Fayoum University
Faculty of Agriculture

BIOTREATMENT OF SOME AGRICULTURAL WASTES BY *TRICHODERMA* SPP. FOR ANIMAL FEED USES

By

ABIR MOHAMED HELMI ABD EL-ZAHER

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SUMMARY AND CONCLUSION

In Egypt agricultural wastes accumulate in huge quantities resulting in the difficulty of compiling and high transfer prices so Egyptian farmers resort to burn them in fields where these are a source of transferring pests and diseases to modern agriculture as well as resulting in environmental pollution problems. Therefore wastes should be directed to be utilized and taking advantage of them through converting from a relic burden pollution that surrounding environment to a source of increasing production of the annual income as they contain lignocellulosic fibers represented in cellulose, hemicellulose and lignin, which have many uses as strategy materials in many industries list such as the paper industry and cellulose derivatives.

It is known that the livestock sector in the Arab Republic of Egypt suffers from a drastic lack of available feed materials used in animal nutrition and the burden posed by the state to fill the gap by importing raw materials that are used in the feed industry. Agricultural wastes are the most important natural substances that could contribute effectively to bridge this deficit, but it need some initial processors to suit this purpose, as the nature of their chemical composition makes them with low protein content, low digestibility and high lignin content. Therefore the aim of this study is to improve the protein content and nutritional value of some agricultural wastes available in Egypt namely tomato leaves, sugar beet leaves, sugar beet pulp, rice straw and sugarcane bagasse by physiochemical and biological treatments using *Trichoderma viridi, Trichoderma harzianum* and *Trichoderma reesei.*

Results obtained in this work could be summarized as follows:

(1) Chemical analysis of the cellulosic wastes under study indicated their low protein content except sugar beet leaves, sugar beet pulp and tomato leaves and high fiber content. Whereas crude protein contents recorded 3.75, 5.62, 10.62, 14.31 and 15.12% and crude fiber 36.8, 34.7, 27.7, 14.5 and 7.9% in each of the sugarcane bagasse, rice straw, sugar beet pulp, tomato leaves and sugar beet leaves, respectively.

(2) Acid treatment (0.5 N H_2SO_4) with boiling for tomato leaves increased crude protein content in fermented substrate using

Trichoderma viridi, *Trichoderma harzianum* and *Trichoderma reesei* from 15.12 to 18.53, 18.52 and 18.25% after 5, 10 and 10 days, of fermentation time respectively.

(3) When sugar beet leaves treated with acid (0.5 N H_2SO_4) and boiling, then fermented by *Trichoderma viridi*, *Trichoderma harzianum* and *Trichoderma reesei*. *Trichoderma reesei* yielded the highest crude protein content (14.2%) after 5 days of incubation.

(4) Boiled sugar beet pulp treated with acid for 60 min. was the most efficient pretreatment for the production of maximum crude protein content (17.9%) with *Trichoderma reesei* after 5 days of incubation.

(5) Rice straw supplemented with ammonium sulphate increased crude protein content to 7.92, 7.83 and 7.79% for *Trichoderma reesei*, *Trichoderma viridi* and *Trichoderma harzianum,* respectively after 10 days incubation. Whereas, rice straw supplemented with ammonium triphosphate showed slight decrease, than ammonium sulphate, in crude protein content to 7.9, 7.52 and 7.50% for *Trichoderma reesei*, *Trichoderma viridi* and *Trichoderma harzianum,* respectively after 5 days of incubation.

(6) It was observed that ammonium triphosphate was the most efficient nitrogen source for the production of maximum crude protein (7.15%) by *Trichoderma viridi* on sugar cane baggase after 5 days whereas; *Trichoderma harzianum* and *Trichoderma reesei* produced 7.13% and 7.09% crude protein after 10 days of incubation, respectively.

(7) Biological assay of tomato leaves, sugar beet leaves, sugar beet pulp, rice straw and sugar cane baggase were done for the safety limits and nutritive value when used as balanced animal feed using experimental albino mice. A total of eighty male albino, mice five weeks aged, were used in this study. Mice were randomly distributed into 16 groups each of five with nearly similar body weight. Each group of mice was randomly subjected to one of the experimental treatment. Each cellulosic waste was

divided into three replacement levels (10, 20 and 40%) of the meal, and one group for control without any replacement.

(8) Mice fed on control diet had higher body weight gain than other groups which fed on diets supplemented with fermented cellulosic wastes. Mice fed on diet containing 10% treated cellulosic wastes had a higher body weight gain. Similar trend of higher body weight gain was shown by those fed on diet containing 20% treated cellulosic wastes. While group fed on diet containing 40% treated cellulosic wastes had the lowest body weight gain during the experimental periods. Mice fed on diet containing 10, 20% treated cellulosic wastes and the control had significant better blood measurements than mice fed on diet containing 40% treated cellulosic wastes.

(9) In general, it is recommended to use 10 and 20% diet containing treated cellulosic wastes to improve the nutritive value of the studied cellulosic wastes as animal feed.

Conclusion:

On basis of the present results, it can be concluded that tomato leaves, sugar beet leaves, sugar beet pulp, rice straw and sugarcane bagasse are of the high potential sources when treated with some specific fungi like *Trichoderma reesei*, *Trichoderma viridi* and *Trichoderma harzianum* to obtain high crude protein food, which could be used for animal feed. As well as to meet the needs of livestock production of feed materials, which are considered safe alternatives for producing food to contribute in the alleviation of environmental and health problems.