UNIVERSIDAD ESTATAL DE BOLÍVAR

FACULTAD CIENCIAS AGROPECUARIAS, RECURSOS NATURALES Y DEL AMBIENTE

ESCUELA DE TECNOLOGÍA E INGENIERÍA AGRONÓMICA

"EVALUACIÓN DE LA PÉRDIDA DEL SUELO POR EROSIÓN HÍDRICA EN TRES SISTEMAS DE PRODUCCIÓN EN LA MICROCUENCA DE LA QUEBRADA CHILCAPAMBA, CANTÓN CHILLANES, PROVINCIA BOLÍVAR"

TESIS PREVIA A LA OBTENCIÓN DEL TITULO DE INGENIERO AGRÓNOMO; OTORGADO POR LA UNIVERSIDAD ESTATAL DE BOLÍVAR A TRAVÉS DE LA FACULTAD DE CIENCIAS AGROPECUARIAS, RECURSOS NATURALES Y DEL AMBIENTE, ESCUELA DE TECNOLOGÍA E INGENIERÍA AGRONÓMICA

AUTOR

EFRAÍN EDWIN CHELA MOROCHO

DIRECTOR

ING. NELSON MONAR G. *M.Sc.*

INSTITUCIÓN AUSPICIADORA: INIAP, SANREM – CRSP USA.

GUARANDA - ECUADOR

2008

VI. RESUMEN Y SUMMARY

6.1 Resumen

Este trabajo de investigación se realizó en el año 2007 - 2008, en la localidad de la Vaquería, Parroquia Chillanes, Cantón Chillanes, Provincia Bolívar. En esta investigación se plantearon los siguientes objetivos: determinar la cantidad de suelo que se pierde por efecto del escurrimiento superficial en los sistemas de producción pasto, maíz y fréjol en monocultivo; calcular el escurrimiento superficial en los sistemas de producción; realizar el análisis económico de la reducción en la productividad de los rubros en estudio por efecto de la erosión hídrica.

En la provincia Bolívar, el 92% de la superficie corresponde a suelos de ladera, de los cuales el 45% se encuentran en procesos de erosión crítica, debido principalmente al uso inadecuado de las prácticas agropecuarias asociadas a las condiciones climáticas y edáficas de la zona. La forma más grave de degradación del suelo es la provocada por la erosión hídrica que depende de la cantidad, intensidad, duración, diámetro de la gota de agua, velocidad y energía cinética de las gotas de lluvia, nivel de pendiente, cobertura del suelo y deficientes prácticas de conservación. De la microcuenca del río Alumbre, no se registran estudios que cuantifiquen la degradación del suelo causado por la erosión hídrica en los principales sistemas de producción. Por esta razón, el INIAP con el apoyo del SANREM CRSP, implementó un estudio con los principales cultivos de la zona (pasto, maíz y fréjol) en un Diseño de Bloques Completos al Azar con tres tratamientos y tres repeticiones, se realizaron análisis de varianza y prueba del Tukey al 5 %.

Las variables que se evaluaron son volumen de agua por precipitación, volumen de agua escurrida, peso total de los sedimentos en suspensión, coeficiente de escurrimiento, volumen de agua infiltrada, peso total de sedimentos por año y la pérdida de macro y micronutrientes.

Los resultados muestran que el sistema de producción que favoreció la pérdida de suelo es el maíz. En el sistema de producción de pasto se registró la menor cantidad de pérdida de suelo, por lo cual contribuye a la conservación de este

recurso. Los sistemas de producción en los que se registró el mayor escurrimiento superficial corresponden a fréjol y maíz. En el sistema maíz es donde se producen mayores pérdidas de macro y micronutrientes del suelo. El sistema de producción de maíz con niveles altos de precipitación favorece el escurrimiento superficial con mayor arrastre de sedimentos y su incidencia directa sobre la pérdida de fertilidad de los suelos. El sistema de producción de pastos favorece la mayor cantidad de infiltración del agua de lluvia. La erosión del suelo no solo genera problemas físicos y ambientales en la subcuenca, sino además repercusiones socioeconómicas en los hogares, pérdidas económicas por la reducción de la productividad de los cultivos de los que depende el sustento familiar.

Finalmente se recomienda diseñar e implementar alternativas tecnológicas amigables con el ambiente para la producción sostenible de los rubros productivos y económicos de la subcuenca y generar espacios para la socialización de la información investigativa generada para motivar y capacitar a los agricultores/as en alternativas tecnológica que fomente la conservación de los suelos en la subcuenca.

6.2 Summary

This work of investigation was made in the year 2007 - 2008, in the locality of the Vaquería, Chillanes region, Province Bolivar. In this investigation considered the following objectives: to determine the amount of soil that loses by effect of the superficial draining in the production systems grass, maize and bean in monoculture; to calculate the superficial draining in the production systems; to make the economic analysis of the reduction in the productivity of the headings in study by effect of the hydric erosion.

In the province of Bolivar, 92% of the surface correspond to slope soils, of which 45% are in processes of critical erosion, had mainly to the inadequate use of the farming practices associated to the climatic and edáficas conditions of the zone. The most serious form of degradation of the soil is the caused one by the hydric erosion that depends on the amount, intensity, duration, diameter of the drop of water, speed and kinetic energy of the drops of rain, slope level, cover of the soil and deficient practices of conservation. Of the microriver basin of the Alumbre river, studies are not registered that quantify the degradation of the soil caused by the hydric erosion in the main production systems. Therefore, the INIAP with the support of SANREM CRSP, at random implemented a study with the main cultures of the zone (grass, maize and bean) in Desing of Complete Blocks with three treatments and three repetitions, were made analysis of variance and test of the Tukey to 5%.

The variables that were evaluated are volume of water by precipitation, slipped volume of water, gross weight of sediments in suspension, coefficient of draining, infiltrated volume of water, sediment gross weight per year and the loss of macro and micronutrients. The results show that the production system that favored the loss of soil is the maize. In the production system of grass the smaller amount of loss of soil was registered, thus contributes to the conservation of this resource. The production systems in which the greater superficial draining was registered correspond to bean and maize. In the system maize it is where greater losses of macro and micronutrients of the soil take place. The production system of maize with high precipitation levels favors the superficial draining with greater drag sediments and its direct incidence on the loss of fertility of soil. The production

system of grass favors the greater amount of infiltration of the rainwater. The erosion of the soil not only generates physical and environmental problems in the subriver basin, but in addition socioeconómicas repercussions in the homes, economic losses by the reduction of the productivity of the cultures on which the familiar sustenance depends. Finally it is recommended to design and to implement alternative technological friendly with the environment for the sustainable production of the productive and economic headings of the subriver basin and to generate spaces for the socialization of the information generated to motivate and to enable to agricultores/as in alternatives technological that the conservation of soils in the subriver basin foments.

6.2 Summary

This work of investigation was made in the year 2007 - 2008, in the locality of the Vaquería, Chillanes region, Province Bolivar. In this investigation considered the following objectives: to determine the amount of soil that loses by effect of the superficial draining in the production systems grass, maize and bean in monoculture; to calculate the superficial draining in the production systems; to make the economic analysis of the reduction in the productivity of the headings in study by effect of the hydric erosion.

In the province of Bolivar, 92% of the surface correspond to slope soils, of which 45% are in processes of critical erosion, had mainly to the inadequate use of the farming practices associated to the climatic and edáficas conditions of the zone. The most serious form of degradation of the soil is the caused one by the hydric erosion that depends on the amount, intensity, duration, diameter of the drop of water, speed and kinetic energy of the drops of rain, slope level, cover of the soil and deficient practices of conservation. Of the microriver basin of the Alumbre river, studies are not registered that quantify the degradation of the soil caused by the hydric erosion in the main production systems. Therefore, the INIAP with the support of SANREM CRSP, at random implemented a study with the main cultures of the zone (grass, maize and bean) in Desing of Complete Blocks with three treatments and three repetitions, were made analysis of variance and test of the Tukey to 5%.

The variables that were evaluated are volume of water by precipitation, slipped volume of water, gross weight of sediments in suspension, coefficient of draining, infiltrated volume of water, sediment gross weight per year and the loss of macro and micronutrients. The results show that the production system that favored the loss of soil is the maize. In the production system of grass the smaller amount of loss of soil was registered, thus contributes to the conservation of this resource. The production systems in which the greater superficial draining was registered correspond to bean and maize. In the system maize it is where greater losses of macro and micronutrients of the soil take place. The production system of maize with high precipitation levels favors the superficial draining with greater drag sediments and its direct incidence on the loss of fertility of soil. The production

system of grass favors the greater amount of infiltration of the rainwater. The erosion of the soil not only generates physical and environmental problems in the subriver basin, but in addition socioeconómicas repercussions in the homes, economic losses by the reduction of the productivity of the cultures on which the familiar sustenance depends. Finally it is recommended to design and to implement alternative technological friendly with the environment for the sustainable production of the productive and economic headings of the subriver basin and to generate spaces for the socialization of the information generated to motivate and to enable to agricultores/as in alternatives technological that the conservation of soils in the subriver basin foments.