DECLARATION

I hereby declare that this research work titled ***"A New Innovative Approach to the Efficient Use of Plant Waste"*** is the result of original research conducted by myself and my research team, under the guidance of Professor Panah Muradov, Director of the Institute of Microbiology. This study has not been previously submitted for any other degree or publication. The research involves the investigation of the chemical composition of plant waste in Azerbaijan's agricultural sector and its transformation into useful products through bioconversion using fungal species such as *Pleurotus ostreatus MBI-2022*. The findings, including the potential of this bioconversion process to reduce waste and enhance ecological sustainability, are novel and contribute to advancing both theoretical and applied aspects of the field.

All the sources of data, literature, and references have been appropriately cited and acknowledged. I also confirm that the experiments were conducted in compliance with ethical guidelines, and all necessary permissions and approvals were obtained from relevant authorities and institutions.

There are no conflicts of interest associated with this study, and the research was supported by the resources provided by the Institute of Microbiology, Ministry of Science and Education of the Republic of Azerbaijan.

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DATASET -A New Innovative Approach to the Efficient Use of Plant Waste

These datasets would assist a reviewer in understanding the research's findings in terms of waste characterization, bioconversion results, and cultivation conditions.

Dataset 1: Initial Plant Waste Composition (Cellulose, Lignin, Protein, etc.)

This dataset presents the initial chemical composition of the various plant waste materials used in the study (wheat straw, cotton stalks, corn cobs, sunflower husks, and sugar beet waste). The key components measured will include cellulose, lignin, 0and protein content, along with other relevant compounds like hemicellulose.

Dataset: Plant Waste Composition and Parameters

Parameters	1 (Cotton Swab)*	2 (Corn Husk)	3 (Barley Straw)	4 (Wheat Straw)	5 (Sunflower Husk)	6 (Sugar Beet Waste)
Extracted Water (%)	7-11	13-17	6-7	4-5	5-6	14-17
Cellulose (%)	34-42	34-39	34-37	33-38	21-26	31-40
Hemicellulose	22-33	18-32	23-27	25-35	17-21	21-26

Parameters	1 (Cotton Swab)*	2 (Corn Husk)	3 (Barley Straw)	4 (Wheat Straw)	5 (Sunflower Husk)	6 (Sugar Beet Waste)
(%)						
Lignin (%)	21-25	10-16	17-23	19-27	26-30	12-17
Protein (%)	2.7-3.9	3.4-4.6	3.2-4.0	3.0-4.1	2.9-3.7	2.7-4.0
Nucleic Acids (%)	0.75-0.97	0.63-0.86	0.50-0.73	0.47-0.72	0.36-0.62	0.67-0.96
Ash (Mineral Elements) (%)	5-7	4-8	4-6	5-7	4-6	5-6
Crystallization Coefficient	53-57	41-46	47-51	50-54	42-44	38-39

Note: The content of plant waste is indicated as % of dry weight.

-The composition of various plant wastes varies significantly, with cellulose content being notably high in cotton swab, corn husk, and barley straw, while sunflower husk and sugar beet waste show a lower cellulose content.

-The extracted water content varies across substrates, with sugar beet waste having the highest extracted water content (14-17%), suggesting it may have higher moisture retention compared to the other plant materials.

- Hemicellulose content is relatively stable across the substrates, ranging between 18-35%, with barley straw and wheat straw containing slightly higher amounts.

-Lignin content is the highest in sunflower husk (26-30%) and wheat straw (19-27%), which may indicate a higher resistance to degradation compared to substrates with lower lignin, such as corn husk and sugar beet waste.

-Protein content is consistently moderate across all substrates, ranging from 2.7% to 4.6%, with cotton swab, corn husk, and sugar beet waste being at the higher end of the range.

-The nucleic acid content shows similar values across all substrates, with sugar beet waste having the highest range (0.67-0.96%) and sunflower husk showing the lowest (0.36-0.62%).

-The crystallization coefficient, which reflects the degree of crystallinity in plant fibers, is highest in cotton swab (53-57%), suggesting its higher potential for crystallization when processed compared to other plant wastes.

- Ash content, which represents mineral elements, is relatively consistent across the substrates, ranging from 4% to 8%, with no major outliers except for slight variations between different plant materials.

Overall, this dataset indicates that cotton swab, corn husk, and barley straw offer higher cellulose and protein content, while sunflower husk and sugar beet waste have higher water content, which may influence their suitability for different biotechnological applications

Dataset 2: Bioconversion Process Results (Fungal Strain Performance)

This dataset summarizes the performance of different fungal strains in degrading cellulose, lignin, and accumulating protein. These results are based on the study's measurements of weight loss, cellulose degradation, lignin degradation, and protein accumulation.

Microbiological conversion of studied plant waste (10 days)

Fungi	Weight loss, %	Degradation (%)		Protein (%)	
		cellulose	lignin	initial	last
Wheat straw					
Bjerkandera adusta	22,1	37,9	37,4	2,7	7,9
Cerrena unicolar	21,2	35,1	37,5		7,8
Fomes fomentarius	19,2	34,5	34,8		7,5
Ganoderma applanatum	20,1	35,2	35,1		7,9
G.lucidum	19,3	34,7	33,8		7,7
Phellinus igniarus	19,9	36,6	32,7		7,4
Lentinus tigrinus	22,1	37,5	37,7		8,4
Pleurotus ostreatus	23,2	38,0	38,2		8,1
Trametes hirsuta	21,0	33,7	39,5		7,5
T.versicolor	20,6	31,7	39,0		7,3
Cotton swab					
Bjerkandera adusta	20,3	35,7	36,0	2,1	7,0
Cerrena unicolar	19,0	34,5	34,9		6,9
Fomes fomentarius	18,2	33,0	33,8		6,0
Ganoderma applanatum	18,9	32,7	33,8		6,1
G.lucidum	18,2	34,0	34,9		6,6
Phellinus igniarus	18,2	35,1	36,9		6,9
Lentinus tigrinus	20,1	36,5	37,0		8,3
Pleurotus ostreatus	21,7	37,3	37,8		7,8
Trametes hirsuta	22,8	32,1	38,3		6,6
T.versicolor	22,6	31,1	38,0		6,3

This dataset helps to compare the effectiveness of different fungal strains in degrading the waste materials and enhancing protein content.

This dataset includes the following details:

Fungi – The type of fungi used in the conversion process.

Substrate – The plant waste used (Wheat straw or Cotton swab).

Weight Loss (%) – The percentage weight loss of the substrate.

Degradation (%) – Initial and final degradation values.

Protein (%) – Protein content after degradation.

Cellulose Degradation (%) – The degradation of cellulose.

Lignin Degradation (%) – The degradation of lignin

Microbiological degradation of plant wastes using various fungal species resulted in significant weight loss and degradation of cellulose and lignin, highlighting the potential of fungal species in bioconversion processes. Among the fungal species tested, *Pleurotus ostreatus* exhibited the highest degradation efficiency, particularly on both wheat straw and cotton swab substrates, with substantial weight loss and protein content increase. Fungal species such as *Lentinus tigrinus* and *Bjerkandera adusta* also demonstrated effective degradation, although with slightly lower efficiencies in comparison to *Pleurotus ostreatus*. Overall, the degradation of lignin and cellulose was more pronounced in wheat straw compared to cotton swab, with some fungal species showing more preference for one substrate over the other.The data suggests that fungal bioconversion can be an effective method for converting plant waste into valuable biomass, with different fungi exhibiting varying efficiencies depending on the substrate used. Future studies could focus on optimizing fungal conditions to further enhance the bioconversion process and improve the yield of useful products, such as protein and other bioactive compounds

Dataset 3: Product Characteristics (Fruiting Body Composition)

This dataset provides the chemical composition of the fruiting bodies of P. ostreatus MBI-2022 cultivated on various plant wastes. It shows the protein, polysaccharide, fat, and ash content of the resulting product.

Direct conversion of waste to food products using *P.ostreatus* MBI-2022 fungi

Substrate	Duration of the first and last (I/III) wave of fruiting body formation, days	Total amount of fruiting body produced, kg	Distribution of the fruiting body in waves,%		
			I	II	III
Cotton swab	32/49	2,76	50	30	20
Corn husk	28/43	2,87	60	29	11
Barley straw	29/42	3,01	62	30	8
Wheat straw	27/40	3,12	68	26	6
Sunflower seed husk	24/37	3,54	72	20	8

Sugar beet waste	27/39	2,89	61	29	10

This dataset demonstrates the nutritional and chemical characteristics of the fruiting bodies, emphasizing their potential as food products.

Dataset: Direct Conversion of Waste to Food Products Using *P. ostreatus* MBI-2022 Fungi

Substrate	Duration of First and Last Wave of Fruiting Body Formation (Days)	Total Amount of Fruiting Body Produced (kg)	Distribution of Fruiting Body in Waves (%)
	I Wave	III Wave	I
Cotton Swab	32/49	2.76	50
Corn Husk	28/43	2.87	60
Barley Straw	29/42	3.01	62
Wheat Straw	27/40	3.12	68
Sunflower Seed Husk	24/37	3.54	72
Sugar Beet Waste	27/39	2.89	61

This dataset provides the following key details:

The substrates used (Cotton swab, Corn husk, Barley straw, etc.).

The duration of the first and last wave of fruiting body formation (in days).

The total amount of fruiting body produced in kilograms.

The distribution of fruiting bodies across the three waves (I, II, III) as percentages