“BIOCOMPOST BASED ON ORGANIC WASTES FOR SOIL BIO-IMPROVEMENT”

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Abstract:

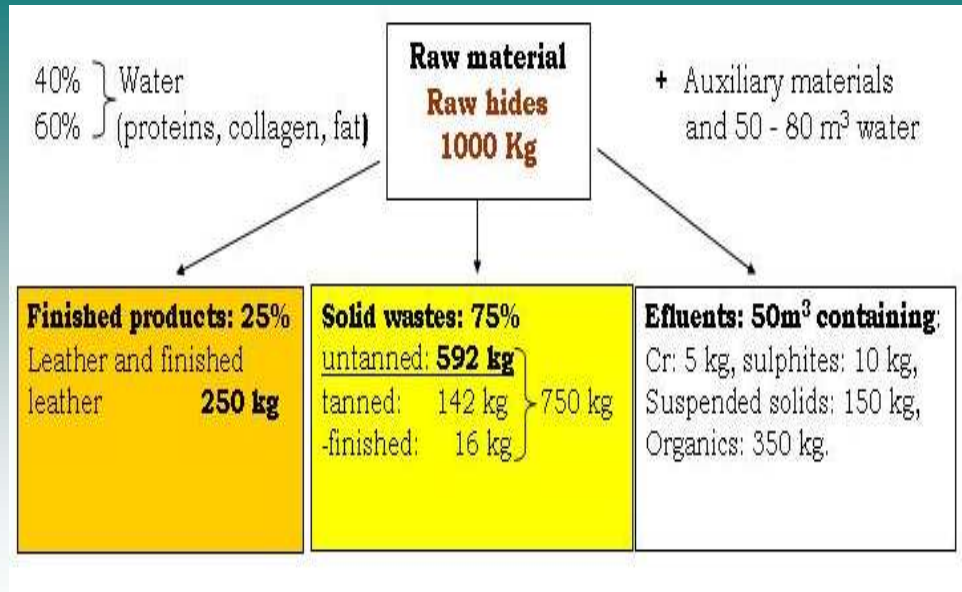
Recent studies carried on in Central and Eastern Europe showed that in these countries, the main degradation processes induced by human activity consist in reduced soil fertility, crust-formation, water and wind erosion, landslides and chemical pollution.
Conservation of soils and their fertility in equilibrium to natural processes represent an essential requirement for ensuring food safety for a growing population.
For this purpose, are is applied natural proteic sources, containing also other nutritive elements, and the optimized form is represented by complex proteic products / composts with controlled additions of the elements lacking from the specified soils. The very high variability of compost composition, due to the heterogeneity of wastes, leads to complex problems of sampling and analytical characterization.

EXPERIMENTAL RESULTS

The work presents a new pilot technology for biochemical decay of the tannery protein wastes and use of the resulted products as fertilizers in farming. As it is shown in the figure below, from 1.000 kg raw hides (raw material), 250 kg are found in the finished leather and the remaining of 750 kg are hide wastes.

Most of the tanneries and leather good manufacturers have to cope with severe problems regarding waste disposal, especially as their stocking in the garbage pits will result in chromium accumulation within soil with possible adverse effects on the ecosystem.

Untanned waste reclaiming is of particular interest, because of removal of such wastes as fleshings almost wholly while obtaining valuable products both from qualitative and economic points of view.



An innovative process for raw hide waste treatment was proposed. The protein waste hydrolysis was conducted in an acid medium, under pressure; the resulted liquor was filtered and concentrated up to a paste consistency.

Physical-chemical characterization of hide wastes

Pelt wastes were obtained from the SC Pielorex tannery of Jilava. In this study limed hide (treated with 1.2 % sodium sulphide, 1.5 % sodium hydrosulphide and 3 % calcium hydroxide) wastes were used. Wastes have resulted from bovine hide (35 kg weight) fleshing and trimming. Hides contained 50-68 % proteins, 0.6-9 % fat, 15-50 % ash and less than 5 % water by dry weight.

The biochemical-enzymatic treatment

From the experience gained in the field of pelt waste degradation a combined biochemical- enzymatic process was thought to be the best to obtain an efficient fertilizer showing a long time action [1].

The biochemical-enzymatic process for the preparation of the protein containing fertilizer

Waste screening and weighing	*Balance*
Wash	**Water, 20-25°C, 1-2 h** **Drain the washing bath**
Deliming	**Bath: 100 %** **Mixing with ammonium sulphate 4 %, 2,5-3,5 h**
Check	**1 % phenolphthalein**
Wash	**Water, 20-25°C, 30 min.**
Grinding	**Grinding machine**
Hydrolysis	**1 kg pelt wastes in 2 lwater** **0.15 % alum, $SO_4Al_2 \cdot SO_4K_2 \cdot 24\ H_2O$** **0.10 kg industrial salt** **0.05 kg hydrochloric acid (22°Be)** **0.8-1.7 g conc.BIOSIN TR**
Check	**pH = 3.5-4.5**
Neutralization	**8-10 g/L sodium carbonate/1 kg treated wastes**
Mixing	**25-30 min.**
Check	**pH = 7.0-7.3**
Treatment by phenol	**1-1.5 % phenol**
Chemical-physical tests for the protein containing fertilizer	

The protein containing wastes were hydrolyzed in an acid medium under high pressure; the resulted liquid was subjected to filtration and concentration to obtain a pasty material. Pelt wastes were washed with water at 20-25oC because of high alkalinity (before processing pelt contained water 76 % and shown a pH of 13) [2], [3].

The total protein level was measured by means of the total nitrogen. The resulted nitrogen level (g/l) was increased by a factor of 6.25 to obtain the total protein level.
ICPI together with the National Research & Development Institute for Pedology, Agrochemistry and Environment Protection –ICPA- Bucharest carried out tests by applying the resulted fertilizer samples on soil columns and characterizing the investigated soil on eroded soil models.

Characterization of the test soil: **in the Snagov-Ilfov and Aldeni-Buzău in the Vlăsia Plain hydrographic areas the brown-redish and argillaceous-eluvial soils are dominant to the North (35.9 % and 30.4 5, respectively) with additional colluvial (19.2 %) and cambic black earth (6.3 %).**

Taking into account the study object, a test device involving soil columns of 500 mm in diameter and 1500 mm high was placed in the soil models hall (vegetation house). Test soils originated from the Aldeni-Buzau test field for the soil erosion and the Balotesti-Ilfov pilot test field for drainage[4].
Screening the products showing the best characteristics for agricultural use was performed by a range of biological tests in the laboratory, greenhouse and field. ICPI carried out join tests with ICPI together with the R&D Institute for Plant Culture and Protection-Bucharest with 2 fertilizer samples obtained from protein containing wastes (A and T) mixed with forest brown-redish soil (test field of Băneasa). Physical-chemical tests on fertilizer samples have revealed higher sodium sulphide and calcium oxide levels in the sample A than in the sample T. The obtained results were processed statistically by the variant analysis method[5].

Action of the fertilizers (A and T types) on the test plant growth as compared to the control (M)

Sample A have shown slight phytotoxicity for the cucumber growth revealed by leaf limb edge yellowing which may be caused by the applied dose being hardly tolerated by the cucumber plants which are more sensitive than the other plant species involved in the study.

Sample T stimulates the sprouting in sugar beet, bean and tomato plants and inhibits it in sunflower plant. Sample A has a favourable effect on the wheat and maize growth.

Sample A stimulates sprouting and growth in wheat, sugar beet, bean and tomato plants. It has an adverse effect on the sunflower growth. The sunflower is the least sensible plant to the products obtained by biochemical decay of the tannery protein wastes.

Sample T stimulates the sprouting in sugar beet, cucumber, bean and tomato plants. It also stimulates the aerial part growth in wheat and maize.

*As a **conclusion**, the hide wastes can be used as fertilizers under specific conditions, acting in time.*

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THANK YOU !

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