C0202: Vegetation characteristic of ecological zones of Kwara State, Nigeria and responses to different land clearing options

J. O. Olaoye and Z. T. Olumontoyin
Agricultural and Biosystems Engineering Department
University of Ilorin, Ilorin, Nigeria
joloye@unilorin.edu.ng

<Introduction>

Kwara State, Nigeria is generally classified as savannah ecotone lying at the transition belt of the derived savannah and forest zones (Olayinka, 2002). In practice, modern or mechanical clearing is profoundly classified as total, selective and windrowing (FAO, 2013a and b). Traditionally, agricultural land clearing is predominantly done during dry season. This approach depending on prevailing circumstances in terms of dynism of the vegetation and on course the interest of farmers may include setting the vegetation on fire to burn off all piny matter. The leaves of trees and shrubs adhered and these are then manually removed either by cutting down or digging up and transported depending on the size and type of tree. Generally, wild cash crops such as cassava/bitter, shea butter, cashew, orange, mango trees among others are spaced so as to serve as complementary source of income to the household of farmers especially during off-season period.

The choice of land clearing option is related to the prevailing cultural practices associated to a given locally. The current practices believed structured and critical appraisal of appropriate land clearing option related to prevailing nature of vegetation distribution, cost and specific energy requirements. Land clearing is seldom considered in the studies to mechanizing images in Kwara State and in itself Nigeria. Farming has been predominantly peasant in nature, up till recent when commercialization of agriculture is being encouraged, despite its huge financial and material requirement. Towards attainment of food sufficiency, adoption of appropriate tillage mechanization with its economic importance of enhancing transition of our farmers from peasant farming to commercial type. Appropriate land clearing is an important prerequisite to effective and efficient use of tillage machinery to enhance easy adoption of tillage mechanization. It feeds to cutting off unnecessary costs accrued to tillage practices, eventual reduction in cost of farm produce, enhancement of labour productivity and ultimately results in cheaper food produce thus enabling the鄙视 of those that can afford it which will result in hunger reduction

The objective of this study is to determine and classify the vegetation characteristic of ecological zones of Kwara State for crops productively and to determine the distribution of natural resources in Kwara State. The responses of each agricultural zone in Kwara State, Nigeria shall be studied to establish appropriate land clearing options for each established zones.

<Material and Methods>

The satellite photograph of Kwara State was applied and considered suitable for ease of collective sight and appreciation of existence, arrangement, population and interactions of the natural resources of interest.

The most current and available Landsat image of Kwara State was sourced and used for this study.

The digital images of Kwara State were processed through formatting and data correction, digital enhancement and automated classification to build up better visual interpretation. The ILWIS software was employed and modification of the appearance of images possible for optimum visual interpretation (Jie, 2013).

The yields from different agricultural zones were investigated by imposing three well defined land clearing options on each of the classified land clearing zones. The defined land clearing options include: manual land clearing plus burning, manual land clearing cum harvesting and sawing, and mechanical land clearing using bulldozer.

Three plots of size 25 m x 190 m each were set up in Ille, Shioo in Ekiti Local Government Area (LGA), Ilipaja in Ile-Ife Local Government Area and Aso in Ekiti which are respectively in Ille-Ife North, Ille-Ife South and Ille-Ife Central Senatorial Districts. The experimental plots were replicated three within each location

<Results and Discussion Ctd>

The result of the analysis of the digital image and land use photograph of Kwara State indicated that the land available for land clearing can be broadly classified into forest and savannah vegetation coverages (Figure 1). These classes cut across the sixteen (16) Local Government Areas of the state in varying proportions (Figure 2).

The total land and water mass based on the 2006 land use and land cover as processed and analyzed amount to 3,677,865.895, out of which built-up, forest and savannah areas occupy 615,498,14,732,1,757,350,39,476 and 1,266,789,711 respectively while the water-body occupy 16,287,792 (0.46%) (Table 2).

Figure 1: Land Cover Map of Kwara State

The total land and water mass of the State at 3,677,865.895 is which is 47.70% of the total land and water mass of the State. Table 1 illustrates the distribution of forest land in the State. Ilorin LGA has the highest value of 3071328.8 (83.80%) which corresponds to 17.44% and 8.05% of forest area of Kwara State and total land and water masses.

The total land and water mass of the State stands at 3,677,865.895 and it is unevenly distributed amongst the 16 LGAs as shown in Table 1. It is therefore observable that Ilorin LGA has the largest area coverage of 905,003.80 while Ofun LGA has the least area coverage of 5,045,045.00. Table 1 shows the general distribution of the land classifications on the basis of 16 LGAs arranged in alphabetical order. Table 1 revealed that 71.1% of Kwara State Land and Water spread wide across Kwara North Senatorial District with 2,471,616.81 ha while Kwara South and Kwara Central Senatorial Districts cover 23.8% (877,865.98) and 5.1% (170,079) respectively.

The result showed in Table 1 that the vegetation of Kwara State falls within the woodland savanna land cover with slight variations in terms of nature of vegetation population and growth. This observation is justified by the location of the state, Kwara State falls within the middle belt region which falls between the northern savannah and southern forest belts of the country.

<Conclusion>

The vegetation data of Kwara State was identified using band image of the State processed with ILWIS and IDRISI software on the basis of the built-up, forest, savannah and water covered areas.

The varying distribution of Kwara State was determined to compare mainly of forest and savannah vegetation occupying 47.70% and 35.34% of the State land mass respectively while the built-up area and water mass of the State constitute 16.73% and 0.44% of the Kwara State.

Apart from Ille-Ife and Ile-Ife LGA’s with less than 10% savannah covered areas that can be instructively prospected forest LGAs, the remaining 14/16 LGA’s house substantial forest and savannah distribution.

This study has revealed that cost, time or period of operation, number of labour and machine employed and farm size are significant to the land clearing option selection.

500m² was cleared in an average time of 31.93hrs at an average cost of $ 116.63 using manual land clearing plus burning while using manual land clearing cum harvesting and sawing 500m² was cleared in 28.49hrs at an average cost of $201.49 and similarly, using mechanical land clearing some area of land was cleared in 0.39hr at an average cost of $ 106.97.

Option 1 and 2 are best suited for clearing forests not exceeding 50m² except that option 2 is better suited for land with fairly high tree population. Option 3 on the other hand is best suited for farm sizes of 50m² and above to enhance less and more affordable land clearing cost per hectare.