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Digestibility of Broiler Birds

Development of Local Communities

Discovering Thoughts, Inventing Future

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Poultry Farming and Disease Management Practices in Small-Scale Farmers in Kisii County, Kenya

By Ezra Ochami Aondo, Ombui Jackson N., Onono Joshua, Richard Onduso & Omasaki Simion K

Kisii University

Abstract- One of the most important constraints of poultry production is disease. Among the major important diseases are: viral, fungal, bacterial and parasitic infections. A cross sectional survey was carried out in small-scale poultry farmers in Kisii County, Kenya to establish the common diseases and their management practices. A structured and semi-structured questionnaire was administered to 400 households. Sampled households were obtained from a target population of 247,050 using a stratified random sampling technique. Analysis of data was performed using statistical package for social sciences (SPSS) version 16 software. Results indicated that majority of the farmers (58.8%) were male while 55% had a farm size of less than one acre. Newcastle (29.3%) was the most important poultry disease in the study area. Of the interviewed farmers, 46.6% relied on both ethno vet and conventional medicine to treat their birds. More than 65% of the farmers did not vaccinate their birds while those who vaccinated, never did it regularly.

Keywords: *bio-security measures, ethno-veterinary, newcastle disease, vaccination.*

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Poultry Farming and Disease Management Practices in Small-Scale Farmers in Kisii County, Kenya

Ezra Ochami Aondo [α], Ombui Jackson N. [σ], Onono Joshua [ρ], Richard Onduso [ω] & Omasaki Simion K. [¥]

Abstract- One of the most important constraints of poultry production is disease. Among the major important diseases are: viral, fungal, bacterial and parasitic infections. A cross sectional survey was carried out in small-scale poultry farmers in Kisii County, Kenya to establish the common diseases and their management practices. A structured and semi-structured questionnaire was administered to 400 households. Sampled households were obtained from a target population of 247,050 using a stratified random sampling technique. Analysis of data was performed using statistical package for social sciences (SPSS) version 16 software. Results indicated that majority of the farmers (58.8%) were male while 55% had a farm size of less than one acre. Newcastle (29.3%) was the most important poultry disease in the study area. Of the interviewed farmers' 46.6% relied on both ethno vet and conventional medicine to treat their birds. More than 65% of the farmers did not vaccinate their birds while those who vaccinated, never did it regularly. The methods of vaccines application (35%) was identified as the major challenge to poultry vaccination. Most farmers practiced proper disposal (burying) of the dead birds (34.5%) as a common biosecurity measure. Greenish diarrhea was identified by most farmers (20.3%) as the common sign of diseases in the study area. Most farmers used Aloe Vera to manage poultry diseases. We recommend that there is an urgent need for the farmers to embrace good poultry diseases management practices and the government to support them by providing subsidized vaccinations and technical support in order to develop and stimulate economic development of poultry farming in Kisii.

Keywords: bio-security measures, ethno-veterinary, newcastle disease, vaccination.

I. Introduction

The global poultry industry is expected to grow continuously as demand for eggs and meat is driven by increasing populations, rising incomes and urbanization. It is the fastest growing agricultural sub-sector; especially in developing countries Kenya included (Atela et al 2016, mottet and Tempio, 2019). Poultry is a major asset, providing income and food security and play a role in cultural functions and market participation to rural households (Nduthu 2015, Lindahl et al 2019). They are preferred because of the little investment required, low input, and short production cycles compared with other livestock enterprises (Atela et al 2016). Even if most of the sector's growth has been driven by private players, public concerns about the sector's impact on the environment and human health, its contribution to climate change and to local and global economy is triggering governments' response and the development of public policies for the sector (mottet and Tempio, 2019). The sector is facing unprecedented challenges among them diseases which include; viral, fungal, bacterial and parasitic infections (Nduthu 2015, Apopo et al 2019, Lindahl et al 2019, mutinda et al 2019).

Even though effective poultry farming practices against diseases are available in most countries, the uptake by poultry farmers is often very low (Lindahl et al 2019). Poultry vaccination is the most important option to the management of most poultry diseases. However, vaccine failure and subsequent outbreaks in vaccinated chickens are a major challenge in poultry farming (Lindahl et al 2019). This could be due to the use of live vaccines which may revert to virulence resulting in disease. Further, live vaccines may become non-viable due to poor handling and yield no immune response as anticipated (Mutinda et al 2019).

Biosecurity is an indispensable tool to mitigate the spread of poultry infectious diseases but only a few poultry farmers understand and practice these measures. Biosecurity principles of isolation and containment remain the most important. However, only a few documents are available about the impact of these measures in various poultry farming settings and very little have any evidence of their feasibility and effectiveness (Silva et al 2020).

In most developing countries, farmers depend on indigenous knowledge and practices to control, prevent and cure the many infections affecting both human and their animals (Sambo et al 2015). Consequently, the use of ethno veterinary remedies using medicinal plants has gained more attention due to their accessibility, easy to prepare and administer at no cost. On the other hand, conventional drugs are either unavailable or too expensive for the small-scale resource poor farmers (Sambo et al 2015). Medicinal plants are broad spectrum and may be a future to pathogen that may develop resistance to conventional

Author α: School of Agriculture and Natural Resource Management, Department of Animal science, Kisii University, P. O. Box 408-40200 Kisii, Kenya. e-mail: dr.ezraochami@gmail.com

Author σ ρ ω ¥: Faculty of Veterinary Medicine, Department of Public Health, Pharmacology and Toxicology, University of Nairobi, Kangemi, Nairobi, Kenya.

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drugs (Silva et al 2020). Farmers use garlic, green leaves, local alcohol, lemon, paper powder and butter among others as drenching, nasal application and smoking in attempt to control and cure many infections affecting their birds (Silva et al 2020).

Poultry production in Kenya suffers major setbacks due to factors such as disease and parasite infestation, high prices and poor quality of feeds, predation, and low levels of animal health and husbandry practices (Ogada et al 2016). Poultry diseases and disease management practices in Kisii, Kenya, from the farmer's perspective, have not been optimally understood and practiced, a situation that limits interventions for improvement of poultry production. The current study aimed at providing a better understanding of poultry farming and diseases management practices, and identification of constraints and opportunities for improved poultry farming in Kisii County.

II. Materials and Methods

A cross sectional survey was conducted on 400 households distributed across nine sub-counties of Kisii, Kenya as shown in table 1 below. Stratified random sampling technique was used to select these sample size from a target population of 247,050 households. Data was collected using structured and semi structured questionnaires through direct interviews. Households were briefed about the objective of the study before starting the interviews and data collection at the farms. Information was collected based on characteristics of the farms, poultry management and farming support services provided by the Ministry of Agriculture, Livestock and Fisheries Development (MALFD) and Non Governmental Organizations (NGOs). Results of all exercises creating visual representations of data was captured on a digital camera and later transferred to the data storage laptop. Current stock, housing type and bio-security practices were identified through observations and noted for the purpose of data analysis. Data were analyzed using the statistical package for social sciences (SPSS) version 16 software and presented using descriptive statistics such as frequency and percentage.

Table 1: Sampling frame and sample size

Sub-county	Zone A	Zone B	Zone C	Total population	Percentage	Sample size (Households)
Nyaribari Chache	10100	9500	9112	28,712	12	48
Nyaribari Masaba	9050	8500	8765	26,315	11	44
Bobasi	11000	10500	11960	33,460	14	56
Bomachoge Borabu	8000	7500	7500	23,000	9	36
Bomachoge Chache	8550	8550	8550	25,650	10	40
Kitutu chache south	9050	10400	10470	29,920	12	48
Kitutu chache north	7900	7600	8232	23,732	10	40
Bonchari	8130	8040	8245	24,415	10	40
South Mugirango	10686	10560	10600	31,846	13	52
Total	82466	81150	83434	247,050	100	400

III. Results

a) *Description of poultry farms*

Male predominantly headed the households (62%). Over 50% of the households had a farm size of less than one acre while less than 45% had a family size of less than five members. The majority (58%) of the farmers engaged in agricultural activities. Most farmers (69.5%) used their own savings as capital to start poultry farming (Table 2).

Table 2: Description of poultry farms (n=400)

Variable	Parameter	Frequency	Percentage
Head of family	Male	248	62
	Female	152	38
Family size	<5	180	45
	5-10	140	35
	>10	80	20
Farm size (acres)	<1	218	54.5
	1-5	153	38.3
	>5	29	7.2
Livelihood activity other than poultry	Agricultural (crop and livestock)	232	58
	Non-agricultural(Business and employment)	168	42
Source of funds for poultry farming	Personal savings	238	69.5
	Loan	114	28.5
	Government grants	48	12

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b) Farmers Characteristics

Majorities (54%) of the farmers were aged between 40 and 60 years and 58.5% of them were males. The highest academic qualification held by most farmers was tertiary education (47%), with 62.7% of them having no training on poultry farming. However, of those with training in poultry farming, 63.8% of them were trained by private service providers, 28.2% by government extension officers and 8.0% by NGOs. (Table 3).

Table 3: The age, sex, education level and training of poultry farmers (n=400)

Variable	Parameter	Frequency	Percentage
Age of farmer	20-39	95	23.8
	40-60	216	54
	Above 60	89	22.2
Sex of farmer	Male	234	58.5
	Female	166	41.5
Level of education	Primary	102	25.5
	Secondary	110	27.5
	Tertiary	188	47
Any training on poultry farming	Yes	149	37.3
	No	251	62.7
Trained by	Private service providers	95	63.8
	Government service providers	42	28.2
	NGOs	12	8.0

c) Common causes of mortality, poultry diseases and their signs

The following diseases were identified as the most common in the study area. Newcastle disease (29.3%), internal parasites (16.0%) and Salmonellosis (12.8%) were the common diseases in the farmers' flocks. Marek's disease (3.0%) and infectious bursal disease (3.8%) were the least common diseases reported. Farmers (20.3%) reported seeing greenish diarrhea followed by presence of worms in the faeces (17.5%), comb lesions (14%), yellowish diarrhea, (13.3%), Ecto-parasites (12.3%), whitish diarrhea, (10.5%) and blood stained feces (8.8%). The major causes of mortality and/or loss of poultry in the farms were identified as diseases (29.5%), predators (25.0%), parasites 19.2%, accidents and injuries 14% respectively (Table 4).

Table 4: Common poultry diseases and their signs in the study area (N=400)

Variable	Parameter	Frequency	Percentage
Common signs of poultry disease seen	Yellowish diarrhea	53	13.3
	Whitish diarrhea	42	10.5
	Greenish diarrhea	81	20.3
	Faeces stained with blood	35	8.8
	Paralysis	14	3.5
	Worms seen in faeces	70	17.5
	Ecto-parasites on the body	49	12.3
	Lesions on the comb	56	14.0
Common diseases of poultry	Eye coryza	48	12.0
	Fowl pox	43	10.8
	Salmonellosis	51	12.8
	Gumboro	15	3.8
	Marek's	12	3.0
	disease		
	Newcastle disease	117	29.3

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	Infectious bronchitis	50	12.5
	Internal parasites	64	16.0
Common causes of poultry mortality/losses	Disease	118	29.5
	Predators	100	25.0
	Theft	28	7.0
	Parasites	77	19.2
	Accidents and injuries	56	14.0
	Unknown	11	2.8
	Poisoning	10	2.5

d) Poultry disease management practices

Most farmers (45%) used both conventional and traditional medicines to treat their poultry. Proper disposal of dead birds (26.9%) was practiced by majority of the farmers as a bio-security measure. Only 38.5% of farmers vaccinated their birds, with 29.3% of them vaccinating against Newcastle disease. The methods of vaccine application (35%), was a major challenge in poultry vaccination (Table 5).

Table 5: Farming practices related to poultry disease management (n=400)

Variable	Parameter	Frequency	Percentages
Action taken when birds are sick	Call a veterinarian	50	12.5
	Treat with conventional drugs	70	17.5
	Treat with both conventional and traditional medicines	180	45
	Treat with traditional medicines	100	25
Biosecurity measures practiced	use of special clothing in poultry house	103	25.8
	use of protective boots	41	10.2
	proper disposal of dead birds (burying deep)	138	34.5
	use of foot dips	70	17.5
	fencing the farm	48	12
Do you vaccinate your birds?	Yes	154	38.5
	No	246	61.5
Diseases vaccinated against	Fowl pox	37	23.8
	Newcastle disease	63	40.9
	Gumboro	29	18.7
	Fowl typhoid	25	16.6
Challenges when vaccinating	high cost of vaccines	117	29.3
	vaccines not available	71	17.7
	storage conditions of vaccines	72	18
	methods of vaccines application	140	35

e) Ethno veterinary medicine

Table 6 presents common ethno veterinary medicines used to manage poultry diseases. Majority (49%) of the farmers used Aloe vera to treat poultry diseases.

Table 6: Common medicinal plants used in poultry diseases management (n=400)

Plants spps /local medicine	Frequency	Percentages
Aloe vera	196	49
Allium cepa	46	11.5
Allium sativum	52	13
Azadirachta indica	62	15.5
Capsicum frutescens	44	11

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IV. Discussion

a) Poultry farms characteristics

Of the total interviewed farmers, this study revealed that the majority were males. This high proportion of males to females can be attributed to the religion and custom which play a very crucial role in the livelihoods of the people in the study area that males are the head of the family and are to provide for the households. Trainings by various stakeholders on poultry farming and change of mind set on poultry farming by the males may also have an influence in the male dominance in poultry farming. In addition, the fact that majority of the households in his study are headed by males, a common scenario in many rural families in most regions of African continent where traditions and culture demands for the establishment of marriage where males are head of families, most activities associated with income generation are controlled by men. Our findings are similar to other studies conducted by Kirui (2014) in kenya, and Terefe et al (2018) in Ethiopia who indicated that there are more males involved in poultry faming than females. However, other studies have also reported contradicting results of more females dominating poultry farming (Moige 2014, Sambo et al 2015, Atela et al 2016, Haile and Biratu 2017).

The result shows that majority of the poultry farmers were at the age range of between 41-60 years. This is the age bracket when most people have entered into marriage and they have started the family life. This therefore implies that the family needs of food and additional quick income is in increase, hence demanding the family to venture into a diversity of activities to achieve their goals. Findings of this study agree with Njenga (2017) in Kenya who reported an average age of poultry farmers to be 49 years.

Several studies have investigated factors that influence family size, these include: level of educational, the type of occupation, income level, the size of the land, family size preference, age, age at marriage, religion, security at old and sex preference among others. Most families would prefer to have a family which is easy to provide for their needs without straining them because of the increased cost of living. Our findings indicate that most of the farmers have family size of less than five members. This can be explained mainly by, the reducing land size in the study area where majority of the households had less than 1 acre of land. This result agrees with the findings of Njenga (2017) who reported a household size of 4 members. The age at which most women in Kenya get married also contributes to the number of children that they can get in their reproductive time. Through education, and women empowerment, most women get married late consequently this allows them to have a few children; this might be the case also in this study, since majority (47%) of the farmers had tertiary education. On the other hand, findings from studies done where the land holding is high have indicated higher proportions of household land size (Samkange et al 2018).

The level of education of the farmer will contribute significantly to decision making. In this study, majority of the poultry farmers had college/university education indicating that they are highly educated. Through education and continuous trainings, farmers will be better informed when it comes to decision-making, be it which farming activity to venture in, field of poultry health, management, efficiency, processing and keeping up to date with competitors. Education levels also determines the quality of farmers skills, their allocative abilities and how well they are informed about the new innovations and technologies around them and how faster they can recognize business opportunities around them (Moige 2014, Atela et al 2016). On the other hand this can also be associated with lack of employment, forcing even those who have the highest level of education to take on poultry farming since it requires low capital and input to start (mottet and Tempio, 2019). Contrary to our findings, a study by Samkange et al (2018) reported the lowest proportion of 2.9% of farmers with tertiary level education involvement in poultry farming respectively.

Diversification of enterprises venture is critical especially to low and medium income farmers as this enable them to do re-allocation of some of a farm's productive resources, such as land, capital and farm equipment among other available resources for generation of additional income in a more sustainable manner. In this study, majority of the farmers engaged in other agricultural activities such as crop and other livestock farming apart from practicing poultry farming This may be attributed to the fact that farmers usually want to add more income to their farm earnings. This result agrees with the findings of Moige (2014), who indicated that it is common for some farm household to engage in multiple farming enterprises to complement their earnings from farming occupation for their livelihood. Additionally, the favorable climatic conditions in the study area favor many farming enterprises (Moige 2014).

b) Common poultry diseases, signs and their impact

Diseases and parasites are the main hindrances to success in raising poultry and most common health problems can be avoided through preventative management. In this study, Newcastle disease, internal parasites and Salmonellosis were the most common diseases in the farmers' flocks. Small scale poultry farms are believed to have very limited bio-security practices, use little vaccination, often host multiple poultry species and have higher contact rates with wild birds or foraging areas frequented by wild birds, which increases their susceptibility to diseases. In

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this study also, farmers practiced the extensive production system of rearing where the birds are allowed to scavenge freely, subsequently mixing with neighbor's flocks, the very low numbers of farmers who vaccinate their birds and failure of vaccines to work effectively. Our findings are in agreement with Mutinda et al (2019) and Ogada et al 2016 in Kenya who reported that diseases were the major limitation in poultry production

The results indicates majority of the farmers seeing greenish diarrhea followed by presence of worms in the faeces as the main signs of disease in their farms. This is a clear indication that farmers are able to identify signs of diseases in their flocks and initiate treatment in these areas where poultry diseases are diagnosed using clinical signs. Additionally, most farmers in the study area are literate and have been trained on poultry disease management. Our findings are not different from the results reported by Ogada et al (2016) in Kenya that in disease diagnosis, poultry farming relies heavily on the use of clinical signs due to unavailability of laboratory services. Further the study indicated that Newcastle disease was the most common disease encountered during the study time in Kenya.

Disease and predators are known to be the major causes of mortality in the poultry farming. In this study, diseases accounted for the largest proportion of overall flock mortality (29.5%) while predation contributed to 25%. Newcastle disease (29.3%), internal parasites (16.0%) and Salmonellosis (12.8%) are the most important diseases identified, while predators such as snakes, rats, dogs, cats and foxes are the main causes of losses especially in young birds. Thefts are important cause of loss of adult birds. The fact that majority of the farmers practiced free range farming where birds are left to scavenge and roam freely; it makes birds be prone to diseases and predators. A study conducted by Moige, (2014) indicated that predators and poultry diseases contributed to poultry losses which also agree with our findings.

c) Poultry disease management

Farmers acknowledged that diseases are the major cause for the loss of chicken. Most farmers treat their chicken themselves and only few of them have access or used veterinary services. To treat their sick chickens, most of the farmers use both conventional and local medicinal herbs, which are usually administered through drinking water, whereas few use modern medicine (Table 5 and 6). This can be explained by the high prices of poultry drugs compared with local medicinal herbs which are cheap and easy to administer and the fact that the farmer need to observe the withdrawal period during the administration of conventional drugs. This finding is similar to findings of Samkange et al 2018 in Namibia who reported the high proportions of farmers using local medicinal herbs to treat their birds when they are sick.

A small proportion (12.5%) of the farmers in the study consulted a veterinarian when the birds were sick while the rest treated their birds without the veterinary input. This can be attributed to the unavailability and high cost of veterinary services. The extension linkage between the experts and the farmers are found to be extremely weak. This is because, currently, extension services in Kenya are farmer demand driven. The result clearly reveals that provision of extension services is poor in the study area. These results also concur with the findings of Augustine et al (2014) who documented poor extension services as being among the challenges facing poultry production in Nigeria. Poor Management of poultry diseases has also been reported in various studies (sambo et al 2015, mutinda et al 2019, Silva et al 2020).

In a free-range poultry system, there are increased bio-security risks, due to more exposure to potential sources of disease and food safety pathogens. Some of the greatest bio-security risks in this kind of a production system are wild birds and animals, rodents and airborne infection and human beings. This practice is important because it prevents the spread of diseases from one farm to another. The results show that majority of the farmers practiced proper disposal of dead birds as a biosecurity measure when they died by burying them deep in the ground. The findings on a general note showed that most bio-security measures were not being implemented properly in the study area. This can be attributed to high cost of disinfectants, high cost of fencing and ignorance. This finding contradicts a report by Augustine et al (2014) that revealed that dead birds were given to pets and people willing to consume them.

The results indicate that most farmers do not vaccinate their birds against the common preventable diseases. In this study, only 38.5% of farmers vaccinated their birds. Most vaccine doses are packaged and available in big quantities which farmers cannot access them in smaller quantities. In addition to this, most vaccines are very expensive, not readily available and have complex methods of storage and application which requires animal health personnel to guide them. This is in line with the report of Augustine et al (2014) in Nigeria and Ogada et al 2016 in Kenya, who indicated that only a small proportion of farmers who make efforts to vaccinate their birds against common preventable diseases.

Few farmers did vaccination against Newcastle disease and this is because Newcastle disease is the most common disease of poultry in Kenya affecting majority of small-scale farmers hence causing huge losses (Mutinda et al 2019). Technology uptake for most farmers can be a challenge and hence hinder poultry vaccination. This is manifested in this study as farmers

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indicated that the methods of vaccine application were a major challenge, due to the specific requirements of vaccines in terms of their packaging, availability, storage, transportation, and mode of application.

The use of ethno veterinary medicine in poultry disease management is becoming popular among the small-scale farmers. This is also demonstrated in this study as majority of farmers (49%) used Aloe vera to treat poultry diseases. Considering that most small-scale farmers are poorly endowed with resources, high cost of conventional drugs coupled with the fact that ethno veterinary drugs are cheap, easy to prepare and administer, this was the best alternative for them. Similar findings were also reported by Sambo et al 2015 and Silva et al 2020.

V. Conclusion

We conclude that diseases and predation are the major cause of mortality and loss of poultry birds in the study area. Newcastle disease is the most important poultry disease encountered by small-scale farmers. Majority of the farmers in the study area manage poultry diseases using various ethno veterinary medicines. Generally, bio-security measures as a means of preventing and controlling poultry diseases was not properly implemented. A small proportion of the farmers vaccinated their birds against common preventable poultry diseases.

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Conflict of interest

All authors have declared that they don't have conflict of interest.

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Digestibility of Broiler Birds Fed Degraded and Detoxified Delonix Regia

By Aiyelabegan A. B, Lawal W. S, Balogun, A & Salami, M.O
Institute of Applied Sciences

Abstract- In an experiment to study the digestibility of broiler birds fed degraded and detoxified Delonix regia (DDD), 180 broiler birds fed DDD for eight (8) weeks and at the end of the experiment, it was found that dry matter, protein, ether extract and crude fibre decreases with increase in DDD.

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Digestibility of Broiler Birds Fed Degraded and Detoxified Delonix Regia

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Abstract- **In an experiment to study the digestibility of broiler birds fed degraded and detoxified Delonix regia (DDD), 180 broiler birds fed DDD for eight (8) weeks and at the end of the experiment, it was found that dry matter, protein, ether extract and crude fibre decreases with increase in DDD.**

I. Introduction

The whole of Africa and some third world countries in Asian continent are still lacking behind in production of poultry meat and products, this is because there is serious competition between human being and these birds for major feed ingredients used in making poultry feed like maize, soyabean, palm kernel cake and groundnut. This competition has caused high cost of these ingredients and hence in turn high selling price of poultry meat and products.

It is therefore high time we find solution to this problem, as it is capable of causing malnutrition disease and food insecurity.

Animal nutritionist should therefore swing into action to find an alternative feed ingredients that can serve as good source for both protein and carbohydrates, as it may be very difficult for human being to abandon these stated feed ingredient for poultry birds.

In this experiment, insects like Delonix regia will be degraded and detoxified and make meal out of it to studt the effect on broiler birds. The outcome of the experiment will afford the birds to abandon ingredients like maize, soybean, palmkernel and groundnut to human being for consumption, this will make surplus food for human being and also reduce cost of production of feed and hence reducing the selling price of poultry meat and products and so everyone will be able to afford poultry meat and products and then malnutrition will not occur and there will be food security.

a) Objectives of the experiments

i. Source Delonix regia from school environment
ii. Degrade and detoxified Delonix regia
iii. Prepare Delonix regia meal and feed to broiler birds.
iv. study and take data on feed intake, weight gain and feed to weight gain
v. Take to metabolic cage for feace collection for digestibility

b) Justification

i. Availability of Delonix regia throughout the year
ii. Delonix regia is nutritious
iii. It is not consumable to animals ,so no competiton

II. Material and Methods

a) Site of the Experiment: The experiment was carried out in the Agricultural garden of Kwara State Polytechnic, Ilorin

b) Repaire of Poultry Pen: The pen were repaired by flouring, putting new poultry net to screen away predators and the pens were again divided based on the experimental design.

c) Source of Jatropha Seed: All the Delonix regia were obtained from Polytechnic campus from the beginning till the end of the experiment.

d) Source of feed Stuff: Other feed ingredients are obtained in whole sales (50kg bags and above) from feed mill shops, each of these ingredients was milled separately in their bags for easy mixing and it is manually mixed in the project site based on the feed formulations and percentage of Delonix regia intended in the feed.

e) Inoculation and Preparation of Microorganisms

The Aspergillus niger and Baccillus lichiformis used in the experiment were prepared at the microbiology laboratory of Kwara state Polytechnic, Ilorin

f) Dedredation of Delonix Regia: The seeds is degraded in an harmer mill to increase the surface area of the seed, so that the detorxification effect can be effecte ful.

g) Detoxification of Delonix regia: The seeds were detoxified using four (4) different methods, the first was Physical method this is done by slight toasting of the seeds before grinding and then soak in water for two (2) days to ferment and after which it is then sundry for easy inclusion into the feed. The chemical method include soaking the granulated

Author α: Department of statistics, Institute of Applied Sciences, Kwara State, Polytechnic, Ilorin.
Author σ: Department of Agricultutre Technology, Institute of Applied Sciences, Kwara State Polytechnic, Ilorin.
Author ρ: Departmenet of Agric Enginnearing, Institute of Technology, Kwara State Polytechnic, Ilorin.
Author ω: Department of Sciemce Laboratory Technology, Istitute of Applied Sciences, Kwara State Polytechnic.
e-mail: awsl2004@gmail.com.

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seeds in n- Buthanol for two days in ratio 1:4 after the two days it was rinced thoroughly before soaking in Acethone for another two days in ration 1:4 and it was then rinced again before final soaking in Methanol also in ratio 1:4 for next two days before rinsing and then sundrying for easy inclusion into feed. The Bilogical method is done by making the granulated seed into past by distilled water and Aspergillus niger is added and sealed for seven (7) days after which the it is rinsed and sundried and then Bacellus lichiformis is added and then sealed for another seven (7) days, it is then washed and sundried for inclusion into feed. The combined method is the repetition of all this process on a particular quantity of granulated seeds.

h) *Chiken Feed:* The composition of the experimental diet is shown below in below, the birds were fed five (5) experimental diet for physical method of detoxification, this is repeated for biological, chemical and combined methods of detoxification. The diet had treated Delonixregia meal at 1%, 2%, 3%, 4% and 5%.

Table 2.1: Experimental Diet for Broilers Birds with Graded Level of Dddrm (Degraded, Detoxified Delonix Regia Meal)

Level of inclusion of DDDRM					
Ingridients(%) (control)	0% (Diet 1)	1% (Diet 2)	2% (Diet 3)	3% (diet 4)	4% (Die t 5	5%
Maize	50.0	49.0	48.0	47 .0	46.0	45.0
Soyabean	18.0	18.0	18.0	18.0	18.0	18.0
Groundnut cake	13.0	13.0	13.0	13.0	13.0	13.0
Fishmeal	3.0	3.0	3.0	3.0	3.0	3.0
DDDRM	0.0	1.0	2.0	3.0	4.0	5.0
Palm kernel cake	6.0	6.0	6.0	6.0	6.0	6.0
Wheat offals	7.0	7.0	7.0	7.0	7.0	7.0
Oystal shell	2.0	2.0	2.0	2.0	2.0	2.0
Salt	0.25	0.25	0.25	0.25	0.25	0.25
Broiler Premix	0.25	0.25	0.25	0.25	0.25	0.25
Lysin	0.25	0.25	0.25	0.25	0.25	0.25
Methaonine	0.25	0.25	0.25	0.25	0.25	0.25
Total 100	100		100	100 100		100
Calculated analysis CP(%)	22.30		22.40	22.49		22.6
M.E(kcal/kg) cal.	2920		2918	2915		2918
Lysin (%)	1.10		1.02	1.04		1.00
Methionine	77		75	75		75

2.5 premix supplied per kilogram of diet; vit A12,000,000i u vit D3 2,750,000 I vit E 20,000mg, vit k 3,2000mg. Thiamine B1 1,500mg,Riboflavin B2 4,000mg,Niacin 18,000mg,Panththenic Acid 7,000mg,vit B6 2,000mg vitB1212mcg,Folic Acid 1,000mg Biotin 15meg,Chline chloride 150,000mg,Cobalt 500mg,Copper 600mg,Iodine 1,100mg,Iron 20,000mg,Menganese 80,000mg,Selenium 200mg,Zinc 50,000mg and Antioxidand 125,000mg. CP = Crude protein; ME= Metabolic Energy. DDDRM (Degraded Detoxified Delonixregia meal).

i) Source of Birds

Ross boilers birds used in the experiment was purchased from Affcom Nigeria Limited in Kulende old Jebba Road, Ilorin, Kwara State Nigeria.

i. *Management of Birds*

Washing of drinkers and cleaning of feeding trough were done on daily basis. Litter material was usually turned at least once a week. Clean water and feed were served on daily basis ad-libitum and the left over feed were weighed to know feed intake. Litter was turned once a week and their health status is monitored throughout the period of experiment. Vaccine and drug administration program was carried out according to recommendation for derived savannah zone of Nigeria shown in table 2.2

III. Result and Discussions

Significant difference occurred ($P<0.05$) in dry matter in all the inclusion levels, with 2ml inclusion level (78) being the highest and 4ml (42) the lowest, the crude protein shows a different pattern with 0ml control (71.4) being the highest and 3ml given the lowest (43), the crude fibre shows its highest value at 0ml control (64) and the lowest at 4ml (40), ether extract has the 2ml to be highest (70.6) and the control 0ml to be (39.9) , the Ash has the control to be the highest with (38) and 5ml inclusion Level to be lowest (10.24).

The significant difference experienced in dry matter, crude protein and crude fibre may be as a result of the rate of inclusion level of Delonixregia that was high in the affected diets, the crude protein noticed may

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be because of the quantity that has been made used by the birds while the reverse is experienced in ether extract and Ash content content may be because of difference inclusion levels of Delonixregia.

Table 3.1: Shows data for digestibility of birds fed deloxixregia

Parameter	0ml	1ml	2ml	3ml	4ml	5ml	SEM
Dry matter %	80.80[b]	78.0[a]	62.8[b]	52.4[c]	52.4[c]	42.0d	13.7
Crude protein %	71.40[c]	60.6[b]	51.0[d]	43.0[e]	60.0[b]	56.2[c]	12.1
Crude fibre %	64.0[d]	50.0[b]	49[b]	45.0[c]	40.0[c]	43.0[d]	11.9
Ether extract %	89.9[a]	70.0[a]	63.6[b]	63.6[b]	55.0[c]	56.5[d]	10.2
Ash %	3.90[a]	16.9[b]	18.02[b]	10.44[d]	12.44[c]	10.24[d]	4.7

a, b, c, d and e means within the same row with different superscript are significantly different at (P<0.05)

IV. Conclusion and Recommendation

a) Conclusion

i. Delonixregia cannot be used without degredation and detoxification.

ii. Delonixregia is rich energy can be use to feed birds

b) Recommendation

i. Delonixregia should be well detoxified and tried on other livestock

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About the Contribution of Forest and Aquatic Ecosystems with in Protected Areas to the Sustainable Development of Local Communities

By Bogdan-Vasile Cioruța & Mirela Coman
Technical University of Cluj-Napoca

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Keywords: *biodiversity, community development, natural heritage, ecosystem services.*

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I. Introduction

Protected areas in Romania offer a wide range of ecosystem services, such as regulation and support services (water quality control, flood control, erosion control, regulation of nutrient and toxic substances content, maintaining biodiversity), cultural services (leisure activities, tourism, provision of aesthetic, educational and scientific resources), as well as production services (wood resources, non-wood resources, drinking water resources) [1, 2]. They can be particularly important for local economic development, thus helping to attract investment funds and providing an important direct or indirect source of employment, both locally and regionally.

This paper aims to present some of the benefits of two groups of ecosystem services in a protected area in Romania-Maramures Mountains Natural Park (MMNP), as well as the mechanisms that can support their provision. The results of the studies can be replicated nationally and internationally and used to raise awareness among decision-makers about the importance of protected areas for the economy and well-being of local communities.

Author α: Technical University of Cluj-Napoca - North University Center of Baia Mare, Office of Informatics, 62A Victor Babeș str., 430083, Baia Mare, Romania. Faculty of Applied Sciences from Bucharest, Politehnica University of Bucharest, 313 Splaiul Independenței, 060042, Bucharest, Romania. e-mail: bciorutza@yahoo.com

Author σ: Technical University of Cluj-Napoca, North University Centre of Baia Mare, Faculty of Engineering, 62A Victor Babeș Street, 430083, Baia Mare, Romania. University of Agricultural Sciences and Veterinary Medicine from Cluj-Napoca, Faculty of Agriculture, 3-5 Calea Mănăștur, 400372, Cluj-Napoca, Romania.

II. Methodology

The documentation for this paper was based on the authors' concerns for ecological education and environmental protection [3, 4], and the idea that a community can only develop harmoniously through care for protected areas and the biodiversity that populates them [5, 6]. With a range of highly relevant studies at the national level, both in terms of protected area management [2, 7-10] and some reports on the potential and benefits of forest and aquatic ecosystems, the authors decided to extrapolate the respective approaches on the relatively limited space of the protected natural areas, presenting as a case study the situation regarding the ecosystem in the Maramureș Mountains Natural Park.

III. Results and Discussion

a) Ecosystems in protected natural areas and associated ecosystem services

Ecosystem services are flows of materials, energy, and information from natural capital stocks that combine with the services of manufactured and human capital to produce human well-being [1]. There are of course three perceptual perspectives on what ecosystem services involve, namely:

- Processes by which the environment produces resources that are considered free by humans, such as clean water, timber, pollination, etc.
- The benefits that people get from nature.
- Components of nature consumed or used directly to produce human well_being.

According to the literature [1, 11], ecosystem services are divided, as follows, into the following categories, namely:

- Production services are provided by the ability of ecosystems to provide various resources, such as food, wood, fuel, drinking water, etc.
- Regulation and maintenance services are determined by the ability of ecosystems to control natural processes - regulation of climate, water

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quality and quantity, soil formation, control of diseases and pests, habitat maintenance, etc.

- Cultural services result from physical, intellectual, spiritual, and symbolic interactions with the components of natural capital, in which case we discuss the aesthetic value of the landscape as a space for recreation.

In this sense, the provision of ecosystem services is achieved by combining natural capital with anthropogenic, but taking into account the Management Plan of protected areas, as well as the specific activities allowed in the three areas related to them, namely:

- Integral Protection Zone (IPZ) - human activities are prohibited, except for traditional grazing activities, research activities, education, and ecotourism;
- Buffer Zone or Sustainable Management Zone (SMZ)-which is the transition zone between the Integral Protection Zone and the Sustainable Development Zone;
- Sustainable Development Zone (SDZ)-which includes the built-up areas of the localities in the park, the areas occupied by permanent communication routes, mountain pastures outside the integral protection area, as well as areas outside the built-up areas of localities that have undergone anthropogenic changes.

b) Maramureş Mountains Natural Park from an ecosystem perspective

Maramureş Mountains Natural Park (MMNP) is a delimited territory in which the natural, historical, and cultural attributes are protected based on regulation, for conservation and sustainable development. The surface of the park is 133,621 ha. MMNP was declared a protected area of national interest in the category of natural parks (IUCN category V - Protected landscape: protected area managed mainly for landscape conservation and recreation) in 2005 [12-15]. It was created primarily for the conservation of the local landscape and traditions, for the protection of the zonal natural, spiritual and cultural heritage, for the sustainable management of forests and the encouragement of sustainable tourism based on these values [16]. Moreover, due to the presence of priority habitats and species, it was designated as a site NATURA 2000 - ROSCI0124 and ROSPA0131 Maramureş Mountains (see Fig. 1) [17, 18].

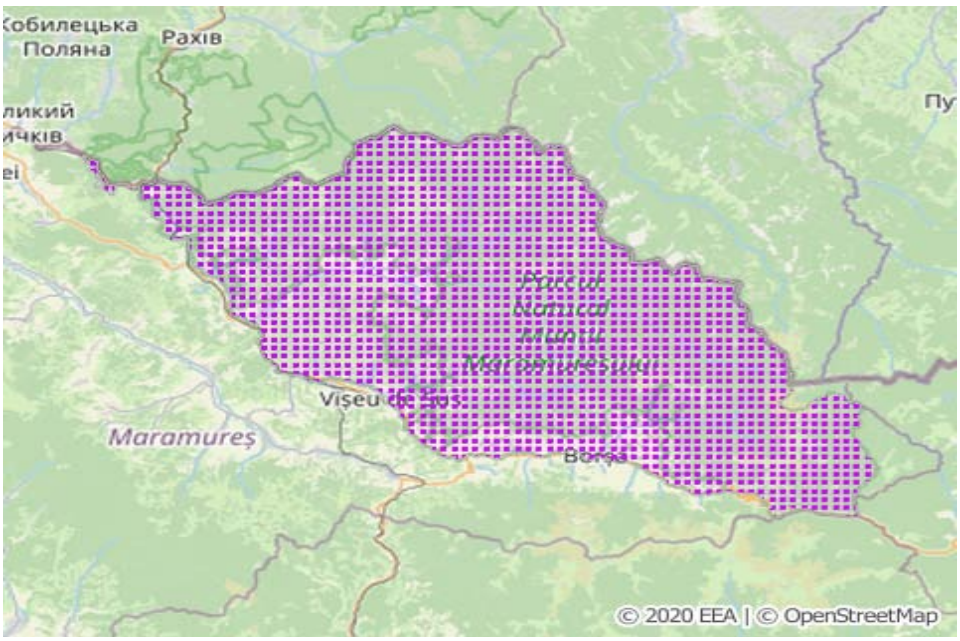

Figure 1: Reference area of the Maramureş Mountains Natural Park [17]

The region is one of the richest biologically in the Northern Hemisphere, ensuring connectivity with Ukraine. In this area, there are species of wildlife such as lynx (*Lynx lynx*), wolf (*Canis lupus*), brown bear (*Ursus arctos*), European mink (*Mustela lutreola*), otter (*Lutra lutra*), as well as special species of mountain flora [12 13].

The main economic activity of the region is the exploitation of wood (with a very limited added value for the local economy), animal husbandry, and, not recently, tourism. The main tourist attractions are Mocăniţa - the steam train on the Vaser Valley, the traditional wooden architecture, the local traditions, and the special landscape. The local communities in the Maramureş Mountains Natural Park are located in the north and east, along the national road and rivers. There are two cities - Vişeul de Sus and Borşa, and 8 communes - Bistra, Leordina, Moisei, Petrova, Poienile de Sub Munte, Ruscova, Repedea, and Vişeu de Jos. the total population within MMNP being 87,580 inhabitants (according to the 2012 census).

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Within the MMNP, several forest habitats (approx. 26) specific to the hill and mountain area were identified and mapped by specialists, including forest ecosystems of both beech and coniferous mixtures, as well as pure or even rare spruce. The forest vegetation covers approximately 65-68% of the PNMM area. Within the Natura 2000 habitats, the largest share in the area included in the habitat type - 9410 Acidophilous spruce forests (*Picea*) from the mountain floor to the alpine one (*Vaccinio-Piceetea*) which sums up several categories of forest habitats.

The MMNP extends in the northern part of the Someş-Tisa hydrographic area. The hydrographic basins with the largest extension in the area of the protected natural area are Vaser, Viseu, and Ruscova. approximately 3.8-4% of the total area of PNMM. At the level of PNMM, within the three specific areas of any protected natural area, respectively ZPI - 17,619.25 ha, ZMD - 75,975.90 ha and ZDD - 40,025.85 ha (see Fig. 2) [19], there are the following categories of aquatic ecosystems:

- Plots (763.1 ha) - permanent and non-permanent watercourses;
- Lentic (24.44 ha) - natural lakes and accumulations;
- Wetlands (4,356.77 ha) - swamps.

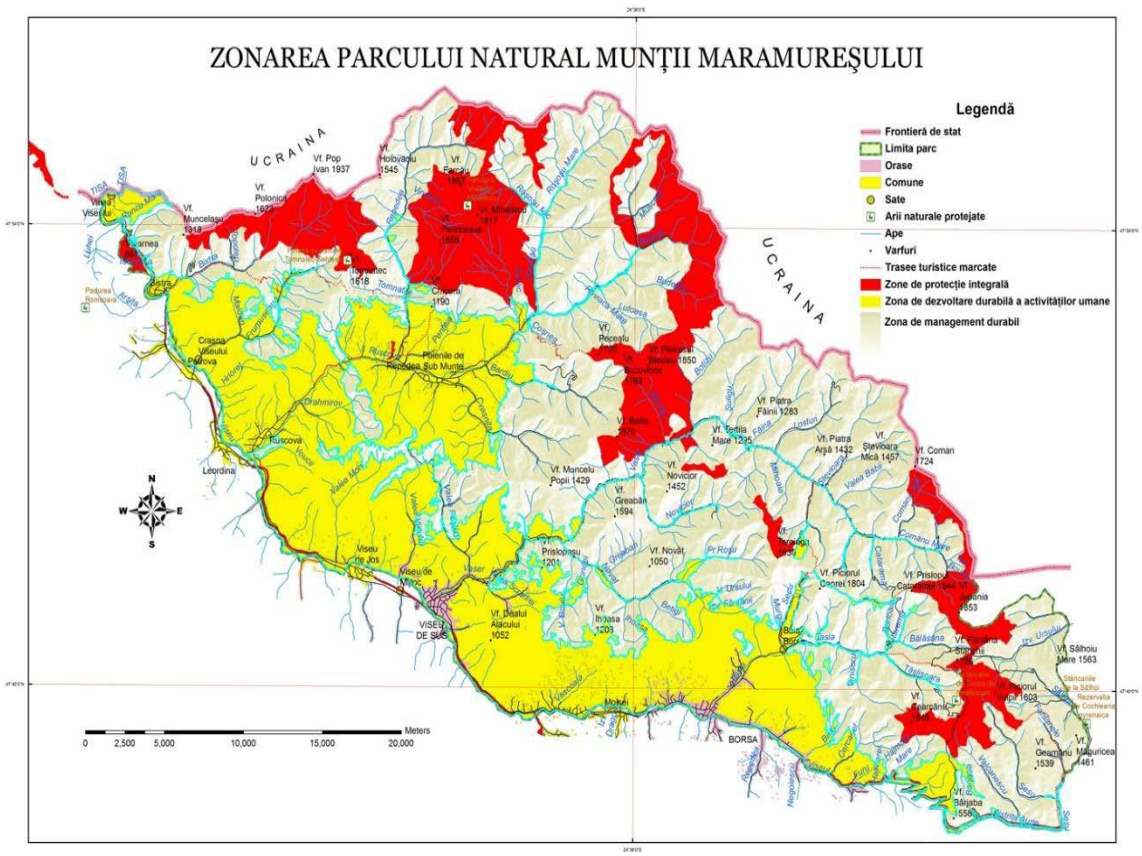

Figure 2: Maramures Mountains Natural Park zoning [19]

In the Maramureş Mountains, the continuity of the lotic systems is naturally interrupted sometimes by waterfalls of significant dimensions: Criva, Tomnatec, and Bardău. In the Vişeu basin, for example, water quality is influenced locally by mineral springs (with a relatively varied composition: bicarbonate, sulfurous, or saline ferrous). The slow aquatic ecosystems in PNMM are less represented, for example, Lutoasa, Bârsânescu, Budescul Mare, Măgurii, Tăul Roşu, and Vinderel lakes. Representative wetlands are the Mejghi, Berescu swamps, the one on Vârtopul Mare, the one below Pietrosul Bardăului, etc.

c) *Evaluation of the contribution of ecosystem services in the MMNP*

Forest and aquatic ecosystems provide services, but they are not quantified and paid for at their true value, so their supply is guaranteed in the long run. Restrictions imposed by the management of protected years to ensure the conservation of natural ecosystems and the provision of ecosystem services are not properly assessed and, consequently, there is no chance of them being paid by the beneficiaries of the services generated.

The forestry sector, where about 50% of Romania's forests are privately owned, is underfunded

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and there are no subsidies or other means of support from the state budget or other funds to manage forests and maintain the role of protection. Besides, there are no compensation schemes for private forest owners in any protected natural area. This is one of the reasons why private owners are reluctant to support the implementation of management measures and very often resort to illegal practices.

The assessment of the services provided by the forest ecosystems in the MMNP pilot area must take into account flood protection services, water supply services, soil erosion control, habitat establishment, and the provision of quiet areas specific to ecological transit corridors, provision of non-timber resources and ease of hunting activities.

About the assessment of the services provided by aquatic ecosystems, this must include production services (water resources used for drinking and local economic activities, mineral water resources, etc.), regulation, and support services (flood control, biodiversity maintenance). and cultural services (the service of recreation and provision of aesthetic resources).

In a participatory manner, a working methodology and a strategy on establishing and calculating compensations for forest owners with restrictions on timber harvesting were developed. Thus, it is desired that those forest owners with protection functions be compensated for the value of the services offered by the forest ecosystems, to maintain the protective functions of the forest. The methodology takes into account the loss of income of the owners, as well as the costs of active management for the forest areas restricted from felling. Similarly, we are working on a strategy that takes into account adequate pricing for the price of water that comes to serve users.

In the pilot area of PNMM, following the ranking of beneficiaries of ecosystem services for the two types of ecosystems according to Table 1, it can be seen that the administrative-territorial units prevail within the structure for forest ecosystem services for flood protection function, followed by hunting associations for the quiet area creation function. Among the aquatic ecosystems, the fish farms, together with the tourists and the administrative-territorial units benefit the most from the supply of the drinking water resource and for economic activities. For these categories of beneficiaries and not only should be followed the payment schemes (grants).

Park administrations (service provider) collect low revenues from visiting fees. The private sector (represented by tour operators, hotels, boarding houses, restaurants, transport companies, and souvenir manufacturers) is the main beneficiary of the ecosystem services provided by the protected area. The private sector is therefore the main stakeholder in getting involved in designing and adopting any possible payment mechanism for ecosystem services, thus keeping their productive potential (protected area) unaltered.

The lack of clear compensatory measures for landowners can also be an incentive for them to continue to use some of the resources (wood, stone, hay, etc.) in an unsustainable manner. This can lead to the degradation of ecosystems, which will negatively affect the supply of tourist services. Inadequate water management can also affect water quality and industry can affect air quality, while uncontrolled infrastructure development can lead to the loss of architectural styles so sought after by tourists.

Table 1: Forest and aquatic ecosystem services and their beneficiaries

Beneficiaries of ecosystem services	Forest ecosystem services	Aquatic ecosystem services
Administrative-territorial units (ATU)	Flood protection Hydrological regularization Erosion control Aesthetic framework Non -wood resources Resources for pharmacology	Drinking water resource Mineral water resource Flood control Recreational resource (tourism)
Road infrastructure companies	Flood protection Erosion control against floods	Flood protection
Insurance companies	Flood protection	Flood protection
Energy sector	Hydrological regularization	Industrial water resource
Water bottling companies	Hydrological regularization	Drinking water resource Mineral water resource
Water dispensers	Hydrological regularization	Drinking water resource
Agricultural holdings	Flood protection Erosion control against floods	Industrial water resource Educational and scientific resource
Educational and research institutions	Educational and scientific resource	Educational and scientific resource
Tourism industry	Aesthetic framework	Drinking water resource

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	Habitat and refuge	Mineral water resource Fish resource Recreational resource (tourism)
Hunters' associations	Aesthetic framework Habitat and refuge Non-wood resources Genetic resources	Maintaining biodiversity Recreational resource (tourism)
Fish farms	-	Industrial water resource Fish resource
Non-timber products companies	Non-wood resources Genetic resources	-
Beekeepers	Habitat and refuge Non-wood resources Genetic resources	-
Pharmaceutical companies	Resources for pharmacology	Drinking water resource

Through this paper, we aimed to identify, describe, analyze and evaluate the services of forest and aquatic ecosystems in the MMNP ecosystem, by using for Romania the recommendations of the European Union, provided in the reports Mapping and Assessment of Ecosystem Services, on meeting the objectives of the EU Biodiversity Strategy.

The results obtained in the work in terms of identified ecosystem services are addressed to national and local public authorities and administrations, scientific communities, non-governmental organizations (NGOs), and the population. The final aim of the paper was to highlight the natural, scientific, recreational, and economic value of wetland ecosystems and the goods and services provided, as well as the role and importance of their sustainable management for biodiversity and socio-economic development of society.

IV. Conclusion and Recommendations

The evaluation of the services provided by the forest and aquatic ecosystems makes an important contribution to the estimation of the total economic value of the services in the area of the different protected areas. The identification, analysis, and valorization of the services provided by each category of the ecosystem cannot be always feasible, because, for certain categories of services, such as cultural ones, the analysis and valorization is performed at the level of the ecosystem complex, and not on each component unit in part. At the same time, economic evaluation (in other words monetary quantification) makes sense from the perspective of quantifying the value of nature to support human activities (the beneficiary principle pays), as well as quantifying the impact of these activities on ecosystems (the polluter pays principle).

In the sense of the above, there are at least two directions for promoting ecosystem services. On the one hand, we are talking about the compensations grant for ecosystem goods and services, and on the other hand, we are talking about the granting of incentive payments (as subsidies) for adopting a behavior that prevents and protects ecosystems.

The "polluter pays" principle is not enough to secure the provision of environmental services in the long run. Therefore, an attempt is made to establish a fair value for environmental services, based on impact and benefits, by applying the "beneficiary pays" principle. To sustainably manage ecosystems in a protected area, an approach that integrates three pillars is needed: legislation - capacity - funding, and in these conditions no legislative framework is useful and effective in the absence of adequate implementation capacity and funding.

The approach we propose is that of shifting from a status of violation of the rules on the protection of ecosystems (forestry and/or aquatic) to a status of stimulating/rewarding practices that ensure the maintenance/restoration of their status. We believe that this forms a package of measures on ecosystem regulation (appropriate legislation), a form of administration and governance, and options for financing payment schemes. Under these conditions, the payments do not serve strictly restrictions or a certain status of ecosystems, but the shift of the behavior of landowners and/or users from actions damaging to natural ecosystems (negative impact) to behavior that sustainably integrates ecological systems. with the socio-economic ones (positive impact).

Competing Interests

Authors have declared that no competing interests exist.

Authors' Contributions

This work was carried out in collaboration between authors. BVC designed the study, performed

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the literature searches, and wrote the first draft of the manuscript. CM managed the analyses of the entire study. All authors read and approved the final manuscript.

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Effect of Ixora Coccinea on Performance Characteristics of American Chinchill a Rabbit

By Lawal S. W, Banjoko I. K, Ahmed S. A & Salami, M. O

Institute of Applied Sciences

Abstract- In an experiment to study the effect of extract of Ixora coccine a on American Chinchilla Rabbit, one hundred and fifty (150) Rabbits were randomly allotted to five treatments with three (3) replicates each per treatments and ten (10) rabbits per treatments in a completely randomized design experiment, the treatments are 1ml, 2ml, 3ml, 4ml and 0ml which is the control and this is administered per liter of drinking water for period of ten (10) weeks, the extract is administered three (3) times a week (Monday, Wednesday and Friday) while the control is 1g/liter of water. Data collected was subjected to variance at 5% and means was separated with Duncan multiple range test. There was a significant difference ($P<0.05$) in with 2ml been the highest weight gain (1400) and in feed intake (93) while the lowest are (801.3) and (59) respectively while the 1ml inclusion level has the best feed to gain ratio.

Keywords: ixora coccinea, plant extract, growth performance, ameriac chinchilla and rabbit 1.0.

GJSFR-D Classification: FOR Code: 070799

Strictly as per the compliance and regulations of:

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Effect of Ixora Coccinea on Performance Characteristics of American Chinchill a Rabbit

Lawal S. W [α], Banjoko I. K [σ], Ahmed S. A [ρ] & Salami, M. O [ω]

Abstract- In an experiment to study the effect of extract of Ixora coccine a on American Chinchilla Rabbit, one hundred and fifty (150) Rabbits were randomly allotted to five treatments with three (3) replicates each per treatments and ten (10) rabbits per treatments in a completely randomized design experiment, the treatments are 1ml, 2ml, 3ml, 4ml and 0ml which is the control and this is administered per liter of drinking water for period of ten (10) weeks, the extract is administered three (3) times a week (Monday, Wednesday and Friday) while the control is 1g/liter of water. Data collected was subjected to variance at 5% and means was separated with Duncan multiple range test. There was a significant difference ($P<0.05$) in with 2ml been the highest weight gain (1400) and in feed intake (93) while the lowest are (801.3) and (59) respectively while the 1ml inclusion level has the best feed to gain ratio.

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I. Introduction

The ever increasing population of Nigeria, Africa and the whole world has brought about farmers to increase their production both in Animal and crop production so as to support the increasing population, so that every Nigerian will be able to take the required minimum protein to avoid malnutrition and lack of food insecurity (Lawal et, al., 2019).

The continuous rise in human population all over the world with annual average of 7 billion has brought an increase in demand for animal protein. The current level of consumption of animal protein is estimated at 7g per caput per day (Lara, Baião, Rocha, Lana, Cançado and Fontes, (2008).

Apart from Poultry, cattle, sheep and goat meat, that are mainly used in supplying the required meat to Nigerian, the use of micron live stock should also be put into use so as to further improve the availability of meat to Nigerians

It is an unfortunate fact that small animals don't have the prestige among third World farmers that large animals do. Even sheep and goats are not accorded the same stature as cattle Hugh (2010), therefore development of family micro live stock farms is regarded as an alternative way to alleviate poverty and ensure food security for socially and economically disadvantaged rural households (Branckaert and Gue'ye, 1999).

Despite the zeal to support the continuous increase in population by expanding the production by farmers, the health of these animals are very important, consumption of only healthy animals will result to healthy nation.

To ensure healthy animals, the normal drugs and vaccine programme for the animals has to be fully followed, to reduce rate of mortality and improve their performance but it has been discovered that the use of antibiotics for birds has a residual effect on the consumers of the meat of the animals, both the FAO and EU has strongly advised against the use of antibiotics and instead the use of herbs as an alternatives is advised by an animal nutritionist. (Murray *et al*., 2001, Ifon and Basir, 1980).

In Africa, there are several herbs that has been suggested by animal nutritionist that can replace antibiotics medically and will even supply some missing nutrients in the feed. (Lawal, W. S 2019).

In this experiment, extract of Ixora Coccine a will be fed to Rabbit and the performance characteristics of rabbit will be study.

a) Objectives

i. Prepare the extract of ixora coccinea.
ii. Feed the extract on the experimental animals.
iii. Study the effect of the extract on their feed intake, weight gain, feed to weight gain.

b) Justification

i. Availability of ixora coccinea almost everywhere.
ii. It could be acquired without any cost.
iii. Ixora coccinea is known for its medicinal value.

II. Material and Methods

Site of Experiment: The experiment will be carried out in Agricultural garden of Agricultural technology department.

Construction of Pen: The rabbit is a social animal and their pen is contrasted as such using iron and making sure there is a living and resting roon.

Sources of Ixora coccinea: The ixora leaves will be harvested around the school garden.

Preparation of ixora extract: This will be done in the laboratory using methanol chemicals.

Author α σ ω: Department of Agricultural Technology, Institute of Applied Sciences, Kwara State Polytechnic.

Author ρ: Department of Science Laboratory Technology, Institute of Applied Sciences, Kwara State, Polytechnic P.M.B. 1375 Ilorin, Kwara State Nigeria. e-mail: awsl2004@gmail.com

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Purchase of Animals: The America Chinchilla Rabbit will be purchase from the Rabbit farm of Ladoke Akintola University, Ogbomoso.

Preparation of feed and fodder: The feed for the experiment will be compounded by buying the feed ingredients, formulate and mill and will be fed only in the morning while the fodder (Tridaxprocubeans) will be served in the afternoon for Rabbit and Grasscutter.

Management of animals: The feeder and drinkers will be washed every morning and fresh feed and water is served ad-libitum, the animals are monitored for their health status. Ixora coccinea will take care of those on treatment while the control will be treated using antibiotics. The ixora coccinea will be added to their drinking water in graded level at 1ml, 2ml, 3ml, 4ml, and 0ml is the control.

Parameters taken: Parameters taken include Feed intake, weight gain, feed to weight gain.

Statistical analysis: All data taken will be subjected to statistically analysis using CRD (Complete randomized design) while the means will be separated using Duncan multiple range.

Conclusion: The discussion will be based on result of the experiment and will be made available.

III. Results and Discussions

Table 3.1: Performance characteristics of America Chinchilla Rabbit fed Ixora coccinea

Parameter	Feed intake	Weight gain	Feed to Weight gain
0ml	60[b]	1256.5[b]	0.13[c]
1ml	59[c]	1142.6[c]	0.06[e]
2ml	93[a]	1400.0[a]	0.19[a]
3ml	59[c]	1095.0[d]	0.05[f]
4ml	59[c]	801.1[e]	0.18[b]
SME	3.04	11.09	0.07

ato e mean within the same column with different superscript are significantly different at (P<0.05)

There was a significant difference (P<0.05) in feed intake with the 2ml inclusion level being the highest while the 4ml inclusion level is the lowest, from first week to third week of the experiment, from first week to end of the experiment, the 3ml inclusion level was the least and the 4ml inclusion level became the highest.

The weight gain shows a significant difference with 2ml inclusion level being the highest (1400g) and 4ml (801.1g) being the lowest. In first and second week of the experiment, there was no significant difference.

Feed to weight gain shows a significant difference (P<0.05) in the first week with 2ml being the lowest and 1ml being the highest, in second week only 4ml shows a significant difference from others and no significant difference occurred between all other inclusion levels. In the third week there was a significant (P<0.05) difference between 4ml,3ml and 1ml but the 0ml (control) and 2ml and this continues till the end of the experiment.

The 2ml inclusion level had the highest value may be as a result of the fact that the value is the right dose for optimum performance, any value above (3ml & 4ml) may just be a waste that will not give the expected return while a lower value will not be enough to give the required perfoermance.

IV. Conclusion and Recommendation

a) Conclusion

i. The value of 2ml of Ixora Coccinean is the required value to give an optimum performance.
ii. The extract should be done in an hygienic condition.
iii. Farmers should use the extract in place of antibiotics and should be used only three (3) times in a week.
iv. Extract alone should be and not be missed with any antibiotics, some farmers will start with antibiotics and will again use extract on same set of birds whenever they are sick.

b) Recommendation

i. Extract should be tried on other types of livestock.
ii. Same concentration of extract should be used throughout the experiment.

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Influence of *Ageratum Conyzoides* Leaf Extract on the Growth Performance and Meat Physical Characteristics of Poultry Birds

By Banjoko I.K, Lawal S.W, Ahmed S.A & Salami, M.O

Institute of Applied Sciences

Abstract- In this study one hundred and five (105) day old each of Cobb broilers and cockerel chicks in two separate studies were allocated to five treatments, 3 replicate per treatment and seven (7) birds per replicate in a complete randomize design. 1mls, 2mls, 3mls, and 4mls of the extract formulation of Ageratum conyzoides was administered per a liter of drinking water to treatment R1, R2, R3, and R4 and 1g/liter antibiotics for the control treatment respectively for three days in a week (Tuesday, Wednesday and Thursday) for five weeks. Broiler and cockerel growth performance and meat physical characteristics were evaluated. Data collected was subjected to analysis of variance (ANOVA) Duncan's Multiple Range Test was computed to compare the difference among the treatment means at probability of 5%. The results revealed that there was no significant effect ($P>0.05$) on the growth performance of broiler and cockerel chicks except for TFI and FCR that performed better ($P<0.05$) with increase in leaf extract.

Keywords: ageratum conyzoides, plant extract, growth performance, physical properties, broiler and cockerel chicks.

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Influence of *Ageratum Conyzoides* Leaf Extract on the Growth Performance and Meat Physical Characteristics of Poultry Birds

Banjoko I.K [α], Lawal S.W [σ], Ahmed S.A [ρ] & Salami, M.O [ω]

Abstract- In this study one hundred and five (105) day old each of Cobb broilers and cockerel chicks in two separate studies were allocated to five treatments, 3 replicate per treatment and seven (7) birds per replicate in a complete randomize design. 1mls, 2mls, 3mls, and 4mls of the extract formulation of Ageratum conyzoides was administered per a liter of drinking water to treatment R1, R2, R3, and R4 and 1g/liter antibiotics for the control treatment respectively for three days in a week (Tuesday, Wednesday and Thursday) for five weeks. Broiler and cockerel growth performance and meat physical characteristics were evaluated. Data collected was subjected to analysis of variance (ANOVA) Duncan's Multiple Range Test was computed to compare the difference among the treatment means at probability of 5%. The results revealed that there was no significant effect ($P>0.05$) on the growth performance of broiler and cockerel chicks except for TFI and FCR that performed better ($P<0.05$) with increase in leaf extract. The meat physical properties for both the broiler and cockerel was affected positively ($P<0.05$) with better performance at increase level of leaf extract. It was concluded that chicks fed 3ml and 4ml leaf extract performed better with better meat physical properties.

Keywords: ageratum conyzoides, plant extract, growth performance, physical properties, broiler and cockerel chicks.

I. Introduction

Poultry production is a source of income, it is a good source of protein and quick returns on investment (Kekocha, 1994). However, the industry in the developing countries is facing some challenges; these challenges include improving bird performance and increase in the cost of feed because of high prices of feed ingredients (Abbas, 2013), and preventing outbreak of diseases. Numerous attempts have been made to overcome these challenges, and one of them involves the use of antibiotics feed promoters.

Antibiotics have revolutionized the human medical world and are still often seed as the magic bullets to target pathogens without harming human body. In last decades the use of antibiotics has been increasingly used in farm animals as well, to treat diseases, to prevent diseases and to promote growth. Despite the improvement the use of antibiotics growth promoters has been criticized due to its possible residual effects and building up of antimicrobial resistance in humans (Barreto*et al*., 2008, Ogbe & John, 2012). The uses of chloramphenicol have resulted into bacteria of the genus Salmonella developing resistance to the drug (Gassner & Wuethrich, 1994). The use of Avilamycin as a growth promoter resulted in an occurrence of avilamycin resistant *Enterococcus faecium* in broiler farms (Aarestrup *et al*., 2000).

The utilization of plants and leave extracts in animal production has found widespread scientific and commercial acceptance as a strategy to reduce or replace totally the over dependence on antibiotics growth promoters and to improve the health status and performance of the animal (Nworgu, 2007). Leave extract also have appetizing and digesting stimulating properties and antimicrobial effects. Leaf and their extracts supply minerals, proteins and vitamins which could complement the inadequacies of most feed stuffs (Ifon and Basir, 1980). Ageratum conyzoides L., Asteraceae, is an annual herbaceous plant with a long history of traditional medicinal uses in several countries of the world as medicinal plant and also has bioactivity with insecticidal and nematocidalacitivity. This tropical species appears to be a valuable agricultural resource (Ming, 1999). A. conyzoides is widely utilized in traditional medicine by various cultures worldwide, although applications vary by region. In Central Africa it is used to treat pneumonia, but the most common use is to cure wounds and burns. Aqueous extracts of leaves or whole plants have been used to treat colic, colds and fevers, diarrhea, rheumatism, spasms, or as a tonic (Negrelle *et al*. 1988; Oliveira *et al*. 1993). Amadi*et al*. (2012) revealed the presence of alkaloids, flavonoids, tannins, saponins, and cyanic acid (HCN) in *Ageratum conyzoides.* Pure isolated alkaloids and their synthetic derivatives have been used as analgesic, antispasmodic and bactericidal agent. Flavonoids according have shown antibacterial, anti-inflammatory, antiallergic, anti-mutagenic, and antiviral, anti-thrombotic and vasodilatory activity (Amadi *et al*., 2012). They also have the ability to scavenge hydroxyl radicals, super oxide anions and lipid peroxy radicals (Okwu, 2004). The

Author α: Department of Science Laboratory Technology, Institute of Applied Sciences Kwara State Polytech P.M.B. 1375 Ilorin, Kwara State Nigeria. e-mail: frome2ukay@yahoo.com

Author σ ρ ω: Department of Agricultural Technology, Institute of Applied Sciences, Kwara State Polytechnic.

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antimicrobial activity of *Ageratum conyzoides* leaf could be due to the abundant presence of alkaloids and flavonoids. Other flavonoid constituents such as aurone, chalcone, flavonoids, flavone, flavonol and leucoanthocyan in of *Ageratum conyzoides* may have aided to the antibacterial activity of the plant. Tannins have astringent properties, hasten the healing of wounds and inflamed mucous membrane (Okwu and Okwu,). Studies have shown that saponins and tannins although nontoxic, can generate adverse physiological responses in animals that consume them and could be attributed to the use of *Ageratum conyzoides* in treating wounds, prevention of blood loss. They exhibit cytotoxic effect and the growth inhibition against a variety of cell making them have anti-inflammatory and anticancer properties. They also show tumour inhibiting activity in animals (Iwu, 1989).

While there have been reports on the efficacy of some leaf extracts on the performance of broilers, providing some protection against bacteria and stimulate the immune system (Craig, 1999), however, data on the effects of A. conyzoides leaf extract on growth performance and meat physical properties of poultry chickens is limited. The objective of this study was, therefore, to determine the effect of A. conyzoides leaf extracts on growth performance and meat physical characteristics of broiler and cockerel chicks.

II. Materials and Methods

a) Plant collection and extraction

The leaves of A. conyzoides was collected from around the Kwara state polytechnic Ilorin, Kwara state, Nigeria. Taxonomic identification of the plant was carried out in the University of Ilorin, faculty of agriculture, Agronomy unit Research and Teaching laboratory. The leaves were wash and dried under shade and later oven dried to 15% moisture content. The oven dried leaves was pulverized with a blender and 25mm mesh diameter sieve was used to obtain the fine dust, 500g of the oven dried leaves was extracted in 2liter 97% ethanol. The extraction lasted for 72hours in a shaker, the extract was concentrated to a paste using rotary evaporator. At the end of the extraction 65.2g leave extract was obtained.

b) Mixing and administration of Ixora root extract

50g of the extract was mixed in 10 percent per volume of DNSO (dimethyl sulphide). That is, 50g in 60mls of DNSO followed by 540mls of distilled water in a jar. The mixture was shaken vigorously until homogenous mixture was obtained.

One hundred and five (105) each of day old broiler and cockerel chick was allocated to five treatments, 3 replicate per treatment and seven (7) birds per replicate. 1mls, 2mls, 3mls, and 4mls of the extract formulation was administered per a liter of drinking water to treatment R1, R2, R3, and R4 respectively for three days in a week, while antibiotic was given at 1gm/liter of water to the control treatment. The administration lasted for five weeks. The birds were given one week withdrawal periods before data were collected.

c) Animal management

Water and feed were provided ad libitum throughout the experimental period. Ventilation and heat were provided and adjusted according to standard broiler management procedure (Oluyemi and Roberts, 2000).

d) Growth Performance characteristics

Total weight gain (TWG) and total feed intake (TFI) was recorded at the end of the experimental trial, the feed conversion ratio (FCR) was calculated from result of weight gain and feed intake.

e) Physical Properties

The birds were fasted over night for 12hours (without feed but with water). Two chicks were randomly selected from each replicates, slaughtered, bled properly, de-feathered, eviscerated to remove the internal organs and the carcass was cut is into primal cut. Meat fillet of equal weight are severed from the breast meat which was used for the physical properties determination.

Cooking loss: meat fillet were weighed tied in a nylon bag and cook in water for 20min at 100°c to an internal temperature at 70°C.

$$\text{Cooking loss} = \frac{\text{weighed before cooking-}}{\text{weight after cooking}} \times 100 \quad \text{Weight before cooking}$$

Thermal shortening: the length of meat fillets were measured prior to cooking and after cooking. The cooked meat was allowed to cool to room temperature and the length measure again.

$$\% \text{ shortening} = \frac{\text{length before cooking-}}{\text{length after cooking}} \times 100 \text{ Length before cooking}$$

Cooking yield: this was obtained by difference between 100% and percentage cooking loss of each meat samples.

Cooking yield =100%-cooking loss

Water holding capacity: 1g of meat sample placed in two filter papers and pressed into two plexi glasses for a minute.

$$\text{W H C} = \text{water area} - \frac{\text{meat area} \times 100}{\text{Water area}}. \quad \text{(Mahendraker}\textit{etal}\text{., 1988).}$$

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f) Statistical analysis

Data generated from this experiment were organized and processed for analysis of variance in completely randomized design (CRD) using (SAS, 1998) Duncan's Multiple Range Test (Duncan's, 1955) was computed to compare the difference among the treatment means at probability of (0.05).

III. Results and Discussion

Table1: Performance Characteristics of Broiler Chicks fed *A. conyzoides* leaf extract

Performance Characteristic	Control (1g antibiotic/L of water)	*A. Conyzoides* leaf extract (ml/L of drinking water)				F_{value}	sig
		R1 (1ml)	R2 (2ml)	R3 (3ml)	R4(4ml)		
TWG	2890.20±9.62	2889.20±1.41	2888.50±33.03	2891.90±22.39	2892.20±12.73	0.006	1.00
TFI	838.30±14.28^{ab}	798.90±39.1^{b}	788.50±21.50^{b}	886.50±9.76^{a}	873.10±12.73^{a}	6.219	0.04
FCR	3.45±0.50^{ab}	3.62±0.18^{a}	3.67±0.04^{a}	3.26±0.07^{b}	3.36±0.04^{b}	5.594	0.04

TWG=total weight gain TFI=total feed intake FCR=feed conversion ratio

Table 2: Performance Characteristics of Cockerel Chicks fed *A. conyzoides* leaf extract

Performance Characteristic	Control (1g antibiotic/L of water)	*A. Conyzoides* leaf extract (ml/L of drinking water)				F_{value}	Sig
		R1 (1ml)	R2 (2ml)	R3 (3ml)	R4(4ml)		
TWG	1151.54±36.77	1153.10±29.7	1200.34±18.69	1159.10±22.63	1141.57±27.15	1.352	0.37
TFI	293.87±29.69	306.02±41.05	355.23±31.36	330.43±41.05	330.43±26.88	0.985	0.49
FCR	3.52±0.50	3.77±0.68	3.79±0.10	3.26±0.13	3.45±0.21	0.752	0.59

TWG=total weight gain TFI=total feed intake FCR=feed conversion ratio

Table 3: Meat Physical Characteristics of Broiler Chicks fed *A. conyzoides* leaf extract

Performance characteristics	Control (1g antibiotic/L of water)	*A. conyzoides* leaf extract (ml/L of drinking water)				F_{value}	Sig
		R1 (1ml)	R2 (2ml)	R3 (3ml)	R4 (4ml)		
Cooking loss	28.57±0.01^{c}	32.32±0.03^{b}	32.60±0.28^{b}	32.53±0.06^{b}	33.33±0.47^{a}	133.87	0.000
Cooking yield	71.43±0.11^{a}	67.68±0.03^{b}	67.40±0.28^{b}	67.43±0.12^{b}	66.67±0.47^{c}	110.37	0.000
Thermal shortening	42.01±1.89^{a}	27.27±0.38^{c}	31.70±0.42^{b}	32.04±0.47^{b}	31.40±0.57^{b}	66.90	0.000
Shrinkage	51.59±1.54^{a}	41.82±1.41^{b}	51.58±0.48^{a}	52.73±1.03^{a}	51.63±0.04^{a}	35.81	0.001
Water holding capacity	43.20±3.11^{b}	27.90±2.83^{c}	55.25±0.14^{a}	54.90±5.66^{a}	55.60±7.07^{a}	14.62	0.007

Table 4: Meat Physical Characteristics of Cockerel Chicks fed *A. conyzoides* leaf extract

Performance characteristics	Control (1g antibiotic/L of water)	*A. conyzoides* leaf extract (ml/L of drinking water)				F_{value}	Sig
		R1 (1ml)	R2 (2ml)	R3 (3ml)	R4 (4ml)		
Cooking loss	29.91±0.01^{a}	22.96±0.06^{b}	22.29±0.13^{b}	22.85±0.07^{b}	22.83±0.04^{b}	928.41	0.000
Cooking yield	70.09±0.14^{b}	77.04±0.98^{a}	77.71±0.10^{a}	77.15±0.01^{a}	77.17±0.14^{a}	94.74	0.000
Thermal shortening	57.15±0.07	57.86±0.08	57.14±0.17	56.99±0.00	57.20±0.21	98.57	0.000
Shrinkage	46.23±0.18^{e}	53.33±0.18^{b}	49.15±0.21^{d}	50.00±0.00^{c}	53.85±0.07^{a}	850.68	0.000
Water holding capacity	58.75±0.06^{b}	67.33±0.14^{a}	68.23±0.16^{a}	66.94±0.06^{a}	67.23±0.33^{a}	107.68	0.000

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IV. Results and Discussion

The results of growth performance characteristics of broiler and cockerel chicks fed extract of *Ageratum conyzoides* were presented in table 1 and 2 respectively. The growth performance characteristics evaluated for includes total weight gain (TWG), total feed intake (TFI) and feed conversion ratio (FCR). There was no significant effect (P>0.05) on the total weight gain of broilers fed *A. conyzoides* compared to control treatment. While addition of the extract had effects (P>0.05) on the total feed intake and feed conversion ratio. An increasing trend was observed in feed intake and feed conversion with an increase level of *A. conyzoides* extract, treatment R4 and R3 performed better than R2, R2 and the control respectively. The extract has no effect (P>0.05) on the growth performance (TWG, TFI and FCR) of cockerel chicks. The results of this study is in accordance with Sarag *et al.* (2012) who achieved highest body weight gain, feed consumption and feed conversion ratio as compared to the control treatment when offered Neem leaf extract to broiler from week one to week five of age. Almagboul *et al.* (1985) using methanolic extract of *A. conyzoides* reported the inhibitory action in the development of *Streptococusaureus, Bacillus subtilis, Eschericichia coli* and *Pseudomonas aeruginosa*. The inhibitory effect might have modify the gut performance thereby, improving performance of the birds. Kumara *etla*. (2007) reported a significant increase in the performance of broilers fed with turmeric powder which support the result obtained in this study. The better performance in broiler and cockerel fed *A. conyzoides* extract could be due to its diversified effect on intestinal micro flora, thereby avoiding stressful conditions. Onyimonyi *et al*. (2007) reported the performance of birds supplemented with papaya showed significant better results compared to control treatment.

There was significant effect *A. conyzoides* leaf extract on physical characteristics of broiler chicks. The cooking loss performed better in treatment R4 compared to treatment R3, R2 and R1, while it was low in the control group. The thermal shortening is low in the treatments which are better compared to the control. The water holding capacity and meat shrinkage was high in treatment R4, R3 and R2 compared to R1. The meat of cockerel was differently affected, the cooking loss was low in all *A. conyzoide* streatment, given the meat a retention and firmness toward heat treatment compared to control treatment. The cooking yield was inversely affected with all *A. conyzoide* streatments yielding better than the control. The thermal shortening of cockerel meat was not affected. The leaf extract affected shrinkage and water holding capacity positively, showing better shrinkage and better water retention capacity than the control. Report have shown that *A. conyzoides* shows the presence of protein noted for repair and replacement of worn out tissues, connective tissues and collagens (Onwuka, 2005). This might have resorted in the better performance of meat from both the broiler and cockerels used in this study. The amino acid profile of *A. conyzoides* leaf extract has shown to contains glycine which is important in the manufacture of haemoglob in and cytochromes, prolineis which aids in the formation of connective tissues and heart muscle, cysteine which contributes to tissue antioxidant actions, leucine plays a role in reduction of muscle protein breakdown and lysine which enables muscle tissues to use oxygen more efficiently hence delay fatigue (Amadi *et al*., 2012). These attributes of *A. conyzoides* might have contributed to the uniqueness of meat from broiler and cockerel chicks.

V. Conclusion

The inclusion of *A. conyzoides* leaf extract in drinking water has been effective in the growth performance and meat physical characteristics of broiler and cockerel chicks. However, treatment R3 and R4 with 3ml and 4ml inclusion level respectively performed better in the study. Further researches are essential to assess the medicinal, pharmaceutical activity and nutritional assay of animal fed *A. conyzoides* extract.

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Response of Jute Mallow (*Corchorus Olitorus*) to Varying Levels of Cow Dung and NPK Application

By Oyewole, Charles Iledun & Otene, Ojimaojo Eunice
Kogi State University

Abstract- The experiment was conducted in the raining seasons of 2016 and 2017 at the Kogi State University Teaching and Research farm to evaluate the effect of cow dung and mineral NPK (15:15:15) on the growth and yield performance of Corchorusolitorius The experiment, a 2*4 Factorial Experiment with four replications consisted of two nutrient sources (Organic and inorganic) as well as four levels of cow dung (0 ton/ha, 2 ton/ha, 4 ton/ha and 6 ton/ha) and four levels of mineral fertilizers NPK 15-15-15 (0 kg/ha, 50 kg/ha, 100 kg/ha, and150 kg/ha). The seeds were immersed in hot water at 97 oC for 10 seconds and then allowed to dry overnight before direct seeding on flat top ridges. Generally results obtained showed significant ($P \leq 0.05$) response of Corchorusolitorius to increasing rates of either cow dung or NPK 15:15:15 for plant height, leaf number, stem girth, number of branches, number of pods, pod weight per plant and total leaf harvest, compared to the control.

Keywords: growth, development; number of branches; number of pods; leaf harvest and yield.

GJSFR-D Classification: FOR Code: 860799

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Oyewole, Charles Iledun [α] & Otene, Ojimaojo Eunice [σ]

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Keywords: growth, development; number of branches; number of pods; leaf harvest and yield.

I. Introduction

In Nigeria the use of inorganic or organic fertilizer is still a must since land productivity is limited and the demand for higher production is pressing, considering the increasing population. Though nutrient elements have specific functions in crop growth and development and yield, however no single element can produce any meaningful changes in plant growth [1, 2].

Plant requirements for different elements supplied in fertilizers which are needed for growth, development and yield differ thus there is the need to investigate the effect of the different levels of these nutrients on farmer's intended goal(s). It should be noted that farmers have different objectives for raising specific crops, and these objectives may change with demands. Thus soil fertility and plant nutrition are important aspect of cropping systems and these include adequate supply of essential nutrients for soil productivity, plant nutrition and qualitative crop yield [2, 3, 4, 5, 6 and 7].

Generally, indigenous leafy vegetables are important in human diets [8] either as valuable sources human nutrients or as traditional medicine in many developing countries. Indigenous leafy vegetables (Jute mallow, Amaranthus, Fluted pumpkin, Waterleaf and Tomatoes) play critical roles in the livelihoods of rural communities especially during times of famine because they are the only alternative sources of medicine, nutrition and cash income [9]. Any operation that will positively affect the growth of these crops will impact positively on the living conditions of these rural communities.

Corchorusolitorius called Jews mallow or Jute mallow is an annual herb with slender stem and an important green leafy vegetable in many countries including Egypt, Sudan, India, Bangladesh, Malaysia, Japan, the Caribbean, Western Nigeria and as well as Cyprus [10].It is consumed as a health vegetable because it contains abundant carotene and other carotenoids, vitamins B1, B2, C, E and minerals with varying proportions of dietary fibre and protein [11, 12].

In West African countries including Ghana, Nigeria and Sierra Leone, the vegetable is cultivated for the stem bark which is used in the production of fibre (Jute) and for its mucilaginous leaves which are also used as food vegetables [13]. The leaves contains anti oxidative phenolic compounds and ionone glycosides have also been isolated from the leaves; they showed inhibitory activity on histamine release from rat peritoneal exudates cells induced by antigen antibody reactions. The seeds are poisonous to mammals and insects and contain cardiac glycoside [13] – this is of medical relevance.

This study therefore, will help to generate data on the response of jute mallow to different levels of organic and inorganic fertilizers; as fertilizations of this often viewed minor leafy vegetable are not common among farmers' plots. The research therefore seeks to:

i. Evaluate effect of organic fertilizer on the growth and development of *Corchorusolitorius*;
ii. Evaluatethe effect of inorganic fertilizer on the growth and development of *Corchorusolitorius*;
iii. Evaluate effect of organic fertilizer on the yield (leaf and seed) of *Corchorusolitorius*, and.

Author α: Department of Crop Production, Kogi State University, P. M. B. 1008, Anyigba, Kogi State, Nigeria. e-mails: oyewole.ci@ksu.edu.ng, oyewolecharles@yahoo.com

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iv. Evaluate the effect of inorganic fertilizer on the yield (leaf and seed) of *Corchorusolitorius.*

II. Materials and Methods

The experiment was conducted in the raining seasons of 2016 and 2017 at the Kogi State University Teaching and Research farm to evaluate effect of cow dung and mineral NPK (15:15:15) on the performance of *Corchorusolitorius*. The experiment, a 2*4 Factorial trial with four replications consisted of two nutrient sources (cow dung and NPK 15:15:15) both at four levels: cow dung (0 ton/ha, 2 ton/ha, 4 ton/ha and 6 ton/ha) and NPK 15:15:15 (0 kg/ha, 50 kg/ha, 100 kg/ha, and150 kg/ha) replicated four times.

NPK 15:15:15 fertilizer was applied at seed sowing, while for those plots requiring organic treatment, cow dung was mixed thoroughly with the soil two weeks before seed sowing to allow for proper decomposition and mineralization.

The seeds of *Corchorusolitorius* were a local variety obtained from the Agricultural Development Project (ADP) office Anyigba, Kogi State, Nigeria. Prior to seed sowing, the seeds were immersed in hot water at 97 °C for 10 seconds and then allowed to dry overnight before direct seeding onto flat top ridges. Weeding was manually carried out using hoes complemented with by hand pulling. Data collected include:

i. Number of leaves was determined by physical counting of leaves on sampled plants;
ii. Leaf area was determined using regression equation as described by Salau *et al*. [14];
iii. Plant height was determined by measuring the plant from the ground level to the top most point of the plant as described by Farnham [15].
iv. Number of branches was determined by physical counting the number of branches on each plant.
v. Freshleaf weight [16] was determined by weighing each of the harve sted leaves/plant using an electronic weighing balance.
vi. Number of fruit yield was determined by counting the number of fruits per plant from sampled population.

III. Results and Discussion

The soil analysis is an indication that the soil of the experimental site is critically limited by various macro nutrients N, P and K, based on the critical levels of these elements required for optimum crop production in Nigeria [17]. The soil textural class was sandy loam with 84.36 % sand, 14.64% clay and 1.00% silt. It contains 0.016 % total N, 1.28 mol/kg value for K while available P was 5.19 mg/kg. (Table 1).The cow dung was analysed for its P^H, organic matter and nutrient element composition. Details are as shown on table 2 below. Of the macro nutrients required for crop growth, P constitute 1.74 %, K was 1.01 %, while N constitute 1.46 %. Total amount of N, P and K added by the addition of 0, 2, 4 and 6 t/ha of cow dung is contained on table 2.1 below.

Table 1: Results of Soil Analysis

Soil properties	Value	Units
Clay	14.64	%
Silt	1.00	%
Sand	84.36	%
Textural class	Sandy Loam	-
P^H	5.8	-
Organic carbon	0.31	-
Available phosphorus	5.19	%
Total nitrogen	0.016	mg/kg
Calcium (Ca)	3.68	mg/kg
Magnesium (Mg)	1.62	Cmol/kg
Potassium (K)	1.28	Cmol/kg
Sodium (Na)	0.58	Cmol/kg
Exchangeable acidity	1.19	Cmol/kg
Total Exchangeable bases	7.16	Cmol/kg
Effective Cation Exchange Capacity	9.07	Cmol/kg

Table 2: Result of Cow Dung Analysis

Nutrient	Compoition
P^H	7.30
Nitrogen	1.46%
Potassium (K)	1.01%

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Phosphorus	1.74%
Magnesium (Mg)	6.75 mg/kg
Sodium (Na)	2.30 mg/kg
Calcium	2.30 mg/kg

Table 2.1: Nutrient addition with the incorporation of Cow Dung

Nutrient % composition	Cow dung t/ha			
	0	2	4	6
Nitrogen (1.46 %)	0	29.2 kg/ha	58.4 kg/ha	87.6 kg/ha
Phosphorus (1.74 %)	0	34.8 kg/ha	69.6 kg/ha	104.4 kg/ha
Potassium (K) (1.01 %)	0	20.2 kg/ha	40.4 kg/ha	60.6 kg/ha

Plant heights as well as number of branches responded significantly ($p \leq 0.05$) to nutrient additions (Table 3). Additions of plant nutrients regardless of nutrient source led to incremental height and branch responses. Thus the least performances were consistently observed in the control treatment while addition of cow dung at 6 t/ha, or NPK 15:15:15 at 150 kg/ha consistently gave the highest height and branch responses. At 8 WAP plots treated to cow dung manure consistently performed better that those treated to NPK fertilizers for each nutrient additions.

The positive proportional relationships between plant heights, crop branching in jute mallow in response to incremental nutrient additions are in line with observations made by Ayoola and Adeniyan [18] on that performance of okra, soybean, jute mallow, cassava, tomato and melon under cow dung manure. Makinde *et al*. [19] had also observed that the most satisfactory method of increasing yield was by application of organic manure. While Dart *et al.* [20] observed that applying NPK 15:15:15 fertilizer had relatively greater effects on vegetative growth than on seed or pods production.

Table 3: Effect of varying levels of cow dung and NPK 15:15:15 on plant height and branching in jute mallow

Nutrient source	Mean plant height (cm)			Mean number of Branches		
	4WAP	6 WAP	8WAP	4 WAP	6 WAP	8 WAP
Organic Manure						
0t/ha	7.81	17.58	45.50	3.75	7.00	14.00
2t/ha	31.38	63.43	100.20	12.25	15.50	21.00
4t/ha	53.40	68.75	106.90	13.50	18.50	22.75
6t/ha	66.38	106.85	124.86	15.75	19.75	23.50
Inorganic manure						
0 kg/ha	9.70	11.33	27.75	4.00	5.00	14.50
50 kg/ha	11.39	25.03	63.03	4.25	7.75	16.75
100 kg/ha	11.16	30.68	80.03	5.50	9.00	16.50
150 kg/ha	11.07	49.53	84.15	7.50	10.25	17.25
Cv (%)	6.89	19.81	4.04	27.53	9.44	18.56
LSD	Ns	8.900*	3.97*	2.210*	Ns	2.450*

*Ns -Not significantly different at 5% level of probability; *- Significantly different at 5% level of probability.*

Number of leaves as well as leaf area responded significantly ($p \leq 0.05$) to nutrient additions (Table 4) at 2, 4, 6 and 8 WAP. Similar to responses of plant height and branching to nutrient additions (Table 3), increasing plant nutrients regardless of nutrient source led to incremental leaf number and leaf area responses, with the control treatment consistently giving the least response while addition of cow dung at 6 t/ha, or NPK 15:15:15 at 150 kg/ha consistently gave the highest responses. At 8 WAP plots treated to cow dung manure also consistently performed better that those treated to NPK fertilizers for each nutrient additions in respect of these parameters. The positive responses in number of leaves and leaf areas obtained in this trial could have resulted from the previously observed height increases and branching with increasing fertilization (Table 3). Increasing leaf number must have impacted on leaf areas.

Table 4: Effect of varying levels of cow dung and NPK 15:15:15 on number of leaves and leaf area in jute mallow

Nutrient source	Mean number of leaves			Mean leaf Area		
	4 WAP	6 WAP	8 WAP	4WAP	6 WAP	8WAP
Organic Manure						
0t/ha	45.00	26.00	37.00	11.58	20.70	22.75
2t/ha	158.00	110.50	126.50	71.88	80.90	80.90
4t/ha	354.00	135.75	177.00	95.65	105.75	105.88

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6t/ha	503.00	217.50	240.75	112.30	125.82	125.95
Inorganic manure						
0 kg/ha	8.00	14.00	199.00	10.40	7.13	7.85
50 kg/ha	13.75	51.50	103.50	28.35	34.85	34.90
100 kg/ha	16.67	64.75	113.50	31.85	108.98	108.98
150 kg/ha	19.75	88.50	119.25	43.98	136.05	136.05
Cv (%)	22.6	8.11	5.17	21.17	7.85	6.94
LSD	5.080*	6.040*	9.010*	9.36*	9.05*	7.69*

*Ns - Not significantly different at 5% level of probability; *- Significantly different at 5% level of probability.*

That cow dung manure performed better that NPK 15:15:15 could be due to the fact that cow dung supplied micronutrients such as magnesium, sodium and calcium which are essential for jute mallow growth and yield [21, 22].In addition, organic manure improves cohesiveness of the soil, increases its water retention capacity and promotes a stable structure of the soil which could have brought about better performance in comparison with NPK 15:15:15 [23]. In line with the observation Agele [24] also found that organic manure litters resulted in better growth and yield of vegetable crops than NPK fertilizer alone.

Although Dart *et al.* [20]had observed that applying NPK 15:15:15 fertilizer had relatively greater effects on vegetative growth than on seed or pods production, however number of pods, fresh pods weight and dry pods weight also responded significant to increasing nutrient additions (Table 5). Plots treated to cow dung did better than those treated to NPK 15:15:15 in regard to pod yield in jute mallow.

Table 5: Effect of varying levels of cow dung and NPK 15:15:15 on yield of jute mallow

Nutrient source	Pods yield / plant (g)		
	No. of pods	Fresh podswt.	Dry pod wt.
Organic Manure			
0t/ha	22.50	29.98	8.11
2t/ha	36.25	66.60	24.65
4t/ha	50.25	68.18	24.15
6t/ha	69.14	151.03	24.88
Inorganic manure			
0 kg/ha	5.25	29.38	7.74
50 kg/ha	11.00	44.28	12.05
100 kg/ha	17.00	66.78	11.93
150 kg/ha	9.00	96.89	21.80
Cv (%)	11.20	8.62	31.11
LSD	1.82	7.88	6.41

*Ns - Not significantly different at 5% level of probability; *- Significantly different at 5% level of probability.*

IV. Conclusion

In this study, jute mallow performed better in terms of growth and yield under cow dung manure treatment in comparison with NPK 15:15:15. This could be attributed to increase nutrient use efficiency or could be due to the fact that cow dung, as any organic manure supplies other micronutrients such as magnesium, sodium and calcium which are essential for jute mallow growth and yield, as against NPK, which basically supplies nitrogen, phosphorus and potassium.

Increasing nutrient supply irrespective of nutrient source led to reciprocate increase in growth and yield responses. Thus application of cow dung manure at the rate 6t/ha gave the highest yield for all the growth and yield characters such as: number of leaves, number of branches, plant height, leaf area and number of pods, fresh weight of plant, as well as dry weight of plant. While for the NPK treatment the best responses where always gotten from the application of 150 kg NPK 15:15:15/ha.

Clearly plant growth was generally enhanced by organic manureor NPK fertilizer across the parameters investigated. Thus higher rates of nutrient addition is recommended for jute mallow production.

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1. Substantial contributions to the conception and acquisition of data, analysis, and interpretation of findings.
2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

Copyright

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Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for Writing a Good Quality Science Frontier Research Paper

Techniques for writing a good quality Science Frontier Research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of science frontier then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

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Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

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Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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