blocks. Each block contains 30 plants for both varieties, corresponding to five replicates for each treatment (control, 42 mM and 84 mM). The plants are watered with distilled water at a photoperiod of 16h and at 20 ° C. At the three-leaf stage, 40 plants of both varieties were treated with both doses of glyphosate. After 8 and 15 days of treatment, we performed chlorophyll assays.

2.2.2.2 Chlorophyll Determination

Chlorophyll extraction was performed according to LEE's protocol slightly modified (1981). 0.5 g of leaves are crushed in a mortar with 10 ml of pure ethanol and centrifuged at 10000 g for 10 min. To achieve complete exhaustion 2 additional ethanol extractions are performed. The pooled supernatant (30ml) frequently having a turbidity, a 10ml aliquot is subjected to a new centrifugation. The optical density of the clear extract is then measured at 649 nm and at 665 nm with a Unikon spectrophotometer.

III. RESULTS AND DISCUSSION

3.1 Germination

Germination begins with the release of the radicle, and then the coleoptile develops, adventitious roots then appears. Results for the effects of glyphosate on the germinability of corn kernels are given by variety in Tables 1 and 2.

3.1.1 Unimproved local variety "Beldi"

After 4 days of germination, we found highly significant differences (p = 0.007) between the three treatments. In fact, with distilled water, germination rate is 58.12% whereas for 42 mM and 84 mM doses the rates are low 29.37% and 20% respectively. Glyphosate treatment caused a reduction in germination. In addition, those for 8 and 12 day durations, the differences are not significant between treatments. This could be related to an early adaptation of germinating grains to glyphosate.

TABLE 1
GERMINATION RATES AND EFFECTS OF GLYPHOSATE DOSES ON THE LOCAL VARIETY

Duration Germination	Treatment glyphosate	Average number of sprouted kernels.	(% Rate)	Standard error	F-Test
4 Days	Distilled water	46.5	(58,12)	3,5	11.016 ** p=0.007
	42 Mm	23,5	(29,37)	3 ,57	
	84 Mm	16	(20,00)	4,30	
8 Days	Distilled water	58,5	(73,12)	16,5	3,729 NS p=0.079
	42 Mm	39,5	(49,37)	5,33	
	84 Mm	30,75	(38,43)	2,56	
12 Days	Distilled water	58,5	(73,12)	16,5	3,027 NS (p=0.113)
	42 Mm	39,5	(49,37)	5,33	
	84 Mm	33	(41,25)	3,26	

3.1.2 Variety imported "paulina":

It is noted that for the three durations, the differences between the treatments are not significant. The paulina variety showed early tolerance from the first days with germination rates comparable to those of control. We can deduce this variety is tolerant to glyphosate.

TABLE 2
GERMINATION RATES AND EFFECTS OF GLYPHOSATE DOSES ON VARIETY IMPORTED "PAULINA"

Duration Germination	Treatment glyphosate	Average number of sprouted kernels.	(% Rate)	Standard error	F
4 Days	Distilled water	73,5	(91,87)	1,5	3,953 NS (p=0,071)
	42 Mm	74,00	(92,50)	1,68	
	84 Mm	54,25	(67,80)	8,04	
8 Days	Distilled water	76,50	(95,62)	0,5	2,204 NS (p=0,181)
	42 Mm	74,00	(92,50)	2,27	
	84 Mm	64,00	(80,00)	5,75	
12 Days	Distilled water	76,50	(95,62)	0.50	2,425 ns (p=0,158)
	42 Mm	74 ,50	(93,12)	1,84	
	84 Mm	64,00	(80,00)	5,75	

3.1.3 Comparisons between varieties:

We compare the germination rates of two varieties; the results are shown in Table 3.

TABLE 3
COMPARISONS OF GERMINATION RATES BETWEEN THE TWO VARIETIES BY THE T-TEST.

Duration Germination	Treatment glyphosate	Variety	Average number of sprouted kernels.	(% Rate)	Standard error	F
4 Days	Distilled water	Local	46,50	(58,12)	3,50	7,091* (P=0.019)
		Paulina	73,50	(91,87)	1,50	
	42 Mm	Local	23,50	(29,37)	3,57	12,793*** (p=0)
		Paulina	74,00	(92,50)	1,68	
	84 Mm	Local	16,00	(20,00)	4,301	4,193** (p=0.006)
		Paulina	54,25	(67,80)	8,04	
8 Days	Distilled water	Local	58,57	(73,12)	16,50	1,090 NS (p=0,389)
		paulina	76,50	(95,62)	0,50	
	42 Mm	Local	39,50	(49,37)	5,33	5,953*** (p=0.001)
		Paulina	74,00	(92,50)	2,27	
	84 Mm	Local	30,75	(38,43)	2,56	5,275** (p=0.002)
		Paulina	64,00	(80,00)	5,75	
12 Days	Distilled water	Local	58,50	(73,12)	16,50	1,090 NS (p=0.389)
		Paulina	76,50	(95,62)	0,50	
	42 Mm	Local	39,50	(49,37)	5,33	6,203*** (p=0,001)
		Paulina	74 ,50	(93,12)	1,84	
	84 Mm	Local	33,00	(41,25)	3,26	4,682** (p=0,003)
		Paulina	64,00	(80,00)	5,75	

We calculated the inhibition rate of germination in both varieties; these are the differences between the germination levels of the control and those found for the two doses, expressed as a percentage. The inhibition rates are shown in Figure 1. The highest inhibition percentages are those recorded in the local variety. The mean rate of inhibition, all doses and duration combined, is -45.17% and -11.74% in the local variety and Paulina respectively. In both varieties, whatever the dose, the effect inhibition decreases with duration, this would be in relation with a gradual adaptation to glyphosate.

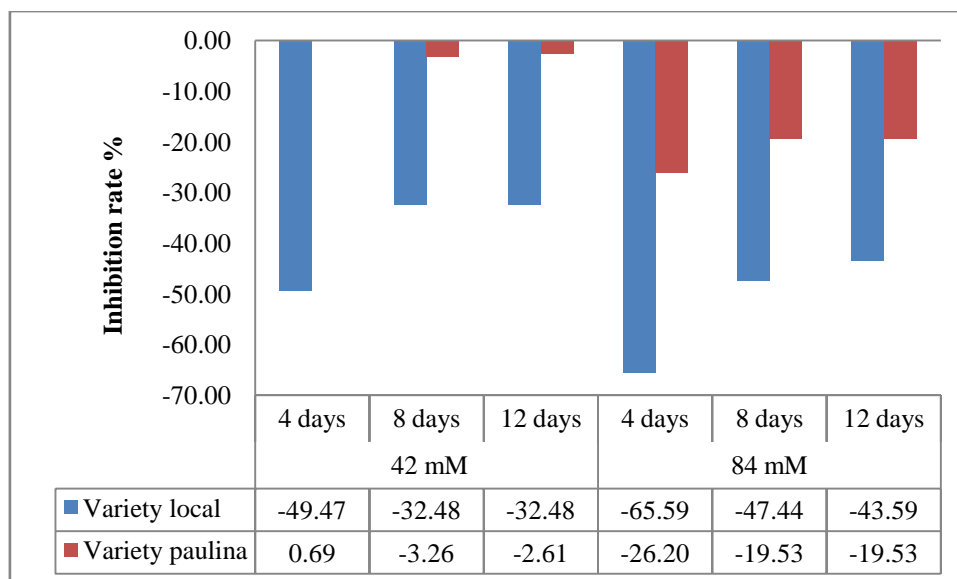


FIGURE 1: Inhibition of germination according to doses and duration

Studies of the glyphosate effects on seed germination are not many. (Blackburn and Boutin, 2003) and most often contradictory, with deleterious effects (Morash and Freedman, 1989, Shuma and al. 1995, Gomes and al. 2014, 2016) or no effects observed (Egley and al., 1978, Piotrowicz-Cieslak and al., 2010).

When the effects are deleterious there is a significant decrease in the germination rate, which we have highlighted in our study. This reduction in germination rate would be accompanied by a reduction in the respiration rate and an accumulation of hydrogen peroxide. Glyphosate has been shown to induce oxidative stress in plants by the accumulation of Reactive oxygen species (ROS) (Gomes and al., 2016). ROS have important role in plants; they participate in the depletion of seed endosperm, the mobilization of reserves, protection against pathogens, and as signaling molecules (Gomes and Garcia, 2013). ROS are involved in germinating seeds; ROS elimination systems play a central role in the germination process (El-Maarouf-Bouteau, Bailly, 2008). If these systems are no longer able to control oxidation rates, there is a disruption of germination. ROS damage cellular components such as proteins, lipids and DNA (Gill and Tuteja, 2010). Also, it has been shown that glyphosate can interfere with the electron transport chain mitochondrial in *Lemna minor* leaves, resulting in ROS accumulation (Gomes and Juneau, 2016). In addition, Lopez-Brana and al. 1984 showed on the mitochondria isolated of corn that protein synthesis as well as mitochondrial respiration is reduced. If the herbicide could have similar toxic effects on the respiratory metabolism of seeds, it could affect seed germination by inducing oxidative stress.

3.2 Chlorophyll:

Chlorophyll content and comparisons between the two varieties as a function of treatment duration and dose are given in Table 4.

3.2.1 Control

After 8 days of treatment with distilled water, comparisons of chlorophyll levels between the two varieties showed highly significant differences ($p = 0.004$). In the local Moroccan variety, we found a rate of $69.89 \mu\text{g} / \text{ml}$ whereas in the Paulina variety we recorded $39.12 \mu\text{g} / \text{ml}$. The photosynthetic power of the local variety is far superior to that of the imported variety paulina. After 15 days, we find that the statistical differences are very highly significant ($p = 0.001$). In addition, we note that the local variety has a chlorophyll level of $88.30 \mu\text{g} / \text{ml}$ which is double compared to that found in the paulina variety $44.21 \mu\text{g}/\text{ml}$.

3.2.2 Glyphosate treatment: 42mM and 84mM

After 8 days of treatment the differences between the two varieties are significant at 42 mM. In fact, the average chlorophyll content in paulina variety is $33.08 \mu\text{g} / \text{ml}$ which is greater than that of the local variety $17.93 \mu\text{g} / \text{ml}$. It noted that paulina has a very good tolerance to glyphosate at this concentration. After 15 days of treatment, the differences between the two varieties are significant at 42 mM and content chlorophyll is very low in the local variety. However, at 84Mm the leaves in both variety became necrotic and we could not measure chlorophyll levels.

TABLE 4
COMPARISONS OF CHLOROPHYLL CONTENT BETWEEN THE TWO VARIETIES BY THE T-TEST

Exposure Duration	Treatment	Variety	Chlorophyll $\mu\text{g/ml}$	Standard error	Test t
8 Days	Distilled water	Paulina	39,12	0,09	6,162** (p=0.004)
		Locale	69,90	4,99	
	42 Mm	Paulina	33,08	4,37	3,921* (p=0,017)
		Locale	17,93	3,32	
	84 Mm	Paulina	31,25	7,29	1,324 N.S, (p=0.256)
		Locale	19,33	5,52	
15 Days	Distilled water	Paulina	44,21	4,00	8,979***, (p=0.001)
		Locale	88,30	2,84	
	42 mM	Paulina	12,64	1,36	3,020* (p=0,039)
		Locale	5,545	1,92	
	84 mM	Paulina	Not determined		
		Locale	Not determined		

We estimate the reduction rates in the amount of chlorophyll by dose and exposure duration expressed as a percentage. The results are shown in Figure 2. The reduction rates, all doses and durations combined, are 77.35% and 34.68% for the local variety and paulina respectively.

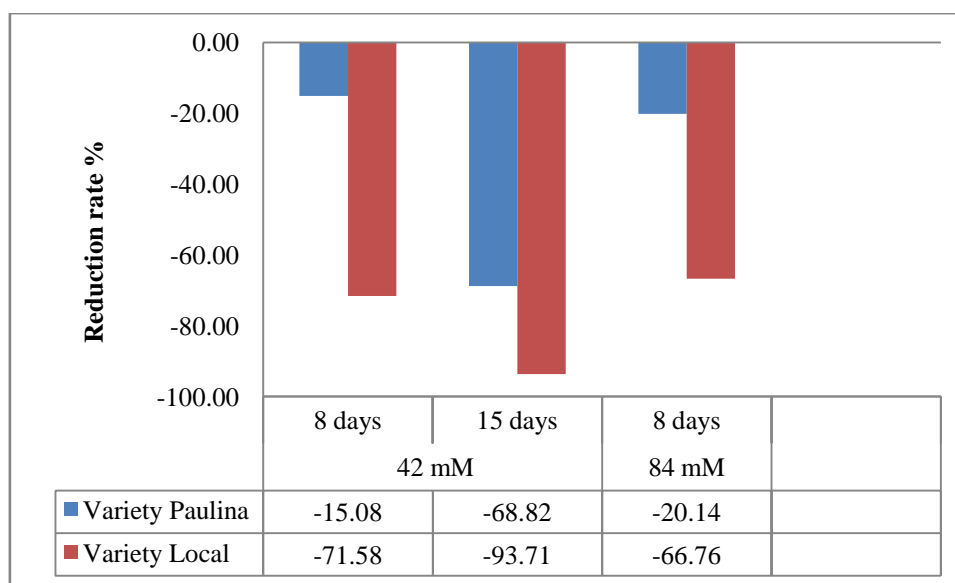


FIGURE 2: Reduction of chlorophyll content as a function of duration and concentration of the herbicide %

The results of the present study show that glyphosate has phytotoxic effects and causes a decrease in chlorophyll content with significant differences between the two varieties. Indeed, the same observations have been made in various species (Ahsan and al., 2008, Miteva et al., 2010, Maroli et al., 2015), involving glyphosate in the disturbance of plant photochemistry. Chlorophyll was significantly reduced after exposure to glyphosate. According to Gomes et al. 2015, these reductions are due to biosynthesis inhibition and/or increased chlorophyll degradation, glyphosate induces degradation of chlorophyll by increasing lipid peroxidation and a significant H₂O₂ accumulation in treated plants. An increase in H₂O₂ accumulation and lipid peroxidation following exposure to glyphosate was also observed in rice (Ahsan et al., 2008) and pea (Miteva et al., 2010). Once accumulated, H₂O₂ will react with subcellular components that may cause enhanced oxidative damage. In contrast, the willow plants treated with AMPA, a degradation product of glyphosate, show an inhibition of the chlorophyll biosynthesis. AMPA directly affects the biosynthesis of chlorophyll by competing with glycine, and / or in the active site of δ -aminolevulinic acid (ALA) synthetase, and deprives plants of the substrates necessary for the biosynthetic pathway chlorophyll (Serra, and al 2013). The induction of peroxide accumulation after treatment with AMPA does not appear to be sufficient to induce oxidative stress; this has been observed in *Arabidopsis thaliana*, indicating that the effects of AMPA are

not due to damage oxidative agents (Serra, and al 2013). Gomes and al. 2015 observed the highest levels of H₂O₂ in glyphosate-treated leaves compared to AMPA-treated plants.

In this context, the chlorophyll reduction in the local variety is twice that of the imported variety, which is explained by a difference in the degradation of glyphosate in both varieties. Given the difference in behavior of the two varieties, we propose that the paulina variety degrades glyphosate to AMPA, which inhibits the synthesis of chlorophyll, whereas the local variety undergoes the direct oxidative effects of glyphosate which degrade chlorophyll.

IV. CONCLUSION

We have demonstrated that the responses of two varieties of Zea Mays with respect to glyphosate are different. The local variety "Beldi" suffered more damage than the imported variety with a sharp reduction in germination and increased degradation of chlorophyll, which would correspond to the direct oxidative effects of glyphosate. However, in the imported variety, the germination capacity and chlorophyll content are less affected, suggesting that this variety could degrade the herbicide to AMPA and tolerate the direct oxidative effects of glyphosate. Additional studies to confirm our results are the determination of content pheophytin of glyphosate treated plants. Pheophytin is one of the degradation products of chlorophyll. Indeed, the pheophytin / chlorophyll ratios inform us if there is an effect on the biosynthesis of chlorophyll and / or on its degradation. In addition, an increase in H₂O₂ accumulation and lipid peroxidation after exposure to glyphosate should be verified. Finally, to better understand the process involved in the metabolism and accumulation of H₂O₂, we will study the activities of antioxidant enzymes (SOD, CAT and APX).

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The Effects of Rural Labour Migration Process on Occupational Distribution, Family Facilities and Livelihoods

Saha Akash¹ and Adhikary M M²

¹Masters Student, Department of Agricultural Extension, Faculty of Agriculture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal

²Professor, Department of Agricultural Extension, Faculty of Agriculture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal

Abstract— Migration of human beings is a phenomenon which has historical roots and wider implications. Migrations have economic genesis but resulting socio-political cultural ramifications. In economic parlance, migration is perceived as when a person is engaged or likely to engage in a remunerative activity in a place of which he is not a native or national. The migrants send remittances to their relatives in the rural areas and these remittance-receiving households use the remittances for various purposes. With this background keeping in mind the present study was conducted with some objectives, such as, to recognize the changing pattern of occupational scenario of the study area; to identify the changes of family facilities before and after migration and to compare the income differences before and after migration. The study was conducted on 100 numbers of respondents in three villages named Chengerkuthi Khalisamari, Jatamari, and Choto Khalisamari under Khalisamari Gram Panchayat of Coochbehar district of West Bengal. The statistical method used for analysis and interpretation of raw data were mean, frequency percentage and paired 't' test. It is noticeable due to high remunerative and regularity of income, the youth and middle aged group are more attracted for migration. The study also reveals migration process transformed the occupational distribution of the respondents massively. The income variation factor before and after migration are also in favour of migration. It is evident that after migration the family daily life standard changed towards a positive direction. The number of cell phone users and bank account holder also increased.

Keywords— Family daily life standard, Migration, Per-capita income, Rural Labour.

I. INTRODUCTION

Migration is the intrinsic character of rural livelihood of India. Many a time, the low economic productivity of the small and fragmented holding associated with uncertainty and seasonality of market prices accrued to the farmers have steered to the process of migration from their own village to elsewhere in search of economic and social security as well. Migration is shift from a place of residence to another place for some length of time or permanently including different types of voluntary movements. It has great impact on economic, social, cultural and psychological life of people, both at place of emigration as well as of migration (Kaur, 2003). Migration of workers is a human phenomenon which has historical roots and wider implications. The search for the source of survival or quest for Eldorado, the blissful life, has ever remained the inspiring and the dovetailing force of migrations. Migrations have economic genesis but resulting socio-political cultural ramifications. Indeed, mingling of different cultures has had positive consequences as well as placing strain on the culture and life of the upcoming society affected in either way by migration. In economic parlance, migration is perceived as when a person is engaged or likely to engage in a remunerative activity in a place of which he is not a native or national.

Migration is an important feature of human civilization. It reflects, human endeavour to survive in the most testing conditions both natural and man-made. Migration in India has existed historically, but, in the context of globalization and opening up of the world economy it has assumed special significance for the country and the society. As a consequence of historical and economic factors, there are serious income disparities, agrarian distress, inadequate employment generation, vast growth of informal economy and the resultant migration from rural areas to urban, urban to urban and backward to comparatively advanced regions in the most appalling conditions. Migration is a global phenomenon. Uneven economic development, inter-regional disparity and differences in living standards between socio-economic groups are some of the important reasons responsible for migration.

The last few decades have observed massive seasonal or permanent migration of peasants from rural to urban areas in the third world countries. This has been extensively documented, and there has also been an enormous growth of theoretical literature and empirical evidence towards an understanding of the realities of rural-urban migration. The phenomenon has also led to a considerable debate on the process of capitalist penetration into rural areas and its role in influencing the existing

socio-economic differentiation in the countryside. One of the prominent theoretical arguments on rural-urban migration views it as individual utility maximization behaviour (Hariss and Todaro 1970), where wage differentials between the urban and rural sectors are considered to be the prime determinant of migration. The neoclassical expected income model of Todaro, with its numerous variants, seems to focus on individual potential migrants, and argues that holding much less constant; people will migrate if they expect to do better than they would if they did not move. The neoclassical theory of migration is largely based on the Lewis model, where the institutionally given urban wage rate and the wage differential between the urban and rural sectors form the basis of framework. This implies that migration from the rural to the urban sector results when the actual rural wage rate falls short of the expected urban wage rate. However, the neo-classical model, which is the most dominating framework in the context of rural-urban migration, assumes that rural migrants are a homogeneous category of poor people, ignoring the fact that their migration is not always based on a strategy of maximization, but of survival. The circulation of labour or migration from rural to urban areas is at times a response to economic necessity. Of land-owning and other institutional mechanisms that lead to migration from rural to urban areas.

The study on the effects of migration process on socio-economic status of the rural population has remained relevant since migration acts as a catalyst in the social transformation process. Migration process not only affects the destiny of individual migrants but also it has a great impact on the conditions of family members left behind, local communalities, social and cultural scenario. Trend of rural labour migration towards urban territory is mainly drive by the regularity of income, high remittances and perceived high social esteem. The migrants send remittances to their relatives in the rural areas and these remittance-receiving households use the remittances for various purposes. With this background keeping in mind the present study was conducted with some objectives, such as: to recognize the changing pattern of occupational scenario of the study area; to identify the changes of family facilities before and after migration; to compare the income differences before and after migration.

II. METHODOLOGY

The study was conducted in three villages named Chengerkuthi Khalisamari, Jatamari, and Choto Khalisamari under Khalisamari Gram Panchayat of Coochbehar district of West Bengal. For analysis of the socio-economic status of migrants household level the data was collected from the migrant individual as well as their family member also. Total number of respondent was 100. State, district, block, gram panchyate were selected purposively but villages and respondents were selected by simple random sampling method. Data collection was done through personal interview method with the help of structured schedule. The statistical method used for analysis and interpretation of raw data were mean, frequency percentage and paired ‘t’ test.

III. RESULT AND DISCUSSIONS

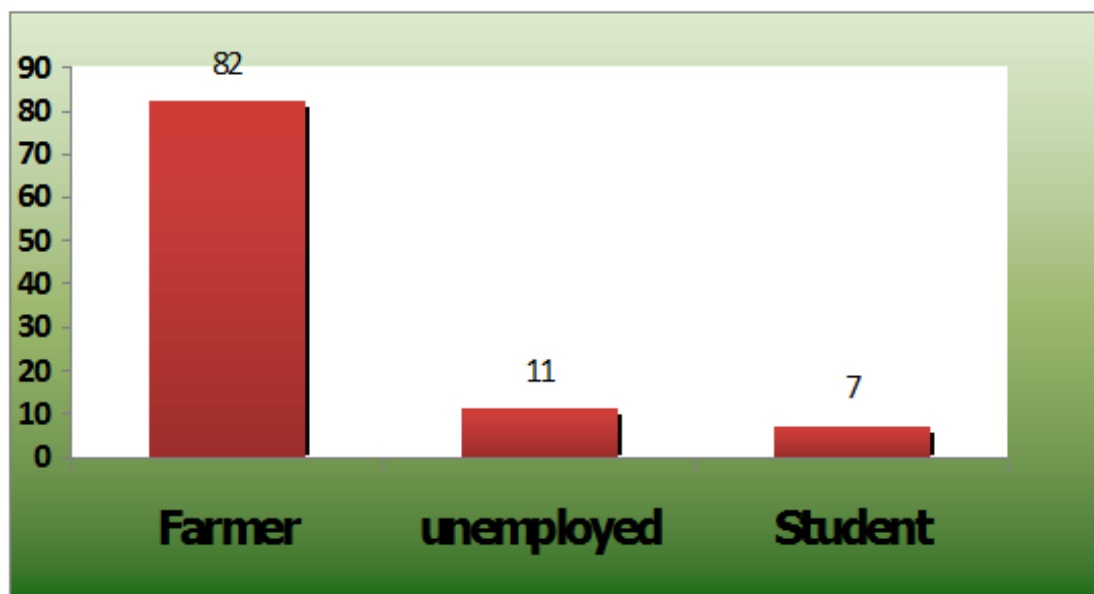


FIG. 1 OCCUPATIONAL DISTRIBUTION OF THE RESPONDENTS BEFORE MIGRATION

The above Fig. reveals the occupational distribution of the respondent before the migration. It represents that from the chart that 82 percent of the respondent was farmer, 11 percent were unemployed, and 7 percent were student.

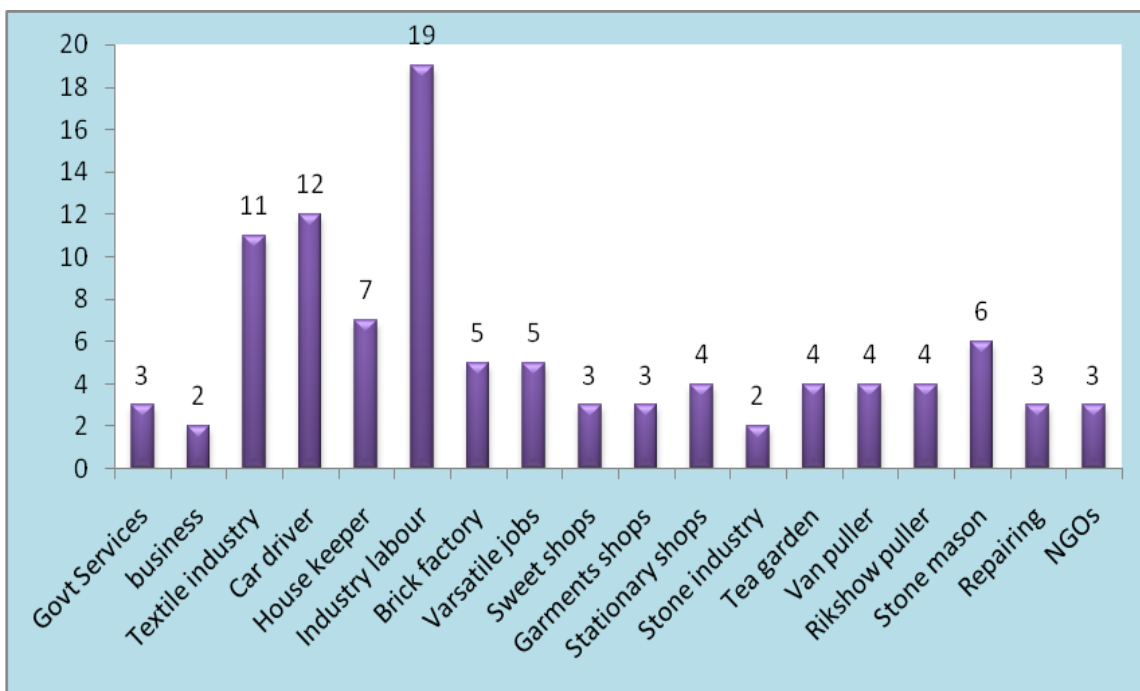


FIG. 2 OCCUPATIONAL DISTRIBUTION OF THE RESPONDENTS AFTER MIGRATION

The Fig. shows the occupational pattern of the respondent after migration. It reveals from the chart that 3 percent of the respondent government services, 2 percent business, 11 percent in textile industry, 12 percent car driver, 7 percent house keeper, 19 percent industry labour, 5 percent in brick industry, 5 percent versatile job, in sweet shop 3 percent, in cloth shop 3 percent, in others stationary shops 4 percent, labour in stone industry 2 percent, 4 percent in tea garden, 4 percent van puller, 4 percent rickshaw puller, 6 percent stonemason, 3 percent repairing, 3 percent some non-governmental companies.

This study clearly indicates that there was a tremendous transformation on occupational distribution before and after migration. Rural economy is basically agriculture dominated. The increasing population rate causes decreasing land-human ratio which results unemployment as well as under employment situation in rural economy. Side by side the regular investment on agricultural sector and uncertainty regarding return also is an important characteristic of rural economy. The youth and middle age group of the rural population with comparatively high educational qualification and social exposure are losing their interest on farming sector and searching for a versatile job sector. Urban unorganised sector attract them with a lot of choice and comparatively regularity of income which influence the rural population to take part in migration process. As a results of this the occupational distribution which was previously (before migration) monolithic (dominated by agriculture) in nature totally changed into versatility after migration.

3.1 Change of family facilities before and after migration: a comparative study

**TABLE 1
CHANGE OF FAMILY FACILITIES BEFORE AND AFTER MIGRATION**

Change of family facilities before and after migration		
	Before Migration	After Migration
Good quality Water Facilities	15%	85%
Toilet Facilities	23%	77%
Cell Phone	15%	85%
Bank Account	4%	96%

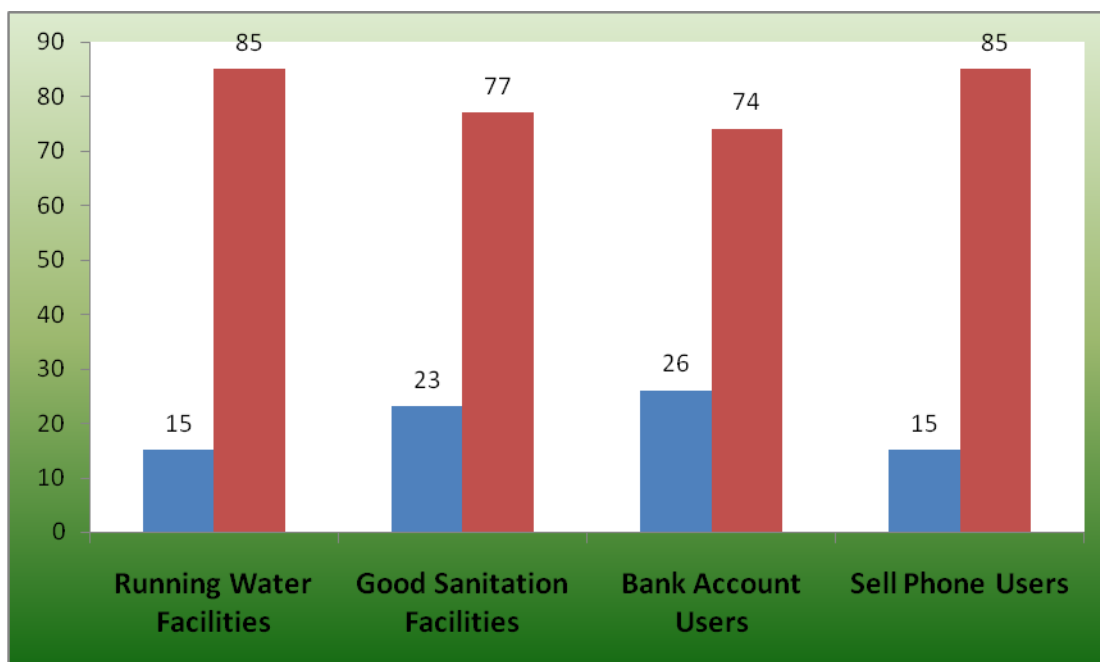


FIGURE 1: CHANGE OF FAMILY FACILITIES BEFORE AND AFTER MIGRATION

The study reveals that, most of the respondents (85 percent) indicate their family enjoys the benefit of quality water facilities after migration, whereas only 15 percent respondent indicates that, they enjoy these facilities before migration. The study also reveals that 77 percent of respondent’s family gets the benefit of good sanitation facilities after migration, whereas only 23 percent of them indicate that they enjoy these facilities before migration. The remittance due to migration and regularity of income the migrant’s households can affords good quality water in daily life. It is also reveals that after migration process a major portion of respondents adopt the good sanitation facilities which help to live a healthy life. This phenomenon indicates migration has a positive impact on migrant’s standard of living.

It is also observed that before migration only 24 percent of migrants get the benefit of bank account whereas after the migration the 74 percent of respondent come under the benefit of the banking facilities. Before migration the respondents had no requirements for banking facilities but after migration for sending remittance, making transactions they come under the arena of banking sectors. The study reveals that before migration only 15 percent of migrants use cell phone in daily life whereas after migration 85 percent of the respondent started to use cell phone. Before migration the needs for communication, social exposure was less. After migration due to maintain the contacts, builds up communication network and other requirements the number of cell phone users increased.

3.2 Change in per-capita income before and after migration: a comparative study

**TABLE 2
PAIR ‘T’ TEST FOR COMPARING INCOME DIFFERENCES BEFORE AND AFTER MIGRATION**

Paired Samples Statistics									
		Mean	N	SD	Std. Error Mean				
Pair 1	A	4.704	100	1188.85685	118.88569				
	B	1.419	100	367.27085	36.72709				
Paired Samples Test									
		Paired Differences					t	df	Significance (2-tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	A- B	3.28	1296.0	129.602	3028.130	3542.450	25.34	99	0.000

Where, *A = per capita Income after Migration*
B = per capita Income before Migration

At 5 percent probability level and 99 degrees of freedom (N-1) where, N indicates total no. of respondents, the table t value is 1.984 and at 1 percent probability level and 99 degrees of freedom, the table t value is 2.626.

't' – test is used for comparing the means of two independent group .the t test was used to test the variation in per capita income before migration and after migration. It is observed that the calculated value of t was 25.349 which are highly significant at 5 percent level of significance (1.984) and also at 1 percent level of significance (2.626) hence, we can conclude that there is a significant difference in per capita income of all respondents before and after migration. This results clearly indicates that migration has a positive and significant impact on livelihood income generation and increment which influence the rural population to take part on the process.

IV. CONCLUSION

Human mobility in its many and varied forms, within and across national borders, is a major characteristic and perhaps even one of the defining features of our contemporary world. People move in ever increasing numbers and for many different purposes related to work, family, social, educational, cultural, business or personal safety concerns; sometimes within their own countries, at other times across the nearest border or perhaps across the world. It is noticeable due to high remunerative and regularity of income, the youth and middle age group are more attracted for migration. The study reveals that migration process transformed the occupational distribution of the migrants massively. The income variation factor before and after migration are in favour of migration also. The study also found that after migration the family daily life status changed towards a positive direction. The number of cell phone users and bank account holder also increased.

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Cost and Return Analysis of Local Chicken Marketing in Mubi North Local Government Area of Adamawa State, Nigeria

Jimjel. Zalkuwi¹, Udhav Prasad Singh², Amita Maurya³, Asabe Ibrahim⁴

^{1,3}Research Scholars Department of Agricultural Economics, Institute of Agricultural science, BHU, Varanasi-221 005.

²Assitant Professor cum junior scientist, Department of Agricultural Economics T.C.A Dholi, RAU Pusa, Samastipur Bihar

⁴Research Scholars Department of Statistics, Faculty of science, BHU, Varanasi-221 005.

Abstract— The study examined the cost and return of local chicken marketing in Mubi north local government area of Adamawa state. Data were collected from 120 respondents with aid of structured questionnaire using purposive and random sampling technique. Descriptive statistics, net income analysis, marketing efficiency (ME) were the analytical tools employed. The result revealed that local chicken marketing in the study area is mostly undertaken by the male gender (85%) who were in their active age between the age of 30-60 years. Majority of them had one form of formal education or the other and have marketing experience of more than five years. On the profitability of the enterprise a total variable cost ₦7887.00 was estimated using 2014 price of input and output. Cost of transportation accounting for 72.84%. The total revenue from the enterprise was estimated ₦13, 100 given the net income of ₦5213 an indication that the enterprise is profitable. A high marketing efficiency of 160% was computed an indication that the profit maximization motive of local chicken marketing is assured. It is recommended that the marketers should be motivated and encouraged with soft loans so as to expand their production.

Keywords— Cost and return, marketing efficiency, Mubi, Adamawa state.

I. INTRODUCTION

Local chicken (*Gallus Domesticus*) production, which is still important in low food deficit in the state, is an appropriate system supporting the fast growing human population with quality protein (Kperegbe, et al 2009). The local chicken usually comprise 5 – 20 birds kept by one family and most often manage by women who provide them with an independent source of income (Ikani and Annatte 2000). Local chicken are adapted to local climate and harsh ecological condition and can withstand and survive local disease condition and therefore less veterinary attention (Paul et al 2003)

The total poultry population in Nigeria has been estimated between 133 – 165 million, however chicken composed of 91% of this population while guinea fowl (4%), ducks (3%), turkey and other (2%) (FLDPS/RIM, 1991)

In this study, therefore an attempt has been made to determine the cost and return of local chicken marketing in Mubi North area of Adamawa State. The specific objectives were to:

1. determine the socio – economic characteristics of local chicken marketers
2. analyse cost and return associated with local chicken production and marketing.
3. estimate the measures of marketing efficiency associated with chicken marketing in the study area.

II. METHODOLOGY

2.1 Study Area

Mubi North local government of Adamawa state lies on the west bank of the Yedseram River, a stream that flows into Lake Chad and is situated on the western flanks of the Mandara Mountain. It shares common boundaries with Borno State to the North Hong Local Government Area to the West, Maiha Local Government to the South and Cameroun Republic to the East.

Temperature is normally warm to hot with minimum temperature of 120c and maximum temperature of 370c (Adebayo, 2004). The ethnic groups are mainly Fali, Gude, Marghi and Fulani. The inhabitants are predominantly farmers and traders

2.2 Nature and Scope of Data

The study used mainly primary data, collected from the administration of structured questionnaires to 120 respondents. Purposive and random samplings were used to select respondent for the study.

2.3 Analytical Tools

Descriptive statistics involving the use of frequency distribution, tables and the mean; and Net income analysis were employed as the tools for analysis. The net farm income (NI) is expressed as:

$$NI = TR - TVC - TFC \quad [1]$$

TR = Total revenue (₦) obtained as the product of per unit cost of chicken multiplied by the total number of the chicken.

TVC = Total variable cost (₦)

TFC = Total Fixed Cost (₦)

The marketing efficiency (ME) was further used to determine how effective price of local chicken reflect the cost incurred in the marketing system, i.e the price that consumers pay for the local chickens delivered by the marketing system should adequately reflect all marketing cost. In perfectly competitive economic environment, prices will definitely reflect all such cost (Olukosi et al 2007).

$$ME = \frac{\text{Value added by marketing}}{\text{Cost of Marketing}} \times 100 \quad [2]$$

III. RESULT AND DISCUSSIONS

TABLE 1
SOCIO – ECONOMIC CHARACTERISTIC OF THE RESPONDENT.

Variable	Frequency	Percentage
Sex		
Male	102	85
Female	18	15
Marital Status		
Single	20	16.67
Married	100	83.33
Age		
< 30	38	34.55
41 – 60	55	50
>60	17	15.45
Main occupation		
Local chicken marketers	73	66.36
Farming	23	20.91
Others	4	3.73
Educational level		
Non – Formal	36	32.73
Primary	25	22.73
Secondary School	47	42.73
Tertiary	2	1.83
Household Size		
1 – 5	62	56.36
6 – 15	34	39.9
> 15	14	13.72
Marketing Experience		
1 – 5	46	41.82
6 – 15	38	34.55
> 15	26	33.63

Source: Field survey 2014.

3.1 Socio – Economic Characteristics of the Respondent

The result in Table 1 revealed that 85% of the respondents were male and only 15% were female, an indication that local chicken marketing in the study are undertaken by the male folk. Consequently, majority of them were married (83.33%) The implication of marital status on agricultural production can be explained in terms of the supply of agricultural family labour. The supply of family labour would be more where the household heads are married. This is in consonance with the findings of Zalkuwi et al 2014

The farmers were within the age bracket 30 – 60 years (84.55%) an indication that they are in their most productive age bracket. This has direct bearing on the availability of able-bodied manpower for primary production. Moreover, age influences the ability to seek and obtain off-farm jobs and income, which could increase farmers’ income and ultimately their production capacity. Parikh and Shah (1995), Maurice (2005), Amazaet al. (2006) Fasasi (2007) and Zalkuwi(2014) reported a significant relationship between farmers’ age and efficiency in agricultural production where younger farmers have the tendency to operate more efficiently than older farmers.

The respondent main occupation shows that 66.36% were into full time local chicken marketing, this result shows that majority of the respondents were into local chicken marketing as primary occupation. On the other hand their educational level, 32.73% had no formal education while 67.27% had acquired different levels of formal education. This study reveals that literacy level is high among the respondents and this could have implication on agricultural production in the area. Education affects productivity through a choice of better inputs and output, and through a better utilization of existing inputs. Adoption of agricultural innovations is also easier and faster among the educated farmers than the uneducated farmers as orchestrated by Njoku (1991) and Amazaet al. (2006) and thus, moves them closer to the frontier output.

TABLE 2
THEIR HOUSEHOLD SIZE DISTRIBUTION REVEALED THAT MOST OF THEM HAD A SMALL HOUSE HOLD SIZE OF 1-5 (56.36%)

Items	Value(₦)	Percentage (%)
Variable Cost		
Transportation		72.84
Feeding	5745.00	21.20
Tax	1735.00	2.57
Medication/Vaccine	203.00	2.60
Total Variable cost (TVC)	204.00	100
	7887.00	
Return		
Total Revenue (TR)		
Net Income (TR – TVC)	13,100	
Total number of bird sold per marketer	5213	
B-C ratio	132	
	1.66	
Return on sale ratio		39.50%
Market Efficiency (ME)		160.09

Source: Field survey 2014

3.2 Cost And Return

The net income from chicken marketing was estimated using 2012 prices of input and output. The information in Table 2 revealed that the total variable cost incurred by the entire respondent is estimated to be ₦7887.00 with the cost transportation accounting for 72.84%. This is attributed to the high cost of transportation in the area. Additionally cost of feeds accounted for 21.20% of the total variable cost and is attributed to the system of animal husbandry practice which require continuous supply of quality feed during the marketing of local chickens.

Furthermore, on the return from the marketing; the total revenue from the sale of 132 local chickens is estimated ₦13, 100 while the net income is estimated to be ₦5213.00 The B-C ratio is 1.66.

To determine marketing efficiency in order to ascertain the improvement of the operation of buying and selling and also pricing aspect to reflect consumers' wishes, a coefficient of 160.09% is estimated.

$$ME = \frac{13,100}{7887} = 160.09$$

This is an indication of higher marketing efficiency. It therefore follows that marketing of local chicken in the study area is efficient; hence the profit maximization motive of the marketers is guaranteed.

IV. CONCLUSION

The study examined the cost and return analysis of local chicken marketing in Mubi North Local Government Area of Adamawa State. Primary data formed the basis for the study. Data were collected from 120 respondents with the aid of structured questionnaire using purposive and random sampling technique. Descriptive statistics, Net income analysis and marketing efficiency were the analytical tools employed. The study revealed that male (85%) dominated the enterprise majority had one form of formal education or the other with a marketing experience of more than five years. Local chicken marketing was found to be profitable and efficient as illustrated by the positive net income of ₦5213.00. A marketing efficiency of 160.09% was computed an indication that the profit maximization motive of marketers is assured. It is recommended that the marketer should be motivated and encouraged with soft loans from the government so as to expand their production.

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Evaluation of the contribution of forest rangelands in the forage balance in the western part of the Central Middle Atlas: Case of the forests of Azrou, Jbel Aoua South and Sidi M'guild

M.El Mderssa¹, H. Achiban², H.Benjelloun³, O.Zennouhi⁴, L.Nassiri⁵, J.Ibijbijen⁶

^{1,4,5,6}Faculty of Sciences Moulay Ismail University - B.P. 11201 Zitoune-Meknès Morocco

²Faculty of Sciences Sidi Mohamed Ben Abdellah-Fès University Morocco

³Soil laboratory, ENFI-Salé Morocco

Abstract— Range management in Morocco is based on traditional practices where the land is used by a community for grazing by sheep. In the Atlas Mountains rangelands and forest lands are extensively used by grazing animals and even if the vegetation is abundant the cover is ongoing degradation especially in summer. The forest as a rich ecosystem where the plant community is constituted by *Quercus* and *Cedrus* sp. where overgrazing has a negative impact on the vegetation inducing degradation. The bred of sheep is Timahdit a bred which is adapted to the high mountain cold of the winter. The range is overgrazed by sheep and undergoes profound mutation with major degradation due to higher pressure by the increasing number of animals of the community which have the right to use the herbaceous cover. This study have the objective to determine the contribution of the range to meet the needs of the animals in the occidental region of the atlas mountains and determine the difference between the potential of the range and the need of the grazing sheep. The results showed that the herbaceous cover is over used by high numbers of animals. So a more rational use of the range is necessary to stop the degradation and sustain the production potential of the forest. The participatory method which includes the population in the decision making will allow better use of the range and sustain the resources and the forest by stopping degradation and a rational use of the range.

Keywords— Rangeland, overgrazing herbaceous cover, Atlas Mountains.

I. INTRODUCTION

Livestock breeding represents a significant share of Morocco's agricultural GDP (26 to 32% depending on the year) and 20% of agricultural employment. It generates significant income for the rural population. Furthermore, it is the best way to enhance pastoral areas. It contributes to the income of more than 80% of the rural population [1]. Rangeland is the primary source of animal feed in Morocco. They contribute on average 36% [2] of annual forage production, or about 3.4 billion forage units (FU). Extensive livestock breeding is the most used type in Morocco, which takes place on collective rangelands or in forest lands. Forest areas contribute to 17% of the national fodder balance [3], support 10 million head of cattle grazing there, and 45% of the national herd [4]. These sylvopastoral ecosystems remain subject to multiple technical, climatic, pastoral and social obstacles. These constraints weigh heavily on the management of this pastoral area and most often hamper the development processes undertaken there. Generally, pastoral ecosystems are very diverse and their level of production does not reflect the real potential of the environment. This situation can be explained by an overexploitation of the sylvopastoral resources: overgrazing, ecimage and delimiting of the tree and arborescent stratum during periods of drought. These repeated practices lead to the opening up or even gradual disappearance of these multiple-use formations, to the threat of soil erosion and consequently to the regeneration and sustainability of sylvopastoral resources, on which the survival of most user populations depends, is compromised. The pastoral mountains of the Middle Atlas constitute a region privileged by the existence of abundant sources and by a favorable tiering of climatic conditions. Extensive livestock breeding in this region is based on Timahdit sheep. The pastoralists of the region who, through a type of life and adapted habitats, use alternately the resources of the mountain in summer, the green oak groves of the Dir in spring, and the pastoral space offered by the Azarhar in winter: seasonal exploitation of these areas between which transhumance is played out, and within each of these areas use the different collective or private complementary paths of the forest. However, the scale of population growth in these areas, the sedentarization of pastoralists, the growth of the market economy and the recurrence of droughts, the ways and practices of using rangelands have undergone profound changes which induce major imbalances

between pastoral supply and demand. Overgrazing is considered the main cause of rangeland degradation. It is a direct consequence of an increase in herd numbers, as rangelands are their main source of nutrition. It is in this context that our study takes part. Indeed, the objective of this article is to estimate the forest potential in forage units and evaluate the impact of rangelands in terms of overgrazing in the study area.

II. MATERIAL AND METHODS

2.1 Presentation of the study area

To evaluate the impact of rangelands in the Middle Atlas area, our investigations have essentially focused on measuring the annual needs of the livestock in forage units, and evaluating the forage potential of forest rangelands in the study area. Indeed, this task was essential to identify indicators of rangeland degradation. Taking into consideration that the Middle Atlas region occupies a considerable surface, our work on the ground was carried out in its western border of the province of Ifrane, encompassing three forests strongly recognized by a very remarkable pastoral activity, namely, the forest of Jbel Aoua South, Azrou and Sidi M'guild (Figure 1).

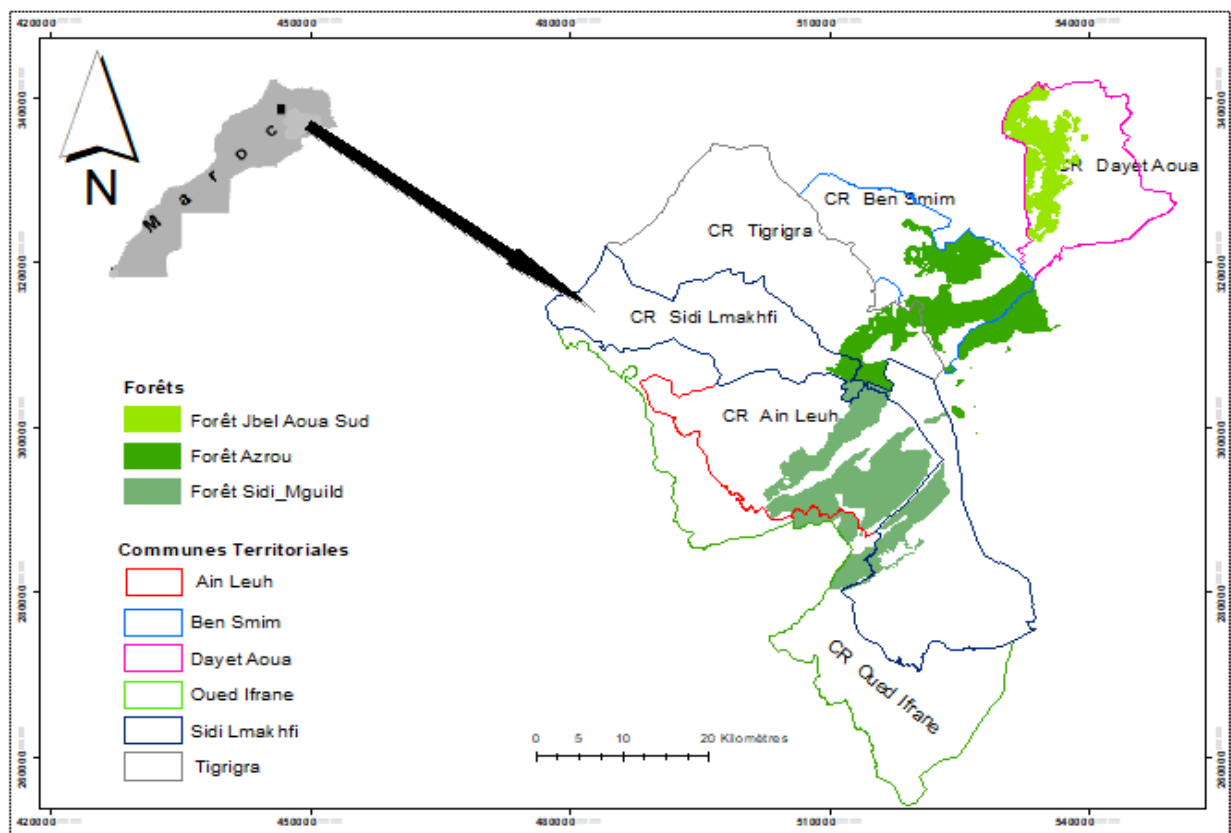


FIGURE 1: Location map of the study area

2.2 Methodological approach

In order to draw up a forage balance in the forest rangelands in the study area, our investigations focused on the determination of forage supply and demand. Thus, data collection from a field surveys and from their previous studies.

2.2.1 The forage offer

The collection of information concerned:

- An in-depth bibliographical study of previous forest management plans in the province of Ifrane;
- A pastoral study carried out by the Ifrane National Park;
- Collection and analysis of population and housing census data (RGPH 2014) by commune and by terroir and other demographic data available at the provincial level.

2.2.2 Feed demand

To determine the forage requirements of the livestock breeding in the study area, the following data were collected and the following documents were reviewed:

- Collection of agricultural statistics, in particular agriculture and livestock breeding: general agricultural census: data by commune, vaccination statistics for livestock breeding in 2005 and 2016, other reference systems and survey results available at ONSSA level, etc;
- Consultation of associations and rural organizations concerned with forests in the area.

The analysis of the data collected made it possible to evaluate the potential in forage units, taking into account all forest formations. Indeed, the areas in question provide forage units with different productions (Table 1).

TABLE 1
FORAGE PRODUCTION BY TYPE OF FOREST VEGETATION

Forest Vegetation	Forage Production (FU/ha/year)
Cedar	300
Mixture of Cedar, Holm oak and Zeen oak	450
Mixture of Cedar and Holm oak	450
Holm oak	420
Zeen oak	320
Holm oak mixed with the Thuriferous Juniper	410
Cedar mixed with the Thuriferous Juniper	410
Mixture of Cedar, Holm oak and the Thuriferous Juniper	370
Mixture of maritime Pine, Cedar and Holm oak	320
Mixture of maritime Pine and Holm oak	310
Reforestation	394
Assylvatic vides	394

The livestock's forage requirements were estimated on the basis of a maintenance ration of 300 FU/year per UPB [5].

III. RESULTS AND DISCUSSIONS

3.1 Evolution of livestock numbers in the study area

The livestock breeding sector offers inescapable assets which enable it to occupy, with pride, the first rank in terms of agricultural turnover in Morocco and more particularly in the Central Middle Atlas [6]. Indeed, the territorial communes of this zone are traditionally considered as lands with a route, characterized by the presence of herd of all kinds confused with different proportions from one commune to another. Between 2005 and 2016, the number of UPB staff showed a positive and significant variation, averaging 28%, with a maximum variation rate recorded in the territorial commune of Sidi El mekhfi (+70.31%), and a minimum rate of (+3.61%) in the commune of Ain Leuh. In terms of numbers, sheep dominate the herd in all the territorial communes concerned. Indeed, the average number of sheep registered in the area is 96 833 against 11 333 goats and only 4 333 cattle in 2016. The average number of UPBs is around 127,567. An analysis of the changes recorded between 2005 and 2016 in the number of UPBs shows excessive growth in livestock numbers, especially in the territorial communes of Sidi El Mekhfi and Bensmim. Indeed, the weaknesses of the area's production systems have encouraged households to focus on livestock breeding activities, and have given concrete form to the abundance of herds to be kept in the forest (Table 2) and (Figure 2).

TABLE 2
EVOLUTION OF THE HERD NUMBERS IN THE AREA BETWEEN 2005 AND 2016

Territorial municipality	Nature of Herd								
	Sheeps		Cattles		Goats		Total of UPB		
	2005	2016	2005	2016	2005	2016	2005	2016	Variation (%)
Oued Ifrane	85521	89000	1600	3500	20500	15000	109921	118500	7,80
Sidi El mekhfi	115499	185000	2500	7050	13690	20500	138951	236650	70,31
Tigrigra	82000	97000	8100	8900	5500	8500	126900	148300	16,86
Ain Leuh	78683	83000	633	1500	16519	10000	95063	98500	3,61
Dayet Aoua	39483	38000	900	2600	11851	7000	53464	56600	5,86
Bensmim	58000	89000	1200	2450	4000	7000	67200	106850	59

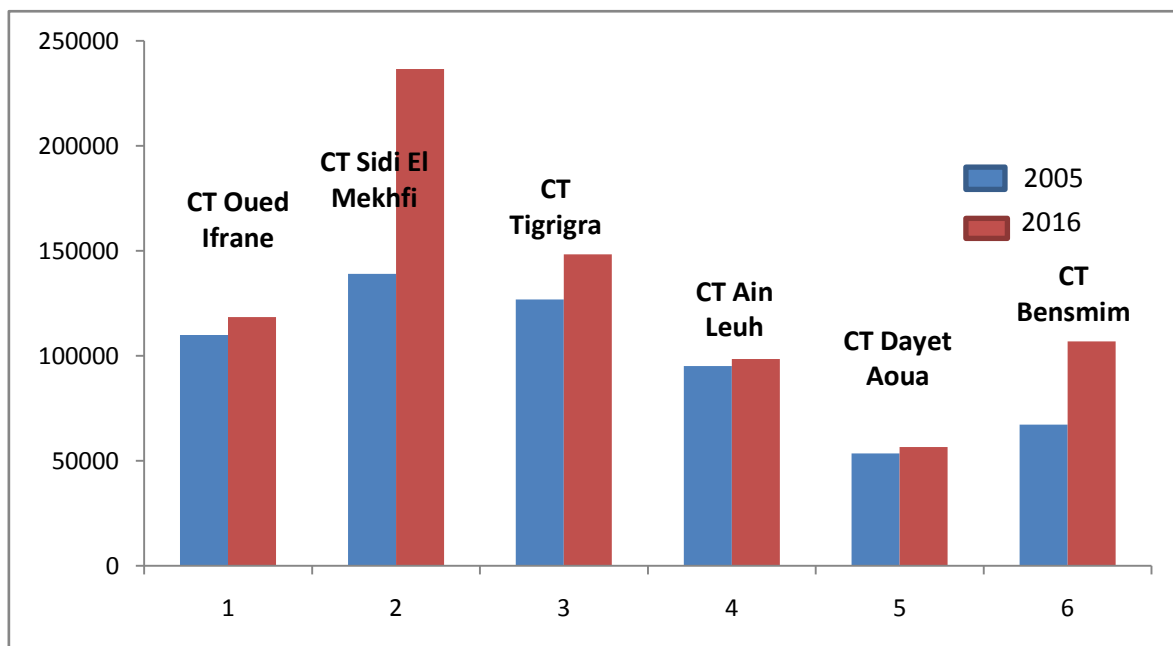


FIGURE 2: Evolution of Livestock Numbers In the Area between 2005 And 2016

3.2 Animal forage requirements in the area

From the data collected from the departments concerned, as well as the average forage requirement per head, we were able to deduce the demand formulated by the entire grazing livestock in the study area. The forage requirements in all the communes concerned amount to 229 620 000 FU/ha/year, with a maximum recorded in the commune of Sidi El Mekhfi: 31% of the forage demand in the study area. For the six municipalities, the needs of sheep represent the major part, these needs are of the order of 75.5% on average, followed by those of cattle representing 17%, on the other hand goats, need only 7.5%. These needs are mainly drawn from forest rangelands whose potential remains below existing capacities, which contributes to overgrazing and strong pastoral pressure in the forests of Sidi M'guild, Azrou and Jbel Aoua South characterizing the area under study (Table 3).

TABLE 3
LIVESTOCK FORAGE REQUIREMENTS IN THE STUDY AREA ON 2016

Territorial municipality	Herd	Number of Herd	Number of UPB	Forage requirements (FU/year)	%
Oued Ifrane	Sheeps	89 000	89 000	26 700 000	75,10
	Cattles	3 500	17 500	5 250 000	14,77
	Goats	15 000	12 000	3 600 000	10,13
	Total	104 000	118 500	35 550 000	100
Sidi El mekhfi	Sheeps	185 000	185 000	55 500 000	78,17
	Cattles	7050	35 250	10 575 000	14,90
	Goats	20 500	16 400	4 920 000	6,93
	Total	212 550	236 650	70 995 000	100
Tigrigra	Sheeps	97 000	97 000	29 100 000	65,41
	Cattles	8 900	44 500	13 350 000	30,01
	Goats	8 500	6 800	2 040 000	4,58
	Total	114 400	148 300	44 490 000	100
Ain Leuh	Sheeps	83 000	83 000	24 900 000	84,26
	Cattles	1 500	7500	2 250 000	7,62
	Goats	10 000	8 000	2 400 000	8,12
	Total	94 500	98 500	29 550 000	100
Dayet Aoua	Sheeps	38 000	38 000	11 400 000	67,14
	Cattles	2 600	13 000	3 900 000	22,97
	Goats	7 000	5 600	1 680 000	9,89
	Total	47 600	56 600	16 980 000	100
Bensmim	Sheeps	89 000	89 000	26 700 000	83,30
	Cattles	2 450	12 250	3 675 000	11,46
	Goats	7 000	5 600	1 680 000	5,24
	Total	98 450	106 850	32 055 000	100

3.3 Forage supply produced in the study area

The forage potential available in the forest rangelands in the study area is estimated at 17 067 302 forage units per hectare per year (Table 4), with intermunicipal and interforest variability. Indeed, the forest of Sidi M'guild offers 8 766 176 FU/ha/year (51.36%), followed by the forest of 5 142 142 FU/ha/year (30.13%), and finally the forest of Jbel Aoua South offers only 3 158 984 FU/ha/year (18.51%). This variability is essentially due to the composition of forest species with significant potential offered by holm oak and cedar forests. Certainly, this value is relatively important in comparison with others found by [7] in the forests of Tafachna and Reggada in the Middle Central Atlas which are of the order of 221 FU/ha and 259 FU/ha respectively. This improved production could also be linked to the favorable climatic conditions in the Ifrane area, which receives more than 1000 mm of rainfall annually, which conditions a favorable water balance in the soil and significant foliation of trees. The high density of the stand studied also contributed to the improvement in this forage value [8].

TABLE 4
FORAGE SUPPLY FROM FOREST RANGELANDS IN THE AREA

Territorial municipality	Forest concerned	Forestry Vegetation	Area open for the grazing (ha)	Forage Production (FU/ha/an)	Forage potentiel (FU/an)
Oued Ifrane	Sidi M'guild	C+CV	2487,38	450	1 119 322
		CV pur	81,97	420	34 430
		CV+Gt	52,25	410	21 423
		C+CV+Gt	2,13	370	790
		VS	436,95	394	172 160
		S/total	3060,68		
Sidi El Mekhfi		C+CV	723	450	325 353
		CV pur	55,06	420	23 126
		CV+Gt	572,20	415	237 465
		C+Gt	143,33	415	59 485
		C+CV+Gt	764,29	430	328 645
		Gt	340,74	410	139 704
		VS	1302,43	394	513 160
	S/Total	3901,05			1 626 938
Ain Leuh		C+CV	8093,44	450	3 642 048
		C pur	350,81	300	105 243
		CV pur	1654,13	420	694 736
		CV+Gt	714,57	415	296 546
		C+CV+Gt	49,35	430	21 223
		Gt	33,85	410	13 882
		VS	2414,13	394	951170
		Cl	139,62	320	44 678
		Rb	54,79	394	21 587
			S/Total	13504,69	
Dayet Aoua	Jbel Aoua South	C+CV	2008	450	903 600
		CV pur	3484	420	1 463 280
		C pur	17	300	5 100
		CV+Pp	1509	310	467 790
		C+CV+Pp	196	320	62 720
		Rb	51	394	20 094
		VS	600	394	236 400
	S/Total	7865			3 158 984
Tigrigra	Azrou	C+CV	1062,19	450	477 985
		C pur	453,4	300	136 020
		CV pur	1621,12	420	680 870
		CZ pur	44,14	320	14 124
		CV+CZ	92,48	450	41616
		C+CV+CZ	79,95	450	35 977
		C+CZ	8,62	450	3879
		Cl	131,75	320	42 160
		Rb	26,16	394	10 307
		VS	336,34	394	132 384
	S/Total	3856,15			1 575 322
Bensmim		C+CV	3994,72	450	1 797 624
		C pur	644,89	300	193 467
		CV pur	1999,08	420	839 613
		CZ pur	40,92	320	13 094
		CV+CZ	55,32	450	24 894
		C+CV+CZ	27,89	450	12 550
		C+CZ	9,74	450	4383
		Cl	98,9	320	31 648
		Rb	65,06	394	25 633
		VS	1663,78	394	655 529
	S/Total	8600,3			3 566 820

C : Cedar, CV : Holm oak, CZ : Zeen oak, Gt : Thuriferous Juniper, Cl : Crategus, Rb : Reforestation, Vs : Assylvatic vides

Compared to the needs of the livestock, the pastoral forestry potential exploited in the study area of the western edge of the Central Middle Atlas represented by the province of Ifrane therefore covers only 7.43% of the annual needs of herd in the forests in question. However, current pastoral practices are causing the vegetation cover to deteriorate in an increasing and worrying manner. At forest level, annual losses are estimated at 1000 ha/year [6]. Also, forest stands remain prone to delimiting and lopping, the products of which will be used as fodder for herd. These practices cause the physiological weakening of the trees leading in the long run to a reduction in density and forest cover in the Middle Atlas. Such a situation threatens the future of forest ecosystems and their equilibrium structures and the exposure of soils to various forms of wind and water erosion, without forgetting the effects of climatic hazards that aggravate this situation [9]. It is in this context that pastoralism researchers have recommended that the "Arbre-Herbe-Animal" balance is necessary to maintain and develop forest and sylvopastoral resources[10] Analysis of the results obtained shows that the forage potential of forest areas does not meet the forage needs of herd in the same terms. Needs far exceed supply in the study area.

On the other hand, the presence of these herds, often all year round in the forest, prevents any possibility of natural regeneration, through soil compaction and watering of young seedlings, which has a negative impact on the balance of ecosystem regeneration in the Central Middle Atlas, home to a forest heritage of great value.

IV. CONCLUSION

The forest rangelands in the study area contribute only 7.43% of the forage requirements of the grazing livestock in this area. Thus, the degradation aspects resulting from overgrazing in the communes studied can be observed at several levels:

- The forage possibilities of the forest of Sidi M'guild, Azrou and Jbel Aoua South remain below the forage needs of the livestock in the area, resulting in remarkable overgrazing leading to degradation of the undergrowth and preventing any possibility of natural regeneration;
- In times of famine, in addition to the failure to respect the defended lands, the shepherds attack the trees by pollarding and delimiting, to draw additional forage units from the herds. This phenomenon largely contributes to injuries and is considered an aggravating factor in the decline and physiological weakening of trees.

The examination of this situation leads us to reflect on the possibility of pastoral improvement based on local species in order to be able to meet the needs of grazing livestock in the forest following the recommendations of the national sylvopastoralism strategy initiated by HCEFLCD in 2016, on the one hand, and to limit the pastoral load, to reserve sufficient pasture for the users' herds, on the other hand.

Consequently, an organization of the user population of these forests is essential for a sustainable use of pastoral resources, through the practice of participatory silvicultural practices (depressing by the population) allow these populations to benefit from the forage units that are necessary for their herd. As well as socio-economic development in the area which will alleviate pastoral pressure on natural resources, in particular through income-generating projects that will make it possible to move from a path of more productive and not dependent on forest areas.

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