Life Science Informatics Publications

Research Journal of Life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences

Journal Home page http://www.rjlbpcs.com/

RJLBPCS

ISSN 2454-6348

Original Research Article **DOI:10.26479/2019.0501.74**

COMPETENCIES NEEDED BY FARMERS IN FORAGE CROP PRODUCTION AND MANAGEMENT FOR SUSTAINABLE DEVELOPMENT IN BENUE STATE

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ABSTRACT: The paper was designed to examine the Competencies needed by farmers in forage Production and Management for sustainable development in Benue State. Three research questions guided the study. Three null hypotheses were formulated and tested at 0.05 level of significance. A total of four hundred and forty one (441) respondents consisting of four hundred and seven (407) Farmers and thirty four (34) Agricultural Extension Agents were used for the study. Questionnaire consisting of thirty nine (39) items were used to elicit information from the respondents. The questionnaire was validated by two experts from the Department of Range Management, University of Agriculture Makurdi. The data collected were analyzed using Mean and standard deviation while t-test was used to test null hypotheses. The paper identified constraints such as soil testing, nutrient management, Fertilization, alternative watering, drainage, pest/diseases control, equipment use among others as areas needed by farmers for sustainable forage establishment. Recommendations were made on the basis of the findings.

KEYWORDS: Sustainable Development, Farmers, Competency, Forage production and Management.

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1. INTRODUCTION

In [1] commission published its report, *our Common Future*, in an attempt to link the issue of economic development and environmental stability. In doing so, the report provided the oft-cited definition of sustainable development as development that meets the needs of the people without compromising the ability of future generation to meet their own needs [2]. Sustainability in relation

to forage production and management are series of principles, official norms and technological recommendations in the process of planting to harvesting and transporting of forage product that aim toward animal health and protection of the environment, to improve the situation of farmers, their families and the public [3]. In this context, sustainability eludes development from the angle of site selection, planting, processes, water management, fodder production and protection, soil conservation techniques, animal husbandry for the wellbeing and safety of farmers and their environment. A farmer is a person engaged in agriculture, raising living organisms for food or raw materials for industries. The term usually applies to people who do some combination of raising field crops, orchards, vineyard and livestock. A farmer might own the farm land or might work as a laborer on the farm land owned by others. A farmer in the view of Michael [4] is someone who is involved in agricultural production and management of the entire crop or animals. In the context of this study, a farmer is one who engages in agricultural practices such as grasses production, management and rearing of animals while protecting the environment. For this reason, livestock production could match the feed requirement of grazing livestock to the amount of forage growing on the field for a giving period of time as this would provide them with significant number of benefits. To accomplish this, farmers need to focus on field and forages growing in them. Well managed grass forage is one of the most effective and high value feed that can be produced and utilized. Therefore, should enlist the aid of agricultural professionals and forage owners with experience and competency in grass species to ensure a good match between forage species and site. Competency in the view of Spava [5], is the standardized requirement for an individual to properly perform a job, it encompasses a combination of knowledge, skills and attitude to improve performance. Competency in forage production and management are those knowledge, Skills and attitude required by farmers for successful establishment of introduced or native forages for sustainable development. Forage crops are a wide range of annual and perennial grasses and legumes grown for pasture (freshly cut grasses), hay (dried), ensilage (silage or hay) in support of various livestock commodities such as dairy, beef, and sheep [6]. Major species include alfafa; red and white clover; timothy; orchard grass; tall fescue; corn; and the cereals wheat, barley and oats. Forage producers use farm equipment such as tractors, trucks, manure spreaders, harvesters and farm buildings such as barns, hay sheds and silos [6]. [7] noted that the goal of forage production is to produce grasses with the level of nutrient required for the kind and class of livestock in the herd at the least cost and in an environmentally sustainable manner. Although not a complicated issue, it is the critical component of livestock production that is the least understood in the study area. An additional goal of forage production, whether with introduced or native species, is to maintain adequate ground cover and plant vigor, reduce the incidence of weed infestation, and maintains or improves environmental parameters such as water and air quality to reduce top soil loss due to erosion. Adequate understanding of the soil-plant-animals interaction is necessary to achieve these

production and environmental goals. [8] Posited that sound forage establishment and management practices are critical to realizing a profit in hay and/ forage based livestock production. It is critical for managers to understand that there are fundamental differences in managing introduced and native forages. Native plants communities known as rangeland dominate the arid region while the use of introduced forages require appropriate grazing management, fertilizer input and more frequent use of herbicides, good grazing management, represents the management strategies use on rangeland[9]. The information contained in this publication is designed to improve the potential for success of forage production and management for both introduced species and rangeland. Although these systems typically compromise introduced species, forages consisting of restored native species may provide complementary attribute extending the year round production of high quality forage and enhancing the value of the forage system for wildlife livestock production.

Land husbandry and establishment: Not all forage species grow well on every type of soil or in all parts of every region. The person in charge of establishment should determine whether or not the forage species under consideration is adapted to the site. A few helpful tips to establishing forage are mentioned at this juncture.

Soil testing: First, producers can learn a great deal about the forage potentials by obtaining soil data, soil should be tested in poorer forage site or in forages that you plan to reseed to determine if your PH is out of balance or if you are short on any nutrient. If this is available can provide first hand information regarding the types of species that may or may not be successfully grown on the site. A second recommendation is to identify those areas that may prove to be potential problem site. Certain areas are prone to floating and may not be suitable for a dry meadow or for a winter forage. Wet areas could prevent hay harvest at the appropriate time and weed forage may be greater due to a continued influx of weed seed from area upstream. Likewise water logged areas are not good for cattle to spend the winter. Conversely, an area that is particularly droughty may also be a poor location [10].

Time of Planting: Although warm-seasoned forage are generally planted in the late winter to early spring and cool-season forages in late-summer, late fall and early winter, however, circumstances beyond the managers control may cause the window of opportunities for planting to be shortened. Therefore, the need for good planning and preparation beforehand is critical [11]. The author noted that seeded preparation usually requires the most time and generally depends on a certain level of moisture to adequately work the soil. Sometimes, the seed bed is ready to be worked, but the breakdown of the tractor or tillage equipment may delay the process. Some producers have gotten to the point of planting seed, but found out much to their dismay that the seed the wanted was not available or cost more than they were willing to spend. therefore, producers anticipating forage establishment should plan well in advance. The secret is to be aware of potential problems that might prevent planting at the time and deal with those issues beforehand. Best management practices are

land management strategies that prevent or reduce the movement of sediment, nutrient, pesticides and other pollutants from the land to surface or ground water. They are designed to prevent water quality from potential adverse effect of land management practices from all location within watershed. Best management practices include, soil and water conservation practices, other management techniques and social actions developed for a particular region as effective and practical tools for environmental protection [12]. The focus of this study is the production and management of grazing land in such a way to impact water quality and pasture reserves in a positive manner. The primary reason to consider in best management practices is that their implementation will help conserve and protect soil, water and air resources for generation to come. Another reason to use management practices on your farm is that many of them are free and/cost effective. Example, soil sampling is free and can save money by preventing over application of nutrients input just by knowing the nutrient content of your soil and recommended fertilizer rate for each individual forage site [13]. Legume establishment in forages allows nitrogen to be fixed in the soil and can reduce your nitrogen fertilization needs. In addition, reducing nitrogen input in your forage legumes also increases the forage quality of your pasture-forage mix [14]. [15] Concluded that if livestock producers could match the feed requirements of grazing livestock to the amount of forage growing in a field for given period of time, it would provide them with a significant number of benefits. To accomplish this, farmers need to focus on fields and forages growing in them, they need to think of their forage as their crop and livestock as means to harvest and add value to that crop, as this would reduce the hydra-headed impediment in forage production having in mind, environmental sustainability in the study area.

2. MATERIALS AND METHODS

The study was conducted using survey research design. Survey research design in the view of [16] is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be the representative sample of the population. The study area is Benue State with a population of 2071, made up of 2037 Farmers and 34 Agricultural Extension Agents in Benue State. Proportionate stratified random sampling technique was utilized to obtain twenty percent (20%) sample for the Farmers (407), the entire population of (34) Agricultural Extension Agents was used because of the small size making a total number of (441). Proportionate stratified sampling according to [17], is the process of selecting a sample based on certain percentages/ratio to ensure that certain sub-groups in the population are adequately represented in the sample. The Instrument for Data Collection is a 39 structured questionnaire items developed from literature reviewed with a four point response scale assigned a weigh value of highly needed (4) averagely needed (3) slightly needed (2) and not needed (1) respectively. The instrument was validated by two experts from the Department of Range Management, University of Agriculture Makurdi. Cronbach alpha reliability method was used for determining the internal consistency of

the instrument and a reliability of 0.95 w as obtained.

Method of data collection and analysis

Four hundred and forty one (441) questionnaires were administered with the help of three research assistants. Weighted mean and standard deviation were used to analyze research questions while t-test was used to test the null hypotheses at 0.05 level of significance. The value of the arithmetic mean of the response scale was 2.50. This means (2.50) was used as cut off point for decision making. Any item whose weighted mean was 2.50 and above was regarded as competency needed by farmers in forage production and management.

3. RESULTS AND DISCUSSION

Research question 1 What are the competences needed by farmers in planning for forage establishment?

Table 1: mean ratings and t-test analysis on competencies needed by farmers and extension agents in planning for forage establishment

S/N	Planning for Forage establishment	$\bar{X}_1$	$\bar{X}_2$	SD_1	SD_2	t-cal	Decision
1	Decide on the forage species based on system requirement and adaptability	4.00	3.10	0.50	0.42	0.49	NS
2	Select the appropriate site for forage establishment based on forage species need	3.00	4.06	0.55	0.57	0.43	NS
3	Obtain soil samples from the site and have them tested.	4.02	3.00	0.40	0.54	0.58	NS
4	Inquire as to availability of seed and seed cost	4.03	3.23	0.40	0.32	0.48	NS
5	Locate equipment that will be needed for establishment well in advance	3.02	4.20	0.92	0.40	0.44	NS
6	Begin seedbed preparation in anticipation of planting	3.02	4.22	0.40	0.44	0.36	NS
7	Incorporate P,K, and /or lime to correct deficiencies in soil PH based on soil test recommendation	3.16	4.00	0.36	0.40	-0.64	S
8	Plant good quality seed at the proper rate to the proper dept.	3.50	3.50	3.53	0.83	-0.10	S
9	In-most case top-dress with N following the germination of grass seedlings	3.50	4.24	0.40	0.52	-0.68	S
10	Be alert for pest such as insect or weeds that may reqire pesticide application	3.26	4.00	0.96	0.80	0.44	NS

Table 1: Reviewed that all the ten (10) items in planning for forage production by Farmers and Agricultural Extension Workers had their mean values ranged from 3.00-4.24, indicating that the ten (10) items were needed by farmers in planning for forage crop production. The table also showed that the standard deviation of the items ranged from 0.36-0.96, indicating that the respondents were not too far from the mean and from one another in their opinion. The table also reviewed that nine (7) items out of ten (10) had their t-cal value greater than the table value at 0.05 level of significance, this indicates that there is no significant difference in the ratings of the responses of Farmers and Agricultural Extension Agents in planning for forage production in Benue State.

Research question 2 what are the competencies needed by farmers in forage production?

Table 2: mean ratings and t-test analysis on competencies needed by farmers and extension agents in forage production

S/no	**Forage establishment**	$\bar{X}_1$	$\bar{X}_2$	**SD₁**	**SD₂**	t-test	Dec.
11	Land use to grow pasture require cultivation every year	3.03	2.65	0.77	0.35	0.90	NS
12	There is generation of dust during cultivation in drier conditions	4.00	2.84	0.82	0.62	1.33	NS
13	Equipment needs to be operated early in the morning and at night	3.00	3.28	0.21	0.71	1.02	NS
14	Calm days should be used to spread Dust materials such as lime	3.12	3.20	0.71	0.63	0.53	NS
15	Forage farmers use equipments such as tractors, trucks, manure spreader and harvester	3.00	2.76	0.30	0.16	0.17	NS
16	Irrigation equipment are useful in drier region	3.54	3.34	0.68	0.48	0.98	NS
17	Growers use manure or fertilizer to improve yield	2.98	3.00	0.72	0.52	1.21	NS
18	Barns, hayshed ,and silos are needed as farm buildings in pasture growing	3.14	3.50	0.70	0.86	0.61	NS
19	Application of nutrient is during work hours	3.15	3.13	0.68	0.62	1.01	NS
20	The most common operation is the application of herbicide to control weed	3.42	3.60	0.72	0.95	0.84	NS
21	Timing of pesticide application is often critical to success	3.11	4.11	0.70	0.98	0.59	NS
22	Drainage and irrigation are critical component of	3.81	3.21	0.68	0.10	0.84	NS

	forage operation						
23	Excess irrigation in coarse soil may result in drainage problems.	3.07	3.05	1.05	0.78	0.94	NS
24	Special attention is needed when cutting, drying and storing forage to maintain nutrient	3.56	3.30	0.60	0.73	0.46	NS
25	Reseed pasture to balance plant growth, animal need and soil condition.	2.75	2.75	0.42	0.62	0.72	NS
26	Plant cool-season forage in late summer to late fall and early winter	2.80	2.56	0.84	0.91	1.20	NS
27	Plant warm-season forage in late winter to early spring	2.80	2.59	0.80	0.90	1.25	NS

Table 2: reviewed that all the seventeen (17) items on forage establishment had their mean values ranged from 2.75-4.11, this showed that the means were above the cut-off point of 2.50, indicating that all the items were needed by Farmers and Agricultural Extension Agents in forage establishment. The table also showed that standard deviation of the items ranged from 0.21-0.98 indicating that the respondents were not far from one another in their opinion. The table further reviewed that sixteen (16) items out of seventeen (17) had their t-cal value above the cut-off point of 0.05 level of significance. This indicates that there was no significant difference.

Research question 3: What are the competencies needed by farmers in forage site management?

Table 3: mean ratings and t-test analysis on competencies needed by farmers and extension agents in Management of forage site

S/N	**Management of forage site**	$\bar{X}_1$	$\bar{X}_2$	**SD₁**	**SD₂**	t-test	Dec.
28	Predict the movement of sediment, nutrient and pesticide and other pollutant from land to surface or groundwater	4.00	3.32	0.62	0.50	-1.03	S
29	The use of nutrient management plan will reduce nutrient losses from pasture.	3.56	3.40	0.70	0.60	1.12	NS
30	Legumes establishment in pasture allows nitrogen to be fixed in the soil	3.34	3.62	0.48	0.54	1.12	NS
31	Legume establishment can reduce fertilization needs	4.02	3.18	0.60	0.72	-0.93	S
32	Legume establishment can improve the forage quality of pasture	3.20	3.82	0.56	0.52	0.21	NS

33	Plant herbaceous vegetation between pasture or crop land area to reduce the amount of sediment and other harmful materials to water bodies.	3.44	4.00	0.46	0.48	1.35	NS
34	Use dry storage to prevent negative environmental impact by protecting fertilizer sources from rain.	3.54	4.00	0.42	0.52	0.82	NS
35	Zones of trees and shrubs located next to stream and pond maintains stream banks	3.25	4.25	0.34	0.85	0.40	NS
36	Stream fencing excludes the livestock from accessing the stream	3.20	4.18	0.57	0.67	0.03	NS
37	Stream fencing maintains stream bank integrity and prevent bank erosion	3.00	4.20	0.39	0.63	0.41	S
38	Alternative watering enhances rotational grazing system	3.30	3.64	0.53	0.70	-0.51	S
39	Alternative watering enhances pasture and nutrient distribution	3.20	4.00	0.62	0.70	-0.12	S

N= number of respondents, $\bar{X}$= mean of respondents Std = Standard deviation of respondents, df = degree of freedom=439, Sig. = P-value; P > 0.05, S = significant, NS = Not significant.

Table 3: reviewed that all the twelve (12) items for forage management had their means ranged from 3.00-4.25, this showed that the means were above the cut-off point of 2.50, indicating that all the items were needed by Farmers and Agricultural Extension Agents in forage management. This table also showed standard deviation of the items ranged from 0.34-0.85 indicating that the respondents were not too far from the mean and from one another. The table further reviewed that the eight (8) items out of twelve (12) had their t-cal value greater than the table value at 0.05 level of significance, this indicates that there was no significant difference in the mean ratings of the responses of Farmers and Agricultural Extension Agents in forage management. Therefore, the null hypotheses of no significant difference were upheld for the (8) items in forage management.

Discursion of Result

The study found out that ten (10) competency items were needed in planning for forage establishment. The result in table 1 are in consonant with the view of [12] who stated that not all forage species grow well on every type of soil or in all parts of every region. The person in charge of establishment should determine whether or not the forage species under consideration is adapted to the site. The result in table 2 and 3 reviewed that all the competency items are needed by farmers in forage establishment. The result in table 2 were in agreement with the report of [7], who noted that the goal of forage production is to produce forages with the level of nutrients required for the kind and class of livestock in the herd at the least cost and in an environmentally sustainable manner. The results in table 3 were also in consonance with the view of [7] who maintained that sound forage

establishment and management practice are critical to realizing a profit in hay and or forage based livestock production. It is critical for managers to understand that they are fundamental differences in managing introduced and native forages. On the hypotheses, the study found out that there was no significant difference in the mean ratings of responses of farmers and agricultural extension agents on the (10) items needed in planning, seventeen (17) items in forage establishment, and twelve (12) items in forage management. The implication is that the respondents did not significantly influence their opinion on all the selected thirty nine (39) items in forage planning, establishment and management competences.

4. CONCLUSION

The benefit of skills acquisition is not in doubt, this is because for success to be achieved in forage production, there are skills that are needed by farmers. The result shows that skills in soil testing, nutrient management, fertilization, alternative watering, drainage, Pest and diseases control and equipment use among others are essential in forage production and management. Acquisition of these skills would boast farmers' interest in the nations request for anti open grazing and ranches establishment and attains sustainable development.

Recommendation

Based on the findings of the study, the following recommendations were raised. Effort should be intensified on educating farmers on the need for proper management practices in forage production and management by government through Agricultural Extension Agents. More researches should be conducted in the area of forage production in other to disseminate same to farmers by research institute through Agricultural Extension Agents. Government should encourage anti-open grazing and ranches establishment law to boost farmers' interest in forage establishment. Farmers should form cooperative groups so that they can exchange ideas and experiences for improved forage productivity in Benue State.

ACKNOWLEDGEMENT

My profound gratitude goes to God Almighty for the grace and strength to finish this research. I am grateful to my Colleague Onu D.O who spared time to scrutinize this work, all your efforts to see to the success of this work are appreciated, God bless you. Also, Dr Mrs Akaa C.W, I appreciate you. To my lovely wife and children, thank you for your prayers and support. The one who type-set this work, God blesses you.

CONFLICT OF INTEREST

Authors have no conflict of interest.

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