level rise and land loss should be involved with very high weigh coefficient. Further deeper study should be realized to have more accuracy prediction on vulnerability index to explain better the real situation and therefore to formulate better the policy to adapt and mitigate to climate change in food production and poverty alleviation for Vietnam.

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21. RESEARCH ON COVER CAPACITY OF NO-TILLAGE PRACTICE TO SOIL EROSION AND MICRO-ORGANISM ACTIVITIES IN SOIL

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ABSTRACT

The research was carried out at Dong Cao catchment, Tien Xuan commune, Thach That district, Hanoi capital with the research methodology such as: Carry out experiments in catchment scale, analysis, synthesis and comparison, and interdisciplinary, multidisciplinary research. The results show that: no-tillage method that uses vegetation cover (DMC) increased soil moisture from 109 to 243% compared to traditional method of cultivation (FC), and reduces soil erosion effectively (1tons compares with 77tons respectively). DMC contributes to increasing soil fertility by not only reducing soil erosion but also increasing the amount of organic matter returned to the soil from 6 to 12%. On the other hand, DMC creates good habitat for max and microorganisms so their diversity and population in the soil are increased considerably, especially earthworm from 20nb in/m^2 in FC to 60nb ind/m^2 in DMC. The DMC saving 50% in labor costs, as well as helping to increase corn yields, improving economic efficiency for the farmers.

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Above research results are clear evidence that non-tillage method is the good cultivation approach to reach the sustainable agricultural practice on sloping land.

Key words: No-tillage, soil erosion, microorganism, catchment, upland Vietnam

I. RATIONAL

Traditional farming as shifting cultivation on sloping land has no place in the current trend of the sustainable agriculture concept on sloping land due to lack of sustainable land protection awareness. This kind of farming practices made the world lost 75 billion tons of soil by erosion, in which most of the land for agricultural production to about 20 million ha of cultivation can not be cultivated (Ananda & Herath, 2003). Especially in the developing countries of Asia, Africa and Latin America: annual soil erosion from 30 to 40 tons/ha/year (Barrow, 1991).

In Vietnam, soil erosion is taking place seriously. The erosion is the main underlying cause breaks the balance in agricultural ecosystems (Pennock, 1997), soil has being degraded quickly in many aspects: chemistry, physics and biology. This is the basic reason reduced stability of farming systems on sloping land, inefficient production, affecting food security at national level in general and the household level in particular, especially households on the sloping land areas. The question is: Why should we pay attention to the sloping land? The fact that land resources of Vietnam are limited: 32.924061ha in which only about 10 million ha of land accreted from the rivers forming the deltas (currently has being exploited to the limit), the rest is sloping land with 22.1 million ha (75% of total area). The area which favorable for agricultural production slope below 150 is only 4.5 million ha, slope from 150 to 250 for agro-forestry production area is 3 million ha and slope >250 (sensitive areas when there are changes in ecological conditions, particularly vegetation cover) has an area of over 13.5 million ha. Meanwhile the pressure on the population density increased, including population growth due to migration and birth rates, has made the area of sloping land per capita is only 0.41 ha. Based on these issues, we conduct a research with the title: 'Research on cover capacity of no-tillage practice to soil erosion and micro-organism in soil' to reduce soil erosion and improve soil fertility for sustainable agricultural practice.

II. CONTENT AND RESEARCH METHODOLOGY

2.1. Research content

The experiment was performed with two methods of cultivation that is cultivated by traditional methods (FC) and no-tillage method mulched by crop residues (DMC) in order to assess their impact on erosion on a large scale (> 1000m^2) and small scale (1m^2) as well (establish 1m^2 internal large area of FC and DMC areas). The model will allow researchers evaluated not only the impact of no-tillage practice to runoff and soil erosion in a more detail, but also and assess the impact of this technique to measure soil properties as well as max and microorganisms in the soil.

2.2. Research methodology

- No-tillage method (DMC): Make hole at 5cm deep following contour line at 70cm between rows and 30cm between holes, put seed then filled with soil. The soil surface is covered with rice straw to the amount of 3.5 tons/ha.

- Farmer cultivation method (FC): in the soil preparation process, turn up the soil to a depth of 10-15cm, weeding then pile up it and burned. Maize was sown in rows following the contour line at 70cm between rows and 30cm between plants.

- Fertilizers apply per ha: 120N + 120P_2O_5 +90 K_2O

- Soil samples were taken before conducting experiment in the field and after the experiment ended at a depth of 0-20cm. Chemical, physical soil properties and max-micro-organisms diversity and population were analyzed following the current methods of Vietnamese standard.

Experimental data was processed by Excel and statistical software IRRISTAT.

III. RESULTS AND DISSCUSSION

3.1. Effect of cultivation methods to soil moisture

Soil moisture is closely related to the growth and development of crops as well as micro fauna activities in the soil.

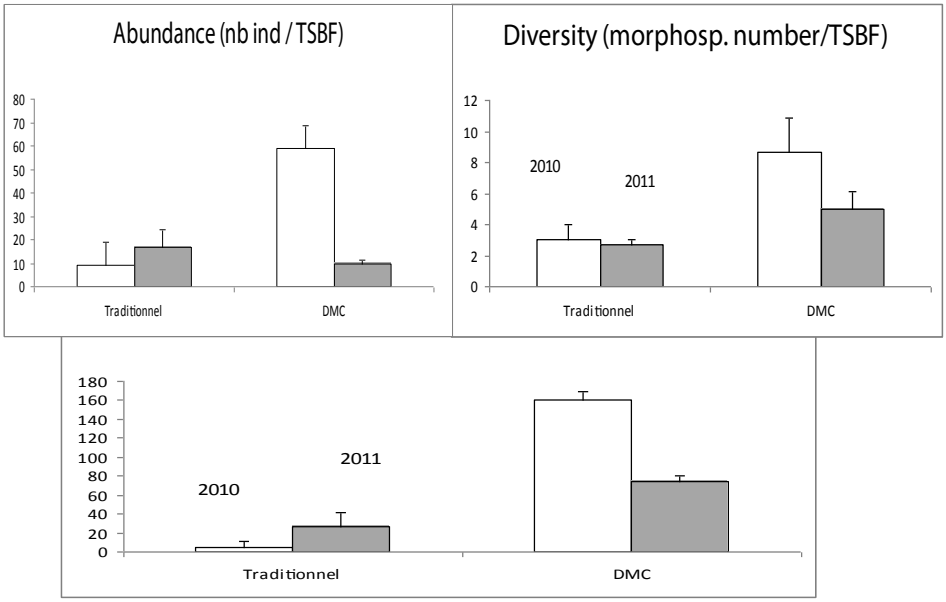
Table 1: Soil moisture (percentage) at cultivation treatments

Treatment	2010	2011	2010	2011	2010	2011
	May	June	July	July	August	August
FC	22.8	12.0	27.7	22.4	23.8	35.5
DMC	25.5	29.2	29.5	30.7	26.0	40.7
% increase	*111.8*	*243.3*	*106.5*	*137.1*	*109.2*	*114.7*

The data in Table 1 show that using DMC the soil moisture is increased from 11% up to 143% in May and June compare with FC, that creating good condition for maize's growth at young stage (vegetative stage) and it may explain why the activities of microorganism and earthworm population in DMC are higher as well as on their biodiversity compared to FC.

3.2. Effect of cultivation methods to earthworm activities in the soil

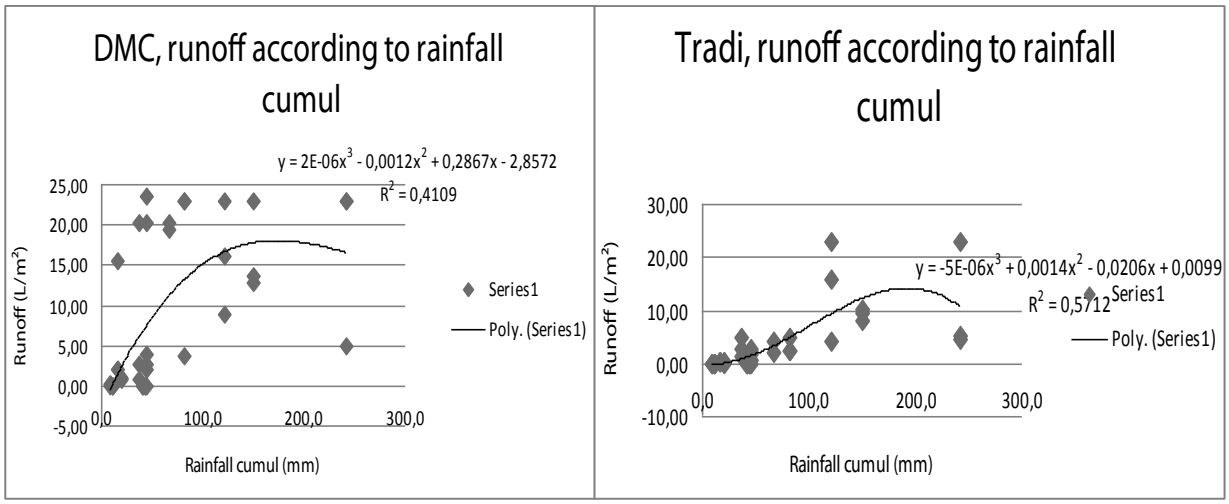
Graphs 1 and 2 show the level diversity of micro fauna of two very different cultivation methods: In the DMC treatment, the number of earthworms and biological diversity higher than FC treatment resulting from good soil moisture creation.



Graph 2: The number of earthworms in 1m²

3.3. Effect of cultivation methods to soil erosion

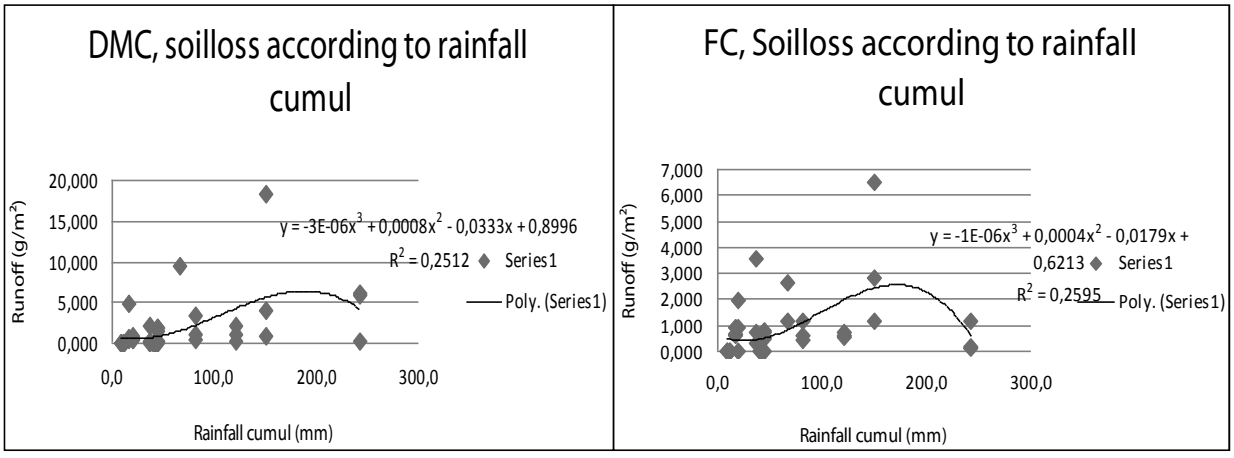
In studies of soil erosion, a part from the factors directly affect the level of erosion such as rainfall, soil cover, slope and slope length, rainfall intensity is strong and influential factor to surface flow and soil erosion. In the studies on soil erosion; Norman Hudson (1981) confirmed that the rainfall threshold 50-75mm/h caused strong erosion and > 75mm/h caused very strong erosion.



Graph 3: Runoff in 1m² of two cultivation methods (DMC and FC)

Our research results in graphs 3 and 4 show the relationship between surface runoff and soil loss in two cultivation methods FC and DMC in plots of 1m2 size. We can recognize that water runoff and soil loss amount in the DMC treatment much more than FC treatment. This result can be explained by the following reasons:

i) Soil moisture at the DMC is much higher than FC (Table 1) so that soil moisture quickly reaches saturation than the FC, as the result, DMC is more water runoff than FC.



Graph 4: Soil loss in 1m² of two cultivation methods (DMC and FC)

Photo 1: Earthworm activities in DMC

ii) Since the soil moisture at DMC higher than FC, that activities of earthworms in particular and micro fauna in general quite strong (Graph1; 2) creating many earthworm-cast on soil surface (photo 1). This is the main reason of soil loss in DMC higher than (FC) within the $1m^2$. However in the big area FC ($700m^2$) and DMC $1200m^2$) soil loss showed completely contrary picture to small area ($1m^2$): On DMC area soil loss considerable less than on FC, resulting from non disturbance of soil surface and dense cover by crop residues and native weeds (1ton and 77 tons respectively; table 2). Regarding soil loss and nutrients lose with eroded sediment, Table 2 indicates that the more soil loss, the more nutrient loses with the soil erosion.

Table2: Loss nutrients by cultivation method

Formulas	Soil loss (T/ha)	Nutrient loss (kg/ha)			
		OC	N	P_2O_5	K_2O
FC	77	2594.9	161.7	1.43	13.65
DMC	1	33.70	2.10	0.02	1.80

3.4. Economic effectiveness of cultivation methods

Table 3: Maize yield at treatments

Treatment	2010		2011	
	Kg seed/m^2	yield (tons/ha)	Kg seed/m^2	yield (tons/ha)
F-C	0.355	3.55	0.502	5.02
DMC	0.412	4.12	0.571	5.71
% increase		16.1		13.7

Table 3 shows maize yield on DMC increases from 13.7 to 16% compares with FC and the economic effect of DMC was significant compared with FC. DMC spent less costs for soil preparation, planting and weeding than FC. This resulted in net interest of the farmers was a positive value compared to negative values of FC. Likewise, the rate of return of DMC was 1.04 while FC was 0.52 (tab.4)

Table 4: Economic effectiveness of treatments (1000 VND)

Items		Treatment	
		DMC	F-C
Expenses for 1 ha	Variety	1,400.000	1,400.000
	Fertilizers	7,010.000	7,010.000
	Soil preparation	1,500.000	15,750.000
	Planting	3,000.000	7,800.000
	Weeding	12,750.000	19,500.000
	Pesticide	1,350.000	750.000
	Harvest	6,000.000	6,000.000
	Total (C)	33,010.000	58,210.000
Income (B)		34,260.000	30,120.000
Net benefit (B- C)		1,250.000	- 28,090.000
Rate of return (B/C)		1.04	0.52

IV. CONCLUSION AND RECOMMENDATION

4.1. Conclusion

- No-tillage method that uses vegetation cover (DMC) increased soil moisture from 109 to 243% compared to traditional method of cultivation(FC), and reduces soil erosion effectively (1tons compares with 77tons respectively).

- DMC contributes to increasing soil fertility by not only reducing soil erosion but also increasing the amount of organic matter returned to the soil from 6 to 12%. On the other hand, DMC creates good habitat for max and microorganisms so their diversity and population in the soil are increased considerably, especially earthworm from 20nb in/m^2 in FC to 60nb ind/m^2 in DMC.

- DMC saving 50% in labor costs, as well as helping to increase corn yields, improving economic efficiency for the farmers.

4.2. Recommendation

- Local authorities should take into account to encourage farmers to adopt no-tillage method.

- To research further on the cultivation practices not only on large scale but also small scale to have the precise conclusions about soil erosion.

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22. RESULTS OF BREEDING TRIPLOID VH13 HYBRID VARIETY

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ABSTARCT

VH13 hybrid mulberry variety was created by the Vietnam Sericulture Research Center, and it was approved as temporary variety for pilot production in some ecological regions by the Scientific council of Ministry of Agriculture and Rural Development in September 2000. Accordingly, it was approved as official national variety in April 2006,

Because of using F1 heterosis and sexual propagation, VH13 hybrid mulberry has a lot of advantages such as: strong growth, high total branch length/tree (60.50m/ tree), short node (3.0-3.3cm), average duration for mature leaves, leaf productivity of 40 tons/ha/ year upwards (in stable mulberry field), increasing by 36% compared with Ha Bac variety, >60% compared with Bau Trang, Bau Den Bao Loc and China introduced ones.

VH13 mulberry tree has less bloom, thick leaf, dark green, short node (3.0-3.2cm), good quality leaves. The protein content in its leaf is 22-24% while in Ha Bac and VH9 variety is 21.24% and 24.40%, respectively. The cocoon yield of silkworm which was fed by VH13 mulberry leaves is 10% higher than that of Ha Bac mulberry leaves and 19% higher than Chinese mulberry leaves. Shell ratio increases by more than 13%, with thicker cocoon shell, higher cocoon quality. 4th and 5th instars growth duration shortens one day. Mulberry consumption per one kg cocoon reduces by 16% compared to Ha Bac. Noted that VH13 mulberry variety generates many leaves in autumn, which is suitable for rearing high quality white cocoon silkworm.

Advantages of VH13 mulberry variety in cultivation characteristics manifest easy leaf plucking, less branch scratch than Ha Bac and VH9, 30% higher harvesting yield than old varieties, VH13 has wide adaptability to different ecological regions, different soil types (river side land, coastal land, hill land and mountainous area), high multiplication coefficient: 300kg mulberry seed per 1 ha parental mulberry gardent/1 year, 28% lower material expenses for newly planting, all year round planting season, high planting survival above 90% and higher than planting by cutting. Especially, VH13 mulberry tree can grow quite better in drought region.

VH13 disease ratio, disease index (which caused by some fungal species) are lower than Ha Bac and Chinese mulberry varieties.

VH13 hybrid mulberry variety was approved as national variety by Ministry of Agriculture and Rural Development in April 2006 to be licensed to disseminate in production at the Northern and Central provinces.

Keywords: Hybrid, mulberry, variety, temporary, national.

I. BACKGROUND

Mulberry silkworm (Bombyx mori L) is monophagous and its sole food is mulberry leaves. Therefore, the number and quality of mulberry leaves are the main factor impacting on productivity and quality of the cocoons, as well as the silk.

On other hand, according to study results on 60% of Nitescu cost of the production, cost of cocoons are used for planting, management, maintenance and harvesting mulberry leaves, so that productivity and quality of mulberry leaves would be distributed greatly to production costs.

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