EDUCATIONAL STANDARD – TRADITIONAL, INNOVATIVE, EMERGING, SUSTAINABLE PROCESSES

I. GENERAL

This standard defines the content criteria of the database for traditional, innovative, emerging and sustainable processes, developed within the E-Food project. The standard aims to develop educational content, guaranteeing an opportunity for its users to familiarize themselves with various processes and their application for food production.

In the sense of this **document DATA BASE FOR TRADITIONAL, INNOVATIVE, EMERGING, SUSTAINABLE PROCESSES** (**DBTIESPr**) are educational materials used by the partners in the project, and in the future also by the students in the partner universities, aimed at familiarizing its users with different types of processes used in the production of food products.

DBTIESpr consists of two related units – a table describing the main elements of the processes (the name of the process, the country that will develop it, and the main products for which it is used) and a description of the process presented in the form of a structure defined by this standard.

The main functions of **DBTIESpr** are:

➢ Acquaintance of the users of the database with the main elements of each process that is used for the production of one or several types of food products;

➢ Analyzing and understanding the possibilities for innovation of the relevant process, as well as the development of innovative processes based on the knowledge obtained;

➢ Practical application of the acquired knowledge, skills and acquired professional competences;

➢ Analyzing, conceptualizing and realizing the educational goals and the learning content presented in the database;

➢ Conceptualizing and implementing integrative links between study subjects in one or more professional fields or between study disciplines or modules in the learning process at partner universities;

The following criteria should be applied when developing a **DBTIESpr**:

- ***A clearly defined target group*** that will use the educational content presented in the database;
- ***Clearly and accurately formulated purpose*** for applying the database;
- ***Information provision***, guaranteeing the fulfillment of the goals and tasks of the project, and at a later stage the possibility of using the database in the education of students;

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- ***Sufficiency of the information and application of appropriate forms for its presentation***;
- ***Appropriate visual presentation and illustration and completeness of content***.

II. MAIN STEPS FOR DEVELOPMENT OF DBTIESpr

1. DRAFT PREPARATION	
Step 1	
1. Preparation	Defining the goals and objectives of the database. Development of the database structure.
Step 2	
1. Draft	The authors plan to prepare a draft. If several authors prepare individual elements of the database, the structuring process is led by the project coordinator.
2. Formatting	The relevant database structures are prepared and the necessary content adjustments are made.
3. Editing	This operation aims to achieve clarity, good organization, connectivity of the text in the database.
4. Audit	An internal or external auditor/reviewer reviews the prepared structure and content of the database.
5. Inclusion of the auditor's opinion	When correcting the database, its structure and content, the reviewer's notes are taken into account. The project coordinator makes the appropriate adjustments.
Step 3	
1. Preparation of final version and structure	A vision of the structure of the description of the materials in the database is drawn up. An example is being developed.
2. Selection of photos, illustrations, tables, graphs, charts and more	Selection of illustrations, tables, graphs, charts, reference and supplementary material to be used in the development of the particular product.
3. Initial layout	Review the original text of the material and place the graphic elements
4. Team review of design and initial layout	The team responsible for preparing the materials reviews and comments on all aspects of the design and evaluates how the text fits.
5. Check and audit	Compliance checks are made and changes are made if necessary.
6. Finalizing specifications	Finalization of the material and preparation for publication on the learning platform.
2. FINALIZATION AND PUBLICATION OF MATERIALS ON THE PLATFORM	
Step 1	
1. Text finalizing	The content of the material is being finalized.
2. Improvements to the design and layout of the final text	Finalizing design and text.

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	3. Final review by the team	The teams perform a final review before publication.
	4. Final checks	Minor and non-essential changes may be made. Completing the files.
	Step 2	
	1. Internal audit	An internal audit is performed by a partner team member.
	2. External audit	Selected materials are subject to an external audit by a specialist from practice or a professor from a university outside the partner countries.
	3. Publish to the platform	The finished materials, which have been internally and/or externally audited, are published on the training platform.
	Step 3	
	1. Approbation and use of materials	Implementation of the prepared materials in order to identify errors, incorrect elements of the texts and graphic elements, inconvenience of navigation, etc. During the period of use, ongoing fixes and replacement of compromised files are allowed.
	2. Adding changes to the file	Correction of the content of the teaching materials and aids based on the results of the approval (examination).

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III. *DATABASE STRUCTURE FOR TRADITIONAL, INNOVATIVE, EMERGING, SUSTAINABLE PROCESSES (DBTIESPr)*

NAME OF THE PROCESS	*The name of the process is given in English.*	***3 cm/4 cm photo of the process***
SHORT DESCRIPTION OF THE PROCESS	*A brief description of the process is made, indicating the data from the database – type of process, type of food products produced by the respective process and others.* ***Volume: maximum up to 500 characters (with spaces); recommended – up to 350 characters (with spaces)***	
DESCRIPTION OF THE PROCESS	*A detailed description of the process is made, including chemical formulas if necessary. The main stages of the process and its applicability in food production are described. The main equipment used for the relevant process is described. Please describe whether the process is sustainable, traditional or innovative. The advantages and disadvantages of the respective process are described.* ***It is recommended that the number of diagrams and photos not exceed 4. Diagrams/photographs should be embedded in the text appropriately.*** ***Volume: maximum - up to 3500 characters (with spaces); recommended – up to 2000 characters (with spaces).***	
SAFETY CONCERNS	*Basic safety aspects of the respective product are presented. It is of particular importance to present the possibilities for ensuring food safety through the application of the relevant process.* ***Volume: maximum up to 500 characters (with spaces); recommended – up to 350 characters (with spaces)***	
POSSIBILITIES FOR INNOVATIONS	*In this segment, basic descriptions of the possibilities for innovation of the relevant process are made - application of a new type of equipment, changes in the relevant regime, use of different types of microorganisms and others.* ***Volume: maximum up to 500 characters (with spaces); recommended – up to 350 characters (with spaces)***	
OTHER ASPECTS	***Volume: maximum up to 500 characters (with spaces); recommended – up to 350 characters (with spaces)***	
REFERENCES	For each process, up to 10 references are presented, formatted according to the requirements: • Journal Articles: ✓ Author 1, A.B.; Author 2, C.D. Title of the article. *Abbreviated Journal Name* **Year**, *Volume*, page range.	

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	• Books and Book Chapters: ✓ Author 1, A.; Author 2, B. Book Title, 3rd ed.; Publisher: Publisher Location, Country, Year; pp. 154–196. ✓ Author 1, A.; Author 2, B. Title of the chapter. In Book Title, 2nd ed.; Editor 1, A., Editor 2, B., Eds.; Publisher: Publisher Location, Country, Year; Volume 3, pp. 154–196. • Unpublished materials intended for publication: ✓ Author 1, A.B.; Author 2, C. Title of Unpublished Work (optional). Correspondence Affiliation, City, State, Country. year, *status* (*manuscript in preparation*; *to be submitted*). ✓ Author 1, A.B.; Author 2, C. Title of Unpublished Work. *Abbreviated Journal Name* year, *phrase indicating stage of publication* (*submitted*; *accepted*; *in press*). • Websites:„ ✓ Title of Site. Available online: URL (accessed on Day Month Year). Unlike published works, websites may change over time or disappear, so we encourage you create an archive of the cited website using a service such as WebCite. Archived websites should be cited using the link provided as follows: ✓ Title of Site. URL (archived on Day Month Year).

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IV. SAMPLE DATABASE MATERIAL LAYOUT FOR TRADITIONAL, INNOVATIVE, EMERGING, SUSTAINABLE PROCESSES (DBTIESPr)

NAME OF THE PROCESS	***ALCOHOL FERMENTATION***	
SHORT DESCRIPTION OF THE PROCESS	Alcoholic fermentation is a biochemical process caused by specific microorganisms (yeast, some bacteria and molds) that break down sugars (monosaccharides) into ethanol and carbon dioxide. In this process, some bi-other products are also formed in small quantities and heat is released. The process is used in the production of alcoholic beverages, in the bakery industry and others.	
DESCRIPTION OF THE PROCESS	The breakdown of carbohydrates in anaerobic conditions with the release and mobilization of energy is called fermentation. In general, bioenergy processes can take place in the absence of O_2 (anaerobic) and in the presence of O_2 (aerobic). When they are performed under anaerobic conditions, the acceptor of hydrogen are intermediate metabolites of catabolism. Yeast degrade carbohydrates using the Embden-Maerhof-Parnas pathway, generating energy in the form of ATP. Pyruvic acid is decarboxylated by the enzyme pyruvate decarboxylase and acetaldehyde and CO2 are obtained. Acceptor of the hydrogen from the dehydrogenases is acetaldehyde. $CH_2COCOOH <———> CH_3CHO + CO_2$ Ethanol and CO_2 are waste products that the cells released into the environment. Alcohol fermentation is characteristic for fungi of the genus *Saccharomyces*, as well as fungi of the genus *Monilia* and the genus *Oidium*. Raw materials for ethanol production have to be annually reproducible in amounts enough for industrial processing – cereals (wheat; barley; rye; corn; millet; oat; sorghum); molasses; potatoes; glucose-fructose syrups; Jerusalem artichoke; Lignocelluloses (wood, leaves, and industry wastes).	

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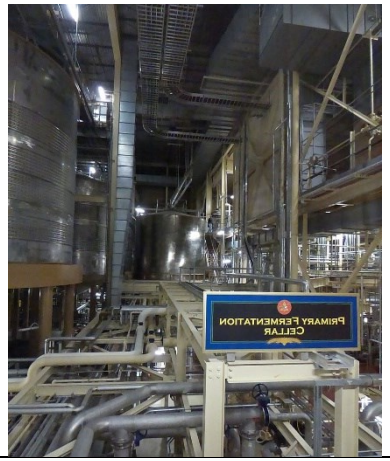
	Alcohol fermentation is the basis for the fermentative production of ethanol, wine, beer and bread. CO_2 plays a major role in the formation of the porous structure of the dough and the bread.   Microorganisms performing alcohol fermentation and application of alcohol fermentation and the employed microorganisms. Alcohol fermentation is the key process in the production of beer, ethyl alcohol, rum, wine and other low-alcoholic drinks, bread, etc. This variety of different products obtained as a result of alcohol fermentation is directly dependent on the fermentable substrate and yeast strains applied for the very fermentation process. The yeasts applied for a long time in the production of specific products are called cultural yeasts. Based on the nature of the conducted fermentation, cultural yeasts are divided into top-and bottom-fermenting yeast strains. Top-fermenting yeasts cause rapid and turbulent fermentation at a temperature of 20-28 °C with formation of a significant amount of foam. The cells are located on the surface of the fermentable medium. Bottom-fermenting yeasts grow inside the substrate at a temperature of 5-10 °C and do not pass into the surface layer. Fermentation is slow and relaxed. Flocculates are formed often. Ethanol yeasts, bread yeasts and some brewers' yeasts are in the group of the top-fermenting yeasts, while the majority of wine and brewers' yeast are bottom-fermenting yeasts. Yeasts are a source of protein (single-cell protein) and vitamins of the B complex. In the cultivation of yeasts of the genera *Candida*, *Torulopsis* and *Trichosporon* in suitable media and conditions, a significant amount of microbial protein is generated. It is applied to balance animal feed in protein content.
SAFETY CONCERNS	*Alcohol fermentation is an environmentally safe process. A source of new strains, carrying alcohol fermentation, are various spontaneously fermented foods from the usual diet of modern man. Thus, these foods are an inexhaustible source of strains carrying alcohol fermentation.*

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POSSIBILITIES FOR INNOVATIONS	*A source of new strains, carrying alcohol fermentation, are various spontaneously fermented foods from the usual diet of modern man. Thus, these foods are an inexhaustible source of strains carrying alcohol fermentation.*
OTHER ASPECTS	-
REFERENCES	1. Denkova, Z.; Murgov I. Microbiology, 2nd ed.; Academic Publisher of UFT, Plovdiv, Bulgaria, 2000. 2. Osman, M.E.H.; Abo-Shady, A.M.; Elshobary, M.E.; Abd El-Ghafar, M.O.; Hanelt, D.; Abomohra, A. Exploring the Prospects of Fermenting/Co-Fermenting Marine Biomass for Enhanced Bioethanol Production. Fermentation 2023, 9, 934. https://doi.org/10.3390/fermentation9110934 3. Castillo, A.B.; Cortes, D.J.D.; Sorino, C.F.; Soriño, C.K.P.; El-Naas, M.H.; Ahmed, T. Bioethanol Production from Waste and Nonsalable Date Palm (Phoenix dactylifera L.) Fruits: Potentials and Challenges. Sustainability 2023, 15, 2937. https://doi.org/10.3390/su15042937

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