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Traces and fate of *lactobacillus plantarum* isolated from indigenous Iranian dairy product: a comprehensive review.

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ABSTRACT

In Iran, a country characterized by diverse ecosystems and abundant biodiversity, both dairy and non-dairy local products are produced. These products and native plants include numerous lactic acid bacteria that can be isolated and identified. Among these, dairy products stand out as a rich source of *Lactobacillus Plantarum*. This bacterium plays a vital role in inhibiting pathogen growth, tolerating acidic and bile conditions, and producing exopolysaccharides. As a probiotic, *Lactobacillus Plantarum* offers health benefits to consumers. Our research focused on indigenous *Lactobacillus plantarum* strains isolated from local Iranian dairy products, revealing the country's genetic reservoir of this bacterium and other *Lactobacillaceae* family members. These findings pave the way for further exploration, including isolation, identification, and industrial applications. According to previous studies, it can be concluded that indigenous *Lactobacillus Plantarum* strains of different parts of Iran are probiotics and have a starter role that we can use on an industrial scale to produce probiotic products and Starter applications according to the characteristics of each isolated strain. However, *Lactobacillus plantarum* strains isolated from some nstive foods are not fit for commercial applications due to their poor technical resilience, low competitiveness, and weak antibacterial characteristics. As a result, both researchers and industry professionals must carefully assess the type and origin of native *Lactobacillus plantarum* strains before using them in industrial processes. This review study showed that each native *Lactobacillus plantarum* isolate has distinct characteristics, which will make their unique properties extremely valuable for developing co-starters, single or mixed starter cultures, and future superfoods.

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1-Introduction

Nowadays, the rising consumption of dairy products like yogurt and doogh has led countries to prepare a large quantity of necessary starters to produce these products. On the other hand, efforts to enhance production efficiency and industrialize these products have involved the manipulation of starters. However, the lack of precise information about these engineered strains poses a significant challenge in the realm of food hygiene and consumer health. Currently, two strains of *Lactobacillus delbrueckii* ssp *bulgaricus* and *Streptococcus thermophilus* are used to produce yogurt. In the not-far past, indigenous mixed starters were employed to produce dairy products. These traditional products exhibit a diverse range of aroma and taste profiles, which can be attributed to the rich microbial flora present in them. Over centuries, indigenous starters have remarkably adapted to the preferences and physiological conditions of inhabitants across various climates. The selection of these bacteria has occurred naturally over thousands of years, influenced by factors such as taste preferences, food culture, climatic conditions, and other aspects of body microbiomes. [1-3].

Due to industrialization, many of the diverse bacteria present in traditional dairy products have been lost. Nowadays, yogurt production primarily relies on just two bacterial strains. However, understanding the natural combination of starter and non-starter microbial flora from traditional products allows us to create a starter that produces a healthy and standardized product while preserving the essential characteristics of these foods. According to this discussed subject and the studies conducted by researchers, it seems that non-starter flora isolated from dairy and even non-dairy products can be used to produce indigenous starters on an industrial scale. In this review study, an attempt has been made to investigate the potential of *Lactobacillus Plantarum* bacteria isolated from indigenous Iranian dairy products to use in the production of industrial mix starters. Lactic Acid Bacteria (LAB) are used as starters in the production of various fermented dairy and non-dairy products. These bacteria exhibit saccharolytic activity and possess a fermentative metabolism and Most of them produce Lactic Acid as their final product [1].

Driven by the demands of various countries and the significant economic potential of lactic acid bacteria (LAB), particularly in developing nations, extensive endeavors have been undertaken to discover and isolate indigenous LAB. For nearly a century, researchers have diligently worked to identify and use these bacteria for industrial applications [4].

Considering Iran's vast territory and diverse climates, there is substantial potential to identify industrially valuable Lactic Acid Bacteria (LAB). Recent studies on local products across various provinces in the country revealed a rich biodiversity of these bacteria, particularly in dairy products. Consequently, these products serve as valuable sources for isolating and identifying LAB . [5, 6] Notably, studies show that local yogurt is the most important source for isolating these bacteria [4, 7].

Throughout history, humanity has greatly benefited from the extensive family of Lactic Acid Bacteria (LAB) in the production of fermented products. This diverse group includes 224 species and 29 subspecies. Among them, *Enterococci, Leuconostoc, Pediococci, Lactococci, Streptococci,* and notably, *Lactobacillus*, stand out. *Lactobacillus plantarum*, in particular, holds a significant place in nature due to its presence in various plants across diverse habitats and climates. Lactic Acid Bacteria (LAB) have significantly influenced the production of various fermented foods, whether

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intentionally or unintentionally. However, their impact extends beyond food production. These bacteria also play a vital role in shaping the microbiome of the digestive system. *Lactobacillus plantarum* exhibits heterofermentative behavior. When fermenting both hexose and pentose sugars, it generates carbon dioxide, ethanol or acetate, and lactic acid [1, 8-10].

Also, Thanks to its diverse antimicrobial metabolites, *Lactobacillus plantarum* possesses several beneficial features. These include inhibiting and preventing the growth of undesirable bacteria, such as pathogens and spoilage bacteria. Additionally, it contributes to reducing the risk of digestive system infections and the development of inflammatory bowel disease. [10-13].

research indicates that this bacterium has been successfully isolated from various Iranian local foods, including yogurt, milk, olives, honey, kefir, vinegar, tarragon, and chal. Notably, it is also utilized in probiotic products, both in dairy and non-dairy food items [14]. studies conducted on various local and traditional products including various dairy items from different regions in Iran, have consistently identified abundant indigenous Lactic Acid Bacteria (LAB). For instance, the research conducted by Leshni et al. in 2016 revealed that *Lactobacillus plantarum*, isolated from honey across 13 Iranian provinces, possesses probiotic abilities and can effectively inhibit *Staphylococcus aureus* bacteria. [15].

Numerous studies have investigated the strains found in Iran's indigenous dairy products over recent years. These findings are summarized in Table 1.

through our examination, we relized that *Lactobacillus Plantarum* plays a crucial role in indigenous Iranian dairy products. Interestingly, this bacterium is rarely used in industrial dairy starters. Consequently, its presence highlights the importance of exploring how it affects the technological characteristics of diverse dairy items. In this article, an attempt has been made to uncover the secret of *Lactobacillus Plantarum's* presence with a comprehensive review of indigenous Iranian dairy products.

Table 1. Isolation and identification of *Lactobacillus plantarum* present in some indigenous products of Iran.

author	year	isolation source	isolation location	isolated strains	Characteristics
[15]	2018	Honey	88 honey samples from 13 provinces	4 isolates of *Lactobacillus Plantarum*	**It was shown that Iranian honey has species of *lactobacillus paracasia* and *lactobacillus Plantarum*, which have a good inhibitory effect on pathogen bacteria, including *Staphylococcus aureus*.**
[16]	2016	Yogurt	Goat, cow, and sheep yogurt of Yazd province	12 isolates, which were 7 strains of *Pediococcus* and 5 *lactobacillus* from *Lactobacillus Plantarum*, *L.*	**The resistance to acidic conditions in the *lactobacillus* was better than *Pediococcus*. (pH= 2.5)**

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author	year	isolation source	isolation location	isolated strains	Characteristics
				Fermentom, and *Lactobacillus Kefiry*.	
[17]	2012	Cheese	Koozeh cheese of East Azerbaijan province	28 strains were isolated that belonged to three species of *Lactobacillus: Lactobacillus Plantarum, Lactobacillus delbruki* and *Lactobacillus casei*.	**among these strains, it has been found that some can tolerate pH=3.**
[18]	2020	Doogh, curd, cheese, and butter	A sampling of traditional workshops in East Azerbaijan province (doogh, curd, cheese, and butter) was performed.	In this study, in addition to *Lactobacillus Plantarum*, other *lactobacillus* were identified and isolated, such as *Lactobacillus casei* and *L.acidophilus*.	**these bacteria can tolerate acidic and alkaline conditions. In this study, it is also recommended that these isolated bacteria can be used as starters**
[19]	2018	traditional cheese	24 samples collected from 8 different traditional cheeses in West Azerbaijan province	A total of 118 *lactobacillus* strains were isolated, including *Lactobacillus Plantarum*	**The results of this study showed that *Lactobacillus Plantarum*, *Lactobacillus Casei,* and *Lactobacillus helveticus* are good compounds of starters with acceptable Permanence. These strains can also be used in the production of industrial cheese to obtain the exclusive properties of traditional cheese**.
[20]	2015	yogurt and traditional cow milk	A sampling of traditional yogurt and traditional cow milk	A total of 14 bacterial strains from the area were identified.	**In addition to having probiotic properties, these strains also had the potential to be used in the dairy**

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author	year	isolation source	isolation location	isolated strains	Characteristics
			available in Khoy City		**industry as a starter, as well as tolerance of the acidic conditions of the stomach and bile salts**.
[21]	2017	Yogurt	Kerman province yogurt sampling Yogurt and Doogh and cheese and fermented milk	The isolation of 47 lactic acid bacteria, of which 12 were probiotic. Among these 6 were *Padiococcus acidilactici* and 6 other cases *lactobacillus plantarum*, *lactobacillus fermentum*, *lactobacillus brevis*, *lactobacillus casei*	**The isolated bacteria can tolerate the acidic conditions of the stomach and bile salts and have probiotic potential. These bacteria have the potential of probiotics and can be used in functional products.**
[22]	2018	Horre	Horre, Khuzestan Province	Isolation of *Lactobacillus plantarum* and *Lactobacillus fermentum*	**The two isolated strains can tolerate bile salts and acidic pH, so we can use them in the industry as probiotics**.
[23]	2011	Milk, doogh, and curd	Sampling of Iranian milk, Doogh, and curd	Isolation of *Lactobacillus* species *Lactobacillus plantarum* *Lactobacillus casei* *Lactobacillus brevis*	**The isolated bacteria had high cholesterol absorption potential and 18 strains could tolerate pH = 2.5, so it was suggested that this strain could be used as a probiotic in the industry. Also, these bacteria had an antagonistic effect on indicator pathogen bacteria**.

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[24]	**2017**	**Motal cheese**	**Unidentified**	**19 isolates were of the *Lactobacillus* genus, of which 4 *Lactobacillus plantarum* isolates were identified**	**Probiotic and technological features were not evaluated.**
[25]	2021	milk and yogurt	10 samples of traditional milk and yogurt from 5 rural areas of Mianeh city, Azerbaijan province	58 isolates of acid tolerant LAB. *Lactobacillus plantarum, Lactobacillus casei.*	**These two bacteria (*Lactobacillus plantarum, Lactobacillus casei*) can prevent biofilm formation by *Pseudomonas aeruginosa*.**
[26]	2009	Local Yogurt	18 examples of yogurt from the tribes of Fars province	22.3% of isolated *Lactobacillus* bacteria were *Lactobacillus plantarum* strains (124 isolates)	**In this study, *L. plantarum* bacteria were not dominant in local yogurt**. **The isolated bacteria can be used as a starter in the dairy industry and more studies should be done on them in the future**.
[27]	2018	dairy products	Eastern regions of the country (isolated strains were taken from the laboratory)	*Lactobacillus plantarum*	**This *L. plantarum* can produce gamma-amino acid**.
[28]	2018	local Cheese, yogurt, and Doogh made from sheep and cow milk.	90 samples of dairy products from the villages around Mahabad city	*Lactobacillus plantarum* was isolated, 46% of the strains were from cheese, 13% of the strains were from yogurt, and 36% of the strains were from Doogh.	**According to the upcoming study, cheese is a more suitable environment for the growth and purification of lactobacilli than yogurt and doogh. The dominant microflora in milk was the *Lactobacillus plantarum* bacteria.**
[29]	2021	Cow and sheep milk. and vegetables. Jug cheese	Bookan city and Selmas Cow and sheep milk and vegetables	Three strains isolated *Lactobacillus plantarum* KMJC4	**In this study, *Lactobacillus brevis* and *Lactobacillus plantarum* were introduced as probiotic strains.**

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	(vegetable + cow milk) *L. Brevis* KMJC1 (cow and sheep milk) *L. curvatus* KMJC3 (cow and sheep milk) *Lactobacillus acidophilus* KMJC2 (cow milk, sheep milk).	***Lactobacillus Plantarum* had the highest antibiotic power against pathogenic bacteria such as *Listeria monocytogenes*, *Escherichia coli*, *Staphylococcus aureus*, *Bacillus cereus*, and *Salmonella enterica* subsp. *Enterica* serovar *Typhimurium* (*S. Typhimurium*).** ***L. plantarum* had the highest adhesion strength** **All strains except *L. curvatus* could tolerate the simulated environment of the gastrointestinal tract**. **These bacteria can be used in the pharmaceutical and food industries as probiotics.**

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[30]	**2009**	**Traditional yogurt**	**194 samples of local Qashqai and Bakhtiari tribe yogurts**	**102 species of lactobacilli were identified. Some of these lactobacilli included: *L. casei, L. gasseri, L. acidophilus, L. salivarius, L. delbrueckii* and *L. plantarum***	**These strains have antimicrobial effects on enteropathogenic bacteria such as *salmonella typhi* and *E. coli*, and *L. casei* had the most effect. These isolated bacteria have probiotic properties**.
[31]	2011	traditional dairy products yoghurt, cheese	Gorout and shour, Different regions of Ardabil province (Moghan and Meshkin Shahr)	38 species of lactic acid were identified. 12 species were *Lactobacillus* and 26 species were Enterococci. In this study, *L. plantarum* was also part of these bacteria.	**The isolated strains can grow at low pH. They can tolerate pH=2.5 and bile salt of 0.3%. at pH=4 all isolates have inhibitory ability against pathogens such as *E. coli* PTCC 1399, *yersinia enterocolitica* ATCC 1159, and *Listeria innocua* DSMZ 20649. some of these isolates can also have this ability at pH=6.5.**
[32]	2016	(cheese, yogurt, curd, and tarkhineh)	100 samples from rural areas of Kermanshah (20 samples of each product)	9 types of LAB bacteria were isolated, and *L. plantarum*15HN was also a part of them	**This isolated *Lactobacillus plantarum* can grow at low pH. It can also prevent the growth of 13 pathogen-indicator bacteria**. **It prevents the adhesion of pathogens to the cells of the digestive system (the lowest adhesion of *E. coli* was when indigenous *L. plantarum* was used.)**
[24]	2017	Raw milk motal cheese	6 samples from the rural areas of Mughan Plain, Ardabil	19 strains of *Lactobacillus* were identified, of which 4 were *Lactobacillus plantarum*.	**In this study, it was found that these *lactobacillus plantarum* strains are capable of producing plantarisin A and plantarisin EF, which can have an antimicrobial effect on bacteria such as**

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					***Escherichia coli* ATCC 25922, *Listeria innocua* ATCC 33090, and *Staphylococcus aureus* ATCC 25923. It was also found that those strains which produce bacteriocin have the potential to be used as starters and co-cultures.**
[33]	2012	traditional yogurt and cheese	30 samples of Chaharmahal and Bakhtiari province yogurt and cheese	43 isolates were identified	**Lactic acid production was higher at 37 C° than at 25 C°. Optimal production of lactic acid.** **proper tolerance of acidity and salt**. **in case of conducting additional studies, we can use them in the food industry.**
[34]	2021	7 yogurt samples from different parts of Behbahan city	Traditional yogurt	4 *Lactobacillus* bacteria were isolated. *L. plantarum* *Lactobacillus buchneri* *Lactobacillus casei*, *Lactobacillus acidophilus*	**All the isolated lactobacilli could produce bacteriocin that in this study, *L. plantarum* had the greatest inhibitory effect on pathogenic bacteria *Shigella dysenteriae* *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Micrococcus luteus* due to the production of bacteriocin.** **The produced bacteriocins were resistant to the effects of pH and heat, but were sensitive to proteolytic enzymes and became inactive**. **The produced bacteriocins can be used as biological preservatives in the food industry**

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[35]	**2017**	**cheese, whey, yogurt, and yogurt drinks (Doogh)**	**37 samples of dairy products from villages around Khorram Abad, Lorestan province**	**7 strains of *Lactobacillus casei* and 5 strains of *L. Plantarum* Two strains of *Saccharomyces cerevisiae* and 2 strains of *Bacillus subtilis* were identified**	**The strains obtained in this study are most sensitive to antibiotics and can hydrolyze fatty acid and casein. In this study, two strains of *L. plantarum* SYL5 (one strain from yogurt and the other from cheese) a strain of *S. Cerevisia*e DDy2, and two strains of *L. casei* AKL2, DDL2 had the most technological features and they can be used as starters**.
[36]	2006	Traditional Iranian Liqvan cheese	8 samples of Liqvan cheese from Liqvan village	215 strains were isolated and identified after fermentation as *Lactobacillus* (46%), *Enterococcus* (42%), and *Pediococcus* (12%). Lactobacilli were very similar to *Lactobacillus plantarum*.	**Production of CO2 from glucose. Production of CO2 from gluconate. Fermentation of ribose, mannitol, sucrose, lactose, sorbitol, and melibiose. Growth at 15 °C.**
.[37]	2016	kashk-e zard and tarkhineh	23 samples of kashk-e zard(Sistan and Balochistan province) And 27 sampels of tarkhineh from kordestan province.	One of the isolated strains was *Lactobacillus plantarum* (other strains were also isolated)	**8 samples of Liqvan cheese from Liqvan village The isolated strains had antimicrobial ability against indicator microbes, and their cell extracts also had an inhibitory effect on pathogenic bacteria.**
[38]	2014	Cheese	Cheese 24 samples of 8 types of cheese in the west of Iran	118 strains were isolated and identified.18 % of isolate was *Lactobacillus plantarum*.	**We can use the isolated strains to produce starters on an industrial scale. Starter species including *Lactobacillus agilis, Lactobacillus plantarum,* and**

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					Lactobacillus casei **can be used and exploited on an industrial scale.**
[39]	2019	khiki cheese	14 samples of khiki cheese from Semnan city	105 isolates from the family of lactic acid bacteria were identified, of which 52 were *Lactobacillus* strains, 53.6% were *Lactobacillus plantarum*, 32.7% were *Lactobacillus paracasei*, and 13.7% were *L. casei*	**The isolated strains can be used for food starters.**
[40].	2017	yogurt, doogh, curd Shiraz Cheese, and Tarkhineh	200 samples of yogurt, doogh, curd Shiraz Cheese, and Tarkhineh	A total of 92 strains were isolated, including *Lactobacillus*, *Lactococcus*, and *Leuconostoc*, of which *L. Plantarum* was also a part of them.	**among the isolated strains *L. plantarum* 15HN, *Lactococcus lactis subsp, cre moris* 44L and *E. mundtii* 50H had tolerance to low pH and bile salts, desirable antimicrobial activity, and acceptable antibiotic sensitivity, and they can be introduced as new probiotics to the food industry**
[41]	2021	Caw's and sheep's Koomeh	5 samples of Caw's and 3 samples of sheep's Koomeh from Naein City	In total, 15 bacterial isolates were identified	**6 out of 15 isolates had characteristics such as good resistance to pH=2.5. 60 ٪ of the isolated strains were sensitive to bile salts, the isolates had good antimicrobial effects and had high antibiotic resistance. The isolates could reduce 70% of cholesterol in the environment.**

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[42]	2016	Chal (fermented camel milk)	Chal samples prepared from Turkmen Sahara in Golestan province	*Lactobacillus* strains: (*L. plantarum*, *L.paraplantarum*, *L. kefiri,* *L. gasseri,* *L. paracasei)* *Leuconostoc*: (*Leu. Lactis*) *Weissella*: (*W. cibaria*) *Enterococcus*: (*E. faecium*)	**Some strains showed antioxidant ability. In this study, camel's milk and cow's milk (Tehran Kaleh Company) were fermented by these strains, and *Leucnostoc lactic* bacteria had the highest radical scavenging activity compared to other strains. Finally, it was suggested that we can use the fermented milk of camels and cows as new functional foods.**
[43-45]	2016 2009 2010	Liqvan cheese	Iranian traditional Lighvan cheese over manufacturing and ripening	125 isolates were isolated, 36 of them were *Lactobacillus* isolates, and *Lactobacillus plantarum* and *L.Paraplantarum* were also present.	**in this study, *Lactobacillus paracasei* was the strain that can be used as an industrial food starter or co-culture.**
[46]	2013	Milk, Cheese, Yogurt, Doogh And Curd	10 samples of each product were collected from nearby villages and Jahrom city	In total, 50 *Lactobacillus* strains were isolated, 9 of them were *Lactobacillus plantarum* strains. Three *L. plantarum* isolates can inhibit *E. coli*, *Salmonella typhimurium,* and *H. pylori* pathogens. *L. Plantarum* strains were isolated from milk and yogurt.	**19 of these bacteria have a growth-inhibiting effect on pathogenic bacteria such as *Salmonella typhimurium*, *E. coli,* and *Helicobacter pylori*. Purification, identification, and use of *Lactobacillus* bacteria from native foods and use as probiotics in dairy products are useful for the prevention and treatment of gastrointestinal infections.**
[47]	2015	Sheep yogurt and ewe colostrum	In total, 100 samples were prepared.	125 isolates of lactic acid bacteria were isolated. 17	***L. plantarum* 17C and *L. plantarum* 13C isolated from colostrum**

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				strains belonged to *Lactobacillus*, among these strains, there was *Lactobacillus plantarum*. 3 of the strains were *L. Plantarum*	**They have the ability to tolerate low pH and bile salts and have favorable antimicrobial activity, on the other hand, they also have acceptable antibiotic sensitivity.** ***L. plantarum* 17C has antiproliferative effects on the HT-29 human colon cancer cell line.**
[48]	2013	Yogurt	50 yogurt samples from northern Iran, Guilan province	*L. plantarum* was isolated along with other lactobacilli	**The isolated lactobacilli are resistant to acidic conditions and bile salts** **They have a good antimicrobial effect on the studied pathogens** **These isolates can be used on an industrial scale.**
[49]	2014	Yogurt	60 yogurt samples from Khuzestan, Khorasan, Yazd, Fars, Guilan, Mazandaran, Kerman, Shahrekord	137 isolates of *Lactobacillus* were isolated, among which *Lactobacillus plantarum* was also present	**The isolates are ready to produce volatile compounds and check their starter properties, and more studies should be done on them**.
[50]	2016	Milk and yogurt	5 samples of Khorasan Razavi goat and ewe yogurt and 1 sample of milk	102 strains were isolated, among which *Lactobacillus plantarum* was also present	**The majority of identified strains could be used as starters**. **There is a need to investigate volatile compounds for the use of strains on an industrial scale Indigenous starter culture may help preserve and enhance the properties and authenticity of traditional yogurts.**

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[51]	**2012**	**yogurt and cheese**	**yogurt and cheese**	**In this study, five species of *Lactobacillus plantarum*, two species of *Lactobacillus brevis,* and one species of *Lactobacillus casei* were accurately identified from 22 isolates that were isolated from traditional dairy products.**	**They had probiotic properties.**
[38]	2014	Cheese	24 samples of traditional cheese in the West Azerbaijan region	118 *Lactobacillus* strains were isolated, and most of the isolated bacteria were *Lactobacillus plantarum*, *Lactobacillus casei, Lactobacillus delbrueckii,* and *Lactobacillus agilis.*	**They had probiotic properties and pH tolerance**
[52]	2010	Liqvan cheese	1 kg traditional Liqvan cheese (with a shelf life of 4 months	The most abundant lactobacilli isolated and identified based on biochemical and morphological tests were facultative heterofermentative lactobacilli,	**These bacteria are responsible for creating the special flavor and taste of Liqvan cheese by using the activities of lipolysis and proteolysis**.

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				especially *Lactobacillus plantarum* and *Lactobacillus casei*. The dominant species isolated from Liqvan cheese were *Lactobacillus plantarum*, *Lactobacillus casei,* and *Lactobacillus paracasei*	
[53]	2019	traditional Poosti cheese	Iranian traditional Poosti cheese	The isolated species included *Lactobacillus plantarum* (S12E, S7B, S14D, S8D, S32E and S8C) and other species included *Lactobacillus paracasei* (S5D), *Lactobacillus acidophilus* (S37A), *Lactobacillus brevis* (S15B) and *Lactobacillus L. buchneri* (S15C).	***Lactobacillus plantarum* S32E bacterium is the most stable against the simulated conditions of the stomach and intestine. Also, *Lactobacillus plantarum* S12E and *Lactobacillus acidophilus* S37A were more sensitive to antibiotics and compared to the reference strain, they showed a significant ability to reduce cholesterol**.

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[54]	**2015**	**Yogurt, curd and cheese**	**Yogurt, curd and cheese**	**9 Lactobacillus strains were isolated**	• **2 *L. Plantarum* strains along with one *Lactobacillus* *Lactobacillus pentosus* strain had the highest biosurfactant production capacity. The biosurfactants produced by these two bacteria showed a suitable ability in the emulsifying cation process.** **The highest amount of biosurfactant production for *Lactobacillus plantarum* strain is at 37°C and for *Lactobacillus pentoses* strain is at 30°C. The production of this biosurfactant in both strains is at neutral pH.**
[55]	2014	traditional dairy products cheese, yogurt, curd, and tarkhineh	in total, 200 samples of traditional dairy products	Molecular identification showed that the isolated strains were *Lactobacillus plantarum* 15HN (yogurt) and *Lactococcus lactis* ssp *Lactis* 44Lac (cheese)	**Among the isolates, these two strains showed significant probiotic properties. They were also resistant to bile salt and low pH. *Lactobacillus plantarum* strain 15HN showed high antagonistic activity against *Salmonella typhimurium*, *S. marcesens*, *Staphylococcus aureus*, *L. monocytogenes*, *Klebsiella pneumoniae*, *S. flexneri*, *Pseudomonas aeruginosa*, *S. mutans*, *S. sapriphyticus* subsp. *saprophytic* and indigenous *Escherichia coli*. Also, this strain was sensitive and semi-sensitive to antibiotics chloramphenicol, tetracycline, erythromycin, ampicillin, gentamicin,**

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					clindamycin, sulfamethoxazole, and penicillin and resistant to vancomycin. The prescreening results showed that *L. plantarum* 15HN secretion metabolites can significantly enhance the growth of human cancer cells with no significant effects on human normal cells at in vitro condition
[56]	2013	Milk, cottage cheese, cheese (one day old), ripened cheese (three months old) Liqvan.	10 samples of milk, cottage cheese, cheese (one day old), and ripened cheese (three months old) Liqvan were studied as 4 stages of the cheese production process.	in total, 95 strains of the genera *Lactobacillus*, *Lactococcus*, *Enterococcus*, *Pediococcus,* and *Leuconostoc* were identified and isolated in all production stages.	**The most species in all stages of production were: *Lactococcus lactis* subspecies *lactis* (25.26%), *Lactobacillus plantarum* (20%), *Enterococcus faecium* (15.78%), and *Enterococcus faecalis* (15.78%). According to the obtained results, it seems that these dominant species play an important role in the ripening and production process of Liqvan cheese and it is possible to use these species on an industrial scale**.
[57]	2020	Yogurt, cheese, Kaymak, doogh, curd and milk	50 traditional dairy products (yogurt, cheese, Kaymak, doogh, curd and milk)	16 *Lactobacillus* strains were isolated: Of which seven strains were *Lactobacillus plantarum*.	**Blood sugar levels and diabetes symptoms were significantly reduced in the diabetic rats treated with *Lactobacillus plantarum* and *Lactobacillus reuteri*.** **Also, the results showed that the rats that were affected by *lactobacillus* had the maximum weight in the fourth week and the minimum weight in the first week**

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[58]	**2021**	**traditional cheese**	**6 Samples of traditional cheese**	**in total, 7 *Lactobacillus* strains were identified and isolated. The results of sequences statistical analysis showed that *Lactobacillus* species belonged to *Lactobacillus plantarum*, *Lactobacillus brevis*, *Lactobacillus acidophilus,* and *Lactobacillus casei*.**	**It was also found that these strains have good probiotic and technological potential. The results of safety and health aspects showed that these strains can be used for human consumption. In this research, the highest self-aggregation and coagulation were observed in *Lactobacillus acidophilus* strain B14 (51.3%) and *Lactobacillus plantarum* strain B20 (43.6%). *Lactobacillus plantarum* strain B20 and *Lactobacillus acidophilus* strain B14 showed the highest probiotic activity.**
[59]	2021	Yogurt, cheese, milk and whey	10 samples of Yogurt, 5 samples of cheese, 8 samples of milk, and 5 samples of whey	24 strains of LAB, including *Lactobacillus plantarum*	**The results of this study show that the new C1 strains of *Lactobacillus plantarum* together with chitosan nanoparticles can have synergistic effects in reducing aflatoxin type B1 in food products. Also, the results showed that this strain has extensive microbial activity and good probiotic activity, and it is also resistant to erythromycin, Fusidic acid, gentamicin, kanamycin, nalidixic acid, neomycin, Ofloxacin, and vancomycin antibiotics**
[7]	2017	Koozeh Paneer (Iranian Koozeh	five samples of Koozeh cheese were randomly collected from the rural areas of Mazandaran	8 strains of LAB including 4 *Lactobacillus plantarum*	**Antagonistic activity against some pathogens (highly inhibiting the activity of *E. coli*). ((According to the analyses, *L. fermentum***

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	traditional cheese)	province including Babol, Cherat, Alasht, Shirgah,and Firouzkouh.	**(MT.ZH893 and MT.ZH993) and *L. plantarum* MT.ZH593 are the best probiotics among the tested ones. Results showed that all the LAB strains were potetial probiotics to develop new formulations for designing functional food products with health-promoting properties)).**

2- background

In Iran, research on lactobacilli primarily focuses on their application in the food industry, particularly in enhancing dairy product quality [1]. Due to Iran's diverse local products, much research has been conducted to identify and isolate indigenous bacterial strains. For instance, a study by Salimi et al in 2013 isolated *Lactobacillus* strains from raw milk in Ardabil province. These indigenous strains include *Lactobacillus plantarum*, *Lactobacillus. acidophilus*, *Lactobacillus. curvatus*, and *Lactobacillus. casei*. Similarly, *Lactobacillus. plantarum* and *Lactobacillus. brevis* were found in raw milk from Sarab City, Ardabil and their acidic activity and performance were confirmed suggesting their potential as starter in the industry.[6]. This topic is so important that other countries also isolate indigenous bacteria for their commercial use in industry because indigenous bacteria have the potential to produce regional local products on an industrial scale. In Iran, most research on isolating and identifying lactobacilli in food has focused primarily on dairy products. Fewer studies have explored lactobacilli in other types of food [60]. According to the studies, the most numerous bacteria in ripened cow and sheep cheeses are *Lactobacillus plantarum* and *Lactobacillus casei*[52]. Also, according to the research conducted by Ahmadi et al., *Lactobacillus agilis* and *Lactobacillus plantarum* were the dominant species isolated from Liqvan cheese made from sheep's milk[61].

2-1- some researches on indigenous products

In the study conducted by Qadiri Afshar et al. in 2018, it was shown that *Lactobacillus* bacteria can be isolated from olives. In this research, 4 strains of *Lactobacillus plantarum* and 1 strain of *Lactobacillus acidophilus* were isolated from Iranian olive samples [62].

In 2015, Emami et al. showed that *Lactobacillus plantarum* isolated from local Iranian olives has antimicrobial ability against *Shigella dysentery* (PTCC1188) and *Escherichia coli* (PTCC1399). In this research, 57% of the isolated strains were *Lactobacillus plantarum*[63].

Also, this bacterium has been isolated from the raw sources of indigenous Iranian plants, such as The rhizosphere of Lenjan rice roots in Isfahan province. this isolated bacterium has probiotic properties [64].

furthermore, in the study conducted at Lahijan Azad University, researchers identified 23 isolates of *Lactobacillus* on 80 samples of fresh vegetables (cabbage, silage, and cucumber) in spring. Among these, three isolates of *Lactobacillus plantarum*, two isolates of *Lactobacillus casei*, and one isolate of *Lactobacillus brevis* demonstrated the highest capacity to withstand acidic conditions and bile salts within the digestive system. Also, these isolated strains had antimicrobial properties

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against pathogenic bacteria, *Staphylococcus aureus* PTCC 1431, *Salmonella typhimurium* PTCC 1639, and *Escherichia coli* PTCC 1399 [65].

Lactobacillus plantarum is commonly found in isolates from local products in Iran and other countries, and it exhibits unique efficiency. Notably, research by Antara NS et al. in 2004 demonstrated that using multiple starters have advantages on microbial and physicochemical characteristics of orutan (an Indonesian fermented sausage). In fact the use of Multiple starters effectively neutralizes the activity of *Enterobacteriaceae.* In contrast, the use of single starters results in delayed neutralization. *Lactobacillus plantarum and Pedicoccus acidolactis* are particularly effective as multiple starters. [66].

In 2007, Scherlink and Vandami employed 19 different sugars for the biochemical identification of lactobacilli. These sugars included glucose, galactose, fructose, mannose, arabinose, rhamnose, xylose, lactose, sucrose, trehalose, cellobiose, maltose, mannitol, raffinose, inositol, sorbitol, salicin, gluconate, and squalene. Notably, during this test, strain IL 127 exhibited similar behavior to *Lactobacillus plantarum*, fermenting rhamnose, while *Lactobacillus plantarum* itself did not[1].

Through dipeptidase, aminopeptidase, endopeptidase and proteinase activities in *Lactobacillus plantarum* and other local mesophilic lactobacilli isolated from Parsabad traditional metal cheese, the production of small peptides and volatile amino acids was observed. These Component contribute to the creation of aromatic compounds and a pleasant taste in these local cheeses. Research indicates that mesophilic *lactobacillus* bacteria, including *Lactobacillus plantarum*, *Lactobacillus curvatus*, and *Lactobacillus paracasei*, play a crucial role in enhancing the flavor profile of traditional Metal Cheese. [2]

On the other hand, *Lactobacillus plantarum* bacteria isolated from indigenous Iranian dairy products can be used as a probiotic in the industry [20, 21, 67].

In a research conducted in 2013 on isolating *Lactobacillus plantarum* from cheese and exploring its potential as a probiotic, researchers discovered that *Lactobacillus plantarum* CJLP55 possesses unique probiotic properties. Notably, this strain exhibits high resistance to conditions resembling the digestive system and is also resilient against antibiotics like vancomycin and polymyxin B. Furthermore, it demonstrates an antibacterial effect against pathogenic strains, making it valuable for various applications in the dairy industry [67].

In a study by Hirano et al., the cell-free supernatant from *Lactobacillus crispatus* and *Lactobacillus plantarum* exhibited inhibitory effects on various pathogenic bacteria, including *Listeria monocytogenes*, *Yersinia enterocolitica*, and *Staphylococcus aureus*. These effects were observed through the creation of inhibition zones [68].

also In the study of Pour Shaker et al., the antimicrobial effect of indigenous *Lactobacillus Plantarum* isolated from local dairy products in the Nadushan region of Yazd was observed [69]. *Lactobacillus plantarum* bacterium was also isolated from Iranian Liqvan cheese, which has applicable and important characteristics. this bacterium exhibits high efficiency in terms of both acid production and proteolytic activity. It should be said that Besides *Lactobacillus plantarum*, other lactobacilli demonstrate similar characteristics. For instance, indigenous *Lactobacillus casei*, isolated from Liqvan traditional cheese, exhibits properties comparable to those of indigenous *Lactobacillus plantarum* [36].

In 2008 Kubota et al. investigated biofilm formation by LAB and their resistance to environmental stresses and it was discovered that

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among the three examined *Lactobacillus* strains, only *Lactobacillus plantarum* and *Lactobacillus brevis* were capable of forming stable and concentrated biofilm surfaces [70]. This highlights the significance of this bacterium in biofilm formation and its practical applications in the industrial context.

On the other hand, the *Lactobacillus.plantarum* strain isolated from Liqvan cheese has a high ability to produce exopolysaccharides and has been able to significantly reduce inflammation and heal skin wounds in rats [71].

The results of another study by Nasrabadi et al. demonstrated that *Lactobacillus plantarum* isolated from Iranian traditional cheese has a significant effect on stomach ulcers caused by acetic acid in rats [72].

In research which is conducted by Hernando et al., molecular analysis showed that two strains isolated from dairy products (traditional cheese and yogurt) belonged to *Lactobacillus plantarum* strain HBM-IAUF-1 and *Lactococcus lactis* HBM-IAUF-8. In this study, *Lactobacillus plantarum* HBM-IAUF-1 exhibited the highest cytotoxicity against SK-BR3 cancer cells after 72 hours, with a concentration of 1000 µl/ml. Similarly, *Lactococcus lactis* HBM-IAUF-8 demonstrated the highest cytotoxicity under the same conditions, but at a concentration of 500 µl/ml. The findings indicated that incorporating traditional and organic dairy products, along with increasing utilization of probiotics in the food industry, may contribute to cancer prevention [73].

"Nasrabadi et al. isolated lactobacilli strains from Babol and Semnan cheeses. These strains demonstrated in vitro tolerance to acidic and bile salt conditions, as well as the ability to bind to Caco-2 cells, which was variable. Furthermore these strains could potentially colonize the human intestine, although further studies are needed to confirm this [74].

In a 2016 study by Ghafourian et al., exopolysaccharide-producing bacteria, including *Lactobacillus plantarum* and two other *Lactobacillus* strains, were inoculated into camel milk. As a result, lactose fermentation products such as lactic acid and extracellular polysaccharides were produced. These modifications enhance the acceptability of the final product for consumers. Additionally, the antioxidant activity of the product increased, making it suitable as a prebiotic offering. On the other hand, keeping this product at the temperature of the refrigerator after 14 days, increased its antioxidant properties, which means that we can consider a shelf life of 14 days in the refrigerator for such a product [75].

In another study focused on the ripening process of a specific type of Dutch cheese, it was found that *Lactobacillus plantarum* and *Lactobacillus casei* convert citrate into several compounds, including CO_2, acetone, diacetyl, acetate, and 2,3-butanediol. Notably, CO_2 gas contributes to creating pores within the cheese, while the other mentioned compounds enhance the cheese's favorable aroma and taste. [76].

"In a study by Abdolahi et al., it was demonstrated that *Lactobacillus plantarum* can inhibit the growth of *Helicobacter pylori* in mixed culture under in vitro conditions. This inhibition is attributed to the production of lactic acid and bacteriocin. furthermore it could be used as a probiotic for in vivo research [77].

In a separate study, *Lactobacillus plantarum* isolated from camel milk also exhibited this capability and caused the largest diameter in the inhibition zone of *Helicobacter pylori* bacterium. As a result, the consumption of probiotic foods has been recommended to the public and people who suffer from digestive diseases [78].

In another study, *lactobacillus* bacteria have inhibited the growth of this pathogen and an inhibition zone has been formed [46].

Research shows that this bacterium can be used to produce functional drinks with health benefits for consumers. Rahim Abadi et al. demenstrated that it is possible to produce a synbiotic malt

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drink with suitable nutritional and biochemical characteristics by using three probiotic strains of *Lactobacillus plantarum*, *Lactobacillus casei,* and *Lactobacillus acidophilus*. On the other hand, synbiotic samples with probiotic microorganisms had better antioxidant activity than the control sample.in this case, *Lactobacillus plantarum* bacterium had less antioxidant activity than the other two bacteria [79].

Lactobacillus plantarum has the ability to produce plantaricin bacteriocin, which finds application in the food industry as a preservative. Additionally, the optimal growth conditions for *Lactobacillus plantarum* isolated from Iranian Tarkhineh under in vitro conditions(table 2) make it a potential candidate for producing probiotic foods [80].

Table 2. The optimal condition for the growth of *Lactobacillus plantarum* T5jq301796.1 bacterium isolated from Iranian Tarkhineh under invitro condition.

Measured parameters	**The optimum condition of each parameter**
pH	**7.26**
Glucose	**25.96 gl-1**
Yeast extract	**1.82%**
Stirring	**40rpm**
Temperature	**37-40°C**
maximum viable cell in the batch fermentation	**10^{10} CFU ml-1**

Iranian food-derived *Lactobacillus plantarum* bacteria, in addition to the mentioned characteristics, have the ability to mitigate the harmful effects of aflatoxin B1 in humans. Their use represents a suitable biological solution for reducing this toxin and enhancing food safety [81].

According to the studies, the role of mesophilic lactobacilli in the production of aromatic substances and the aroma and flavor of traditional cheeses has been confirmed. For example, it has been demonstrated in a research on Fossa (pit) cheese that *Lactobacillus plantarum*, *Lactobacillus curvatus*, and *Lactobacillus paracasei* bacteria generate free amino acids and small peptides through their aminopeptidase, dipeptidase, proteinase, and endopeptidase activities. These compounds ultimately contribute to the delightful aroma and flavor of the cheeses. on the other hand, *Lactobacillus plantarum* and *Lactobacillus casei* bacteria produce co2, which plays a role in creating voids in cheese [82].

In 2019, Gandomi et al. investigated the adhesion properties of 5 strains of *Lactobacillus plantarum* isolated from traditional Siahmazgi cheese. The results showed that these 5 strains have favorable coagulation, hydrophobicity, and cell adhesion. These isolates could be good candidates as promising probiotics for use in functional foods including dairy products [83].

Lactobacilli isolated from Metal Cheese have shown different technological characteristics. Strains of *Lactobacillus brevis* (m4, m9) and *Lactobacillus plantarum* (m16) exhibit significant proteolytic activity. Additionally, *Lactobacillus. plantarum* m19 demonstrates the highest acid production activity. These strains hold promise as potential candidates for use in the industry as starters or pseudo starters [84].

On the other hand, Yazdi et al. identified and isolated 28 strains of LAB using the 16S rRNA method from 7 samples of Zaboli yellow curd. The majority of these isolates were classified

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within the genus *Lactobacillus*, accounting for 24.09% of the strains. They can be used on an industrial scale [85].

In another study conducted by Behbahani et al. *Lactobacillus plantarum* L15 which was isolated from Hureh Khuzestan, exhibits an antagonistic impact on *E. coli* bacteria. This particular bacterium demonstrates anti-adhesion properties and competes effectively against the pathogen and making it a viable alternative for combating this pathogen [86].

In a research studied by Farhang Far et al., they investigated 22 isolates of *Lactobacillus plantarum* obtained from Siahmazgi cheese. Their findings revealed that 5 strains exhibited favorable characteristics, including tolerance to acidic conditions and bile salts, robust growth kinetics at low pH, survival in simulated digestive conditions, and antibacterial activity. Notably, strains F2 and F7 demonstrated even greater resistance. Consequently, these specific strains hold promise as potential new probiotic candidates for future investigations [87].

On the other hand, Traditional Iranian yogurts are a valuable source of LAB. so it is necessary to develop more quantitative and qualitative research on the isolation and identification of new LAB isolates from local yogurts to introduce dairy starters and probiotic microorganisms [88].

In the study conducted by Joghatai et al. on *Lactobacillus plantarum* isolated from Liqvan cheese and human feces, they concluded that due to the favorable probiotic and anticancer properties, they could be used for industrial and clinical applications [89].

In a 2020 study by Shahrampour et al, they demonstrated that pectin alginate edible film significantly enhances the survival of *Lactobacillus plantarum* KMC45 bacterium. These edible films could serve as a promising medium for delivering probiotics and creating functional foods [90].

In a study conducted by Abutaleb et al. in 2020, they demonstrated the feasibility of isolating and identifying Lactic Acid Bacteria (LAB), particularly *Lactobacillus*, from raw camel milk. The findings revealed that these isolated strains not only exhibit protective and functional effects for consumers but also hold potential applications in both the dairy and pharmaceutical industries. [91].

in their 2015 study, Gandomi et al. isolated 71 strains of *Lactobacillus* from Siahmazgi cheese. To assess bacterial growth profiles, they employed a modified liquid culture medium under specific conditions similar to those found in fermented sausages. Among these strains, 5 *Lactobacillus plantarum* strains exhibited high acid activity and pH reduction capabilities when cultured in MRS medium at 30°C for 24 hours and 40°C for 48 hours, resulting in an average pH of approximately 4. Remarkably, all 5 strains (except LSCD11) demonstrated growth tolerance in a 10% salt. Additionally, these strains displayed antimicrobial properties against pathogenic bacteria such as *Listeria monocytogenes*, *Staphylococcus aureus*, and *Escherichia coli* O157:H7. Notably, the LSCD7 and LSCD14 strains stood out for their excellent technological attributes, making them suitable candidates as starters in the production of fermented meat products [83].

In a 2018 study conducted by Adeli et al. they isolated and identified *Lactobacillus plantarum* from raw camel milk sourced from different regions of Kerman. Alongside other bacteria such as *Weissella confusa*, *Leuconostoc mesenteroides*, and *Weissella paramesenteroides*, *Lactobacillus plantarum* exhibited significant antibacterial activity against two pathogens: *Staphylococcus aureus* subsp *aureus* PTCC1431 and *E. coli* ATCC25922. Notably, these isolated probiotics demonstrated a stronger antimicrobial effect against *Staphylococcus aureus* bacteria compared to *E. coli* [92].

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In a 2020 study conducted by Mousavizadeh et al. in Mazandaran province, researchers identified 5 strains of *Lactobacillus plantarum* bacteria. These strains were investigated and found to exhibit inhibitory effects against the *Pseudomonas aeruginosa* bacterium.[93].

In their research on the antifungal properties of *Lactobacillus plantarum* and *Lactobacillus brevis* bacteria isolated from Iranian Liqvan cheese and Metal cheese, Afzali et al. found that *Lactobacillus plantarum* exhibited the highest inhibitory effect or clear zone after *Lactobacillus. brevis*. This effect was compared to the indicator yeasts *Rhodotorula mucilaginosa PTCC 5257*, *Saccharomyces cerevisiae PTCC 5269*, and *Kluyveromyces lactis PTCC 5185*[94].

In the study, researchers isolated 16 strains from Metal Cheese, out of which 6 strains were identified as *Lactobacillus plantarum*. Additionally, it was demonstrated that *Lactobacillus brevis* exhibited the highest antimicrobial ability against the specified yeasts [95].

In 2014, Vasei et al. isolated 54 strains of *Lactobacillus* from Tarkhineh, a traditional Iranian fermented cereal-based food. Among these isolates, there were 19 strains of *Lactobacillus plantarum*, 17 strains of *Lactobacillus fermentum*, 8 strains of *Lactobacillus brevis*, 9 strains of *Lactobacillus pentosus*, and 1 strain of *Lactobacillus diolivorans*. The rep-PCR profiles revealed that *Lactobacillus plantarum* exhibits high intraspecies diversity. Notably, three of these strains demonstrated significant probiotic potential, including two strains of *Lactobacillus plantarum* and one strain of *Lactobacillus fermentum* [97]. In another study conducted by Nami et al. in 2019, *Lactobacillus plantarum* YS5 was isolated from homemade yogurt in different regions of the country. This bacterium exhibits the ability to reduce high cholesterol and has a strong impact on lowering serum cholesterol levels. Notably, it lacks dangerous properties such as BSH activity, antibiotic sensitivity, and hemolytic activity. On the other hand, the specific strain demonstrates significant anti-pathogenic effects, along with a high tolerance to acid and bile salts, hydrophobicity, and self-aggregation. Further research is recommended to explore the functional effects of this bacterium for potential use as a probiotic strain in the industry. The study findings highlight its high probiotic potential, suggesting that *Lactobacillus plantarum YS5* could be employed in the food industry to create low-cholesterol products for individuals with hypercholesterolemia [98].

In their study, Bahadori et al. examined 131 *Lactobacillus* bacteria from 123 samples of pasteurized and local milk and cheese. The primary objective was to identify and investigate the presence of the beta-galactosidase enzyme gene in *Lactobacillus plantarum* strains. Notably, this gene was observed in the standard strain *Lactobacillus plantarum RITCC 1273* and 29 other samples of *Lactobacillus plantarum* band bp 399. The findings suggest that utilizing probiotic bacteria that produce beta-galactosidase can enhance the nutritional value and digestibility of dairy products, benefiting individuals with lactose intolerance [99].

In a 2011 study focused on isolating lactic acid bacteria (LAB) from local dairy products, researchers obtained 20 isolates from *Lactobacillus* subspecies. it was found that most of the strains absorbed over 75% of cholesterol from their environment and demonstrated strong antimicrobial effects against pathogens. Additionally, these bacteria displayed resilience in the acidic pH of the stomach and intestinal environment. Notably, *Lactobacillus plantarum*, *Lactobacillus brevis*, and *Lactobacillus casei* isolated from local

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yogurt and cheese also exhibited antimicrobial properties and efficient cholesterol absorption. Based on these findings, the lactobacilli isolated from local products hold promise for use in functional food production and as starters [23].

In a 2020 study by Mousavizadeh et al. focusing on local Iranian dairy products (yogurt, curd, and kefir), researchers isolated 5 strains of *Lactobacillus plantarum* bacteria with antimicrobial abilities. Notably, these isolated strains demonstrated the ability to inhibit the growth of Escherichia coli. Furthermore, increasing the dosage of this bacterium plays a nutritional role in promoting overall health. As result it is recommended to utilize these bacteria for the production of starter cultures [100].

In a study conducted in Iran on curd, pickles, and tuna, researchers successfully isolated lactic acid bacteria (LAB) from these foods. The dominant bacterium identified in this study was *Lactobacillus plantarum*. Notably, the isolated strain exhibited significant effectiveness in preventing pathogenic bacteria associated with foodborne diseases. Importantly, this strain did not produce biogenic amines and demonstrated the ability to produce lipase enzymes. However, it was not resistant to common antibiotics. These LAB strains hold potential for use as starter cultures in the food industry and can also use as preservatives to extend shelf life. Additionally, *Lactobacillus plantarum* strains (LBC1, LBP1, and LBT1) isolated from fermented foods showed inhibition against pathogens such as *Vibrio parahaemolyticus*, *Salmonella Typhimurium*, *Pseudomonas aeruginosa*, *Pseudomonas fluorescens*, *Staphylococcus aureus*, and *Escherichia coli*. [101]. Moreover, In the study conducted by Hamzelu et al. *lactobacillus* bacteria were isolated from local yogurt in Tehran, Sanandaj, and Golpayegan, Iran. Among these isolates, certain lactobacilli strains were found to have the capability to produce group B vitamins (B2, B3, B6, B9). it is recommended that these bacteria can be used in the production of functional foods [102].

In a 2014 study, researchers investigated 18 samples of gelatinous cheese and 15 samples of yogurt prepared from Chahar Mahal and Bakhtiari provinces. During this study, *Lactobacillus plantarum* was identified. Specifically, two strains were found in yogurt, and five strains were detected in cheese [103].

In another study by Jafarei et al. in 2019, researchers isolated *Lactobacillus plantarum* bacteria from 60 samples of local Iranian dairy products, including yogurt, doogh, dry curd, and semi-dry curd (15 samples of each product). These samples were collected from villages in the Fars province. [104].

3- Results

Numerous research studies conducted by various researchers have focused on local products such as Khiki cheese, Olive Raw milk, Doogh, Yogurt, Horreh, and Tarkhineh. These products are prepared from domesticated animals and plants found in different regions. The investigations have revealed the presence of several lactic acid bacteria, including *Pediococci* such as *Pediococcus acidulactis*, *Lactococci* sach as *Lactococcus lactis* subspecies *lactis*, *Enterococci* sach as *Enterococcus faecium*, *Bifidobacteria* and Lactobacilli including *Lactobacillus casei* and *Lactobacillus fermentum*, *Lactobacillus delbrueckii*, *Lactobacillus brevic*, *L.buchneri* and *Lactobacillus acidophilus* and specially *Lactobacillus plantarum*. these isolated bacteria have capabilities such as inhibiting the growth of pathogens, tolerating acidic and alkaline conditions, probiotic properties, and the ability to produce exopolysaccharides. in addition to these features, they have industrial and commercial potential and can be used in the industry [15, 17, 21, 105].

The studied sources show that the bacterium *Lactobacillus plantarum* as a potential local

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probiotic has a high ability to produce functional fermented dairy products because it brings many benefits from different aspects of health and functional properties for the consumer. On the other hand, Recent research on Iranian non-dairy products, including olive, has demonstrated the efficacy of this bacterium in preventing and treating infections caused by pathogens such as *Shigella dysentery* and *Escherichia coli* as a practical and important method [63]. Studies also show that soil rhizosphere bacteria, especially *Lactobacillus*, play a great role in plant health and growth in different ways [106].

Given the growing preference for industrial dairy products over traditional ones and the high cost of imported commercial starters, there is an opportunity to use this bacterium for commercial purposes. By doing so, we can produce dairy products with an authentic Iranian flavor profile while also preserving this valuable national genetic resource. Moreover, there exists an opportunity to decrease reliance on imported commercial starter cultures from foreign nations. This approach not only yields economic benefits but also mitigates foreign exchange outflows from the country. It is recommended that more studies are needed for the exploitation of this probiotic bacteria and the properties of biofilm formation by them and other indigenous bacteria. Furthermore, there is a need for in-depth investigation into the feasibility of developing novel functional products using these bacteria in the form of multi-strain probiotics and single, double, or multiple Starters.

4- CONCLUSION

Research on Iranian local dairy and non-dairy products indicates that *Lactobacillus* bacteria are commonly found in most dairy foods. Notably, no adverse effects have been reported, and these bacteria exhibit several positive effects. Based on findings, some native strains of *Lactobacillus plantarum* can withstand low pH (2.5) and bile salts, grow at 15 °C, and produce postbiotics like γ-amino acids, lactic acid, and plantaricins A and EF; they inhibit a range of pathogens (e.g., *E. coli*, *Salmonella enterica* subsp. *enterica* serovar *Typhimurium*, *Shigella dysenteriae*, *Listeria innocua*, *Listeria monocytogenes*, *Yersinia enterocolitica*, *Pseudomonas aeruginosa*, *Micrococcus luteus*, *Helicobacter pylori*, *Klebsiella pneumoniae*, and *Salmonella flexneri*), help lower environmental cholesterol, work synergistically with chitosan nanoparticles to reduce aflatoxin B_1 in food products, Production ability CO_2 from glucose and galactose, and ferment sugars such as ribose, mannitol, sucrose, and sorbitol.

These findings have cleared the path for future research with the aim of isolating, identifying, and industrially utilizing these bacterial strains. According to previous studies, certain *Lactobacillus plantarum* native strains from various regions of Iran have potential probiotic characteristics and, depending on the unique features of each isolated strain, could be used as starter culture applications and production of industrial probiotic foods. However, *Lactobacillus plantarum* strains isolated from some native foods are not fit for commercial applications due to their poor technical resilience, low competitiveness, and weak antibacterial characteristics. As a result, both researchers and industry professionals must carefully assess the type and origin of native *Lactobacillus plantarum* strains before using them in industrial processes. This review study showed that each native *Lactobacillus plantarum* isolate has distinct characteristics, which will make their unique properties extremely valuable for developing co-starters, single or mixed starter cultures, and future superfoods (including pro-, pre-, post-, para and metabiotic products). Their presence contributes to unique organoleptic properties in

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certain dairy products. These results show that we can use this indigenous bacterium in the production of mixed or multi-strain starters to improve the aroma and taste properties of industrial dairy products.

References:

[1]Durlu-Ozkaya F, Xanthopoulos V, Tunail N, Litopoulou-Tzanetaki E. Technologically important properties of lactic acid bacteria isolates from Beyaz cheese made from raw ewes' milk. Journal of Applied Microbiology. 2001;91(5):861-70.

[2]Ayad EHE, Nashat S, El-Sadek N, Metwaly H, El-Soda M. Selection of wild lactic acid bacteria isolated from traditional Egyptian dairy products according to production and technological criteria. Food Microbiology. 2004;21(6):715-25.

[3]Rezaei Z, Khanzadi S, Salari A. A survey on biofilm formation of Lactobacillus rhamnosus (PTCC 1637) and Lactobacillus plantarum (PTCC 1745) as a survival strategy of probiotics against antibiotic in vitro and yogurt. Journal of Food Processing and Preservation. 2021:e15991.

[4]Rezaei Z, Salari A, Khanzadi S. Biofilm Formation and Antibacterial Properties of Lactobacillus Isolated from Indigenous Dairy Products. Journal of food quality and hazards control. 2021;8(4):162-8.

[6]Kathiresan K, Thiruneelakandan G. Prospects of lactic acid bacteria of marine origin. 2008.

6. SALIMI NS, KHOMIRI M, MAGHSOUDLOU Y, MIRZANAMADI F. Isolation And Identification Oflactobacillus Spp. From Raw Milk And Determination Of Their Acid Producing Ability. 2015.

[7]Tavakoli M, Hamidi-Esfahani Z, Hejazi MA, Azizi MH, Abbasi S. Characterization of probiotic abilities of Lactobacilli isolated from Iranian Koozeh traditional cheese. Polish Journal of Food and Nutrition Sciences. 2017;67(1).

[8]Homayouni A, Azizi A, Ehsani MR, Yarmand MS, Razavi SH. Effect of microencapsulation and resistant starch on the probiotic survival and sensory properties of synbiotic ice cream. Food Chemistry. 2008;111(1):50-5.

[9]Cebeci A, Gürakan C. Properties of potential probiotic Lactobacillus plantarum strains. Food microbiology. 2003;20(5):511-8.

[10]Tavaria FK, Malcata FX. Enzymatic activities of non-starter lactic acid bacteria isolated from a traditional Portuguese cheese. Enzyme and Microbial Technology. 2003;33(2):236-43.

[11]Gonzalez B, Dominguez-Espinosa R, Alcocer B. Use of Aloe vera juice as substrate for growth of Lactobacillus plantarum and L. casei. Ciencia y Tecnología Alimentaria. 2008;6(2):152-7.

[12]Rezaei Z, Khanzadi S, Salari A. Biofilm formation and antagonistic activity of Lacticaseibacillus rhamnosus (PTCC1712) and Lactiplantibacillus plantarum (PTCC1745). AMB Express. 2021;11(1):1-7.

[13]Varnan M, Mohsenzadeh M, Salari A. Antimicrobial Effects of Lactobacillus Plantarum and Pediococcus Acidilactici Bioprotective Starters against Foodborne Pathogens in Fermented Chicken Meats. Iranian Journal of Nutrition Sciences and Food Technology. 2020;14(4):55-66.

[14]Kalantarmahdavi M, Khanzadi S, Salari A. Edible films incorporating with Lactobacillus plantarum based on sourdough, wheat flour, and gelatin: films characterization and cell viability during storage and simulated gastrointestinal condition. Starch-Stärke. 2021;73(9-10):2000268.

[15]Lashani E, Davoodabadi A, Soltan Dallal MM. Antimicrobial Effects of Lactobacillus Plantarum and Lactobacillus Paracasei Isolated from Honey against Staphylococcus Aureus. Babol-Jbums. 2018;20(3):44-9.

[16]Soltan Dallal M, Khesht Zarrin H, Tajabadi Ebrahimi M, Davoodabadi A, Hakimian M, Sadrabadi A, et al. Isolation and biochemical identification of potentially Probiotic lactic acid

[Downloaded from fsct.modares.ac.ir on 2025-08-03]

[DOI: 10.22034/FSCT.22.160.258]

bacteria isolated from traditional yogurt in Yazd province. Tolooebehdasht. 2016;14(6):171-83.
[17]Hassanzadazar H, Ehsani A, Mardani K, Hesari J. Investigation of antibacterial, acid and bile tolerance properties of lactobacilli isolated from Koozeh cheese. Vet Res Forum. 2012;3(3):181-5.
[18]Pourabdi Sarabi P, Tarinejad A, Hejazi M, Majidi M. Tracing of IIa and IIb bacteriocins in native strains of Lactobacillus isolated from traditional dairy products. Journal of Food Hygiene. 2020;10(39).
[19]Ehsani A, Hashemi M, Afshari A, Aminzare M. Probiotic white cheese production using coculture with Lactobacillus species isolated from traditional cheeses. Veterinary world. 2018;11(5):726.
[20]Narimani T, Tari Nejad AR, Hejazi MA. Isolation and biochemical and molecular identification of Lactobacillus bacteria with probiotic potential from traditional cow milk and yogurt of Khoi city. Food Science and Technology. 2015;12(48):115-28.
[21]Sharifi Yazdi MK, Davoodabadi A, Khesht Zarin HR, Tajabadi Ebrahimi M, Soltan Dallal MM. Characterisation and probiotic potential of lactic acid bacteria isolated from Iranian traditional yogurts. Italian Journal of Animal Science. 2017;16(2):185-8.
[22]Vasiee A, Alizadeh Behbahani B, Tabatabaei Yazdi F, Mortazavi SA, Noorbakhsh H. Diversity and Probiotic Potential of Lactic Acid Bacteria Isolated from Horreh, a Traditional Iranian Fermented Food. Probiotics and Antimicrobial Proteins. 2018;10(2):258-68.
[23]Ebrahimi MT, Ouweh AC, Hejazi MA, Jafari P. Traditional Iranian dairy products: A source of potential probiotic lactobacilli. African Journal of Microbiology Research. 2011;5(1):20-7.
[24]AZIZI F, HABIBI NM, EDALATIAN M. IDENTIFICATION OF LACTOBACILLUS BACTERIA ISOLATED FROM TRADITIONAL RAW MILK MOTAL CHEESE USING POLYPHASIC APPROACH. 2017.
[25]Hoseinian M, Gholizadeh P, Ghotaslou A, Ghotaslou R. Lactobacillus spp. Inhibit the Biofilm Formation of Pseudomonas aeruginosa. 2021.
[26]Azadnia P, Khan Nazer A. Identification of lactic acid bacteria isolated from traditional drinking yoghurt in tribes of Fars province. Iranian Journal of Veterinary Research. 2009;10(3):235-40.
[27]Zarei F, Nateghi L, Eshaghi MR, Abadi MET. Optimization of gamma-aminobutyric acid production in probiotics extracted from local dairy products in west region of Iran using MRS broth and whey protein media. Applied Food Biotechnology. 2018;5(4):233-42.
[28]Mahdavi S, Isazadeh A, Hajazimian S, MOGHTARAN BONAB N, Shekar F, Asgharian A. Isolation of Lactobacillus Species from Domestic Dairy Products of Mahabad City. Int J Infect. 2018;5:62152.
[29]Mahmoudi M, Khomeiri M, Saeidi M, Davoodi H. Lactobacillus Species from Iranian Jug Cheese: Identification and Selection of Probiotic Based on Safety and Functional Properties. Applied Food Biotechnology. 2021;8(1):47-56.
[30]Pishva E, Hassannia N, Fazeli MR, Havaee A, Jamalifar H, Hossein MP, et al. Antibacterial effect of authochlorous Lactobacillus strains isolated from traditional yogurts. Pakistan Journal of Nutrition. 2009;8(8):1132-7.
[31]Jafari B, Rezaie A, Alizadeh S. Isolation and identification of potentially probiotic bacteria from traditional dairy products of Ardabil region in Iran. Ann Biol Res. 2011;2:311-7.
[32]Haghshenas B, Haghshenas M, Nami Y, Khosroushahi AY, Abdullah N, Barzegari A, et al. Probiotic assessment of Lactobacillus plantarum 15HN and Enterococcus mundtii 50H isolated from traditional dairies microbiota. Advanced pharmaceutical bulletin. 2016;6(1):37.

[Downloaded from fsct.modares.ac.ir on 2025-08-03]

[DOI: 10.22034/FSCT.22.160.258]

[33]Sarmast Ghahfarokhi E, Mobini Dehkordi M, Beheshtimaal K. Isolation and evaluation of lactic acid production content in native Lactobacillus of Chaharmahal va Bakhtiari province isolated from dairy products. Biological Journal of Microorganisms. 2012;1(3):41-52.
[34]Alizadeh Behbahani B, Noshad M, Jooyandeh H. Assessing Activity and Characteristics of the Bacteriocins Produced by Lactobacilli from Local Yogurts of Behbahan City. Iranian Journal of Nutrition Sciences & Food Technology. 2021;16(2):111-20.
[35]Rahmati F. Characterization of Lactobacillus, Bacillus and Saccharomyces isolated from Iranian traditional dairy products for potential sources of starter cultures. AIMS microbiology. 2017;3(4):815.
[36]Abdi R, Sheikh-Zeinoddin M, Soleimanian-Zad S. Identification of lactic acid bacteria isolated from traditional Iranian Lighvan cheese. Pak J Biol Sci. 2006;9:99-103.
[37]Mashak Z. Antimicrobial activity of lactobacillus isolated from kashk-e zard and tarkhineh, two Iranian traditional fermented foods. Int J Enteric Pathog. 2016;4(2):1-5.
[38]Ehsani A, Mahmoudi R, Hashemi M, Raeisi M. Identification of Lactobacillus species isolated from traditional cheeses of west Azerbaijan. Iranian Journal of Medical Microbiology. 2014;8(1):38-43.
[39]Parsaeimehr M, Khazaei M, Jebellijavan A, Staji H. The Isolation and Identification of Dominant Lactic Acid Bacteria by the Sequencing of the 16S rRNA in Traditional Cheese (Khiki) in Semnan, Iran. Journal of Human, Environment, and Health Promotion. 2019;5(1):15-20.
[40]Haghshenas B, Nami Y, Almasi A, Abdullah N, Radiah D, Rosli R, et al. Isolation and characterization of probiotics from dairies. Iranian journal of microbiology. 2017;9(4):234.
[41]Shemshad N, Roozbeh Nasiraie L, Majidzadeh Heravi R. Isolation of Probiotic Lactobacilli Bacteria from Traditional Naein Dairy Product (Koome). Iranian Journal of Medical Microbiology. 2021;15(1):85-106.
[42]Soleymanzadeh N, Mirdamadi S, Kianirad M. Antioxidant activity of camel and bovine milk fermented by lactic acid bacteria isolated from traditional fermented camel milk (Chal). Dairy Science & Technology. 2016;96(4):443-57.
[43]Kafili T, Emam Djomeh Z, Mayo B. Physiological biodiversity of Lactobacillus strains isolated during traditional Iranian lighvan cheese manufacturing. International Journal of Food Properties. 2013;16(1):9-17.
[44]Kafili T, Razavi SH, Djomeh ZE, Naghavi MR, Álvarez-Martín P, Mayo B. Microbial characterization of Iranian traditional Lighvan cheese over manufacturing and ripening via culturing and PCR-DGGE analysis: identification and typing of dominant lactobacilli. European Food Research and Technology. 2009;229(1):83-92.
[45]Kafili T, Razavi SH, Djomeh ZE, Salehi G-R, Alvarez-Martin P, Mayo B. Antibiotic resistance-susceptibility profiles of Lactobacillus strains from Lighvan, a traditional Iranian raw milk cheese. Milchwissenschaft. 2010;65(1):59-62.
[46]Dorri K, Namdar N, HemayatkhahJahromi V. Isolation of Lactobacilli from Dairy Products and Their Effects on the Main Pathogenic Bacteria in Stomach and Intestine. Medical Laboratory Journal. 2013;7(1):22-8.
[47]Haghshenas B, Nami Y, Haghshenas M, Abdullah N, Rosli R, Radiah D, et al. Bioactivity characterization of Lactobacillus strains isolated from dairy products. Microbiologyopen. 2015;4(5):803-13.
[48]Alikhani F, Dadras H, Tajehmiri A. Isolation, Identification and Analysis of Probiotic Properties of Lactobacillus spp from Traditional Yoghurts in North of Iran. Journal of Pure and Applied Microbiology. 2013;7(4):2965-71.
[49]RoushanZadeh S, Eskandari MH, Shekarforoush SS, Hosseini A. Phenotypic and

[Downloaded from fsct.modares.ac.ir on 2025-08-03]

[DOI: 10.22034/FSCT.22.160.258]

genotypic diversity of dominant lactic acid bacteria isolated from traditional yoghurts produced by tribes of Iran. Iranian journal of veterinary research. 2014;15(4):347-52.
[50]Farimani RH, Najafi MBH, Bazzaz BSF, Edalatian MR, Bahrami AR, Flórez AB, et al. Identification, typing and functional characterization of dominant lactic acid bacteria strains from Iranian traditional yoghurt. European Food Research and Technology. 2016;242(4):517-26.
[51]Molecular Identification of Probiotic Bacteria in Traditional Dairy Products of Azerbaijan using 16S rDNA. Irrigation and Drainage Structures Engineering Research. 2012;13(3):51-62.
[52]Ghotbi M, Zad SS, Sheikh-Zeinoddin M. Identification of facultative heterofermentative Lactobacillus species in Lighvan cheese. Iranian Food Science & Technology Research Journal. 2010;6(2):145-8.
[53]Abdali H, Saei-Dehkordi SS, Mobini-Dehkordii M, Abtahi-Froushani SM. First isolation and molecular detection of autochthonous potential probiotic lactobacilli isolates from Iranian traditional Poosti cheese and their antioxidative activity. Biological Journal of Microorganism. 2019;8(32):25-39.
[54]Kiani P, Mahmoodi MM. Production of biosurfactant by Lactobacillus for using in food industry as a substitution for synthetic emulsifiers. New Cellularand Molecular Biotechnology Journal. 2015;5(19):61-8.
[55]Haghshenas B, Abdullah N, Nami Y, Radiah D, Rosli R, Khosroushahi AY. Different effects of two newly-isolated probiotic Lactobacillus plantarum 15HN and Lactococcus lactis subsp. Lactis 44Lac strains from traditional dairy products on cancer cell lines. Anaerobe. 2014;30:51-9.
[56]Edalatian M, HABIBI NM, Mortazavi S, Nasiri M, Basami M, Hashemi S. Isolation and identification of the indigenous lactic acid bacteria from lighvan cheese. 2013.
[57]Aminian E, Moazamian E, Edatamanesh MA. Effect of Lactobacillus plantarum and Lactobacillus ruteri isolated from dairy products in streptozotocin-induced diabetic rat models. Journal of Food Microbiology. 2020;7(4):59-68.
[58]Barzegar H, Alizadeh Behbahani B, Falah F. Safety, probiotic properties, antimicrobial activity, and technological performance of Lactobacillus strains isolated from Iranian raw milk cheeses. Food Science & Nutrition. 2021;9(8):4094-107.
[59]Zamani N, Sepahi AA, Fazeli MR, Shariatmadari F. The New Probiotic Lactobacillus Plantarum Strain Isolated from Traditional Dairy Showed The Synergistic Effect on Aflatoxin B1 Detoxification Along with Nanochitosan Particles. 2021.
[60]Nahaei M, Dibavar MA. Isolation and Phenotypic Characterization of Lactobacillus Species from Various Dairy Products"" H. Forouhandeh," S. Zununi Vahed," MS Hejazi. Current Research in Bacteriology. 2010;3(2):84-8.
[61]Ahamdi S, Khamiri M, Khosroshahi A, Kashani Negad M. Isolation and identification of Lacic acid bacteria from Lighvan cheeses. J Agric Sci and Natural Res. 2008;3(16):80-91.
[62]Ghadiry-Afshar S, Yalfani R, Ebrahimi M. Isolation and identification of lactobacilli from Iranian olive samples. Iranian Journal of Biological Sciences. 2018;12(4):31-7.
[63]Emami Z, Khalilian E, Shahsanaei M. Isolation of Lactobacillus plantarum from different varieties of Iranian native olives and investigation of their antimicrobial activity against two pathogenic members of Entrobacteriaceae. Biological Journal of Microorganisms. 2015;4(13):139-60.
[64]Nouri S, Nazeri S, Hosseyni P. Isolation and Biochemical and Molecular Identification of Lactobacillus Plantarum Bacteria from

[Downloaded from fsct.modares.ac.ir on 2025-08-03]

[DOI: 10.22034/FSCT.22.160.258]

Rhizosphere of Lenjan Rice. Biological Journal of Microorganism. 2018;7(27):61-71.
[65]Darsanaki RK, Rokhi ML, Aliabadi MA, Issazadeh K. Antimicrobial activities of Lactobacillus strains isolated from fresh vegetables. Middle-east journal of scientific research. 2012;11(9):1216-9.
[66]Antara NS, Sujaya IN, Yokota A, Asano K, Tomita F. Effects of indigenous starter cultures on the microbial and physicochemical characteristics of Urutan, a balinese fermented sausage. Journal of Bioscience and Bioengineering. 2004;98(2):92-8.
[67]Zamani H. Isolation of a potentially probiotic Lactobacillus plantarum from Siahmezgi cheese and its characterization as a potentially probiotic. 2016.
[68]Hirano J, Yoshida T, Sugiyama T, Koide N, Mori I, Yokochi T. The effect of Lactobacillus rhamnosus on enterohemorrhagic Escherichia coli infection of human intestinal cells in vitro. Microbiology and immunology. 2003;47(6):405-9.
[69]Porshaker M, Hesampour A. Investigation of the bactriocin effect of lactic acid probiotic bacteria isolated from dairy products of Nadushan region, Yazd. Feyz Journal of Kashan University of Medical Sciences. 2019;23(1):36-44.
[70]Kubota H, Senda S, Nomura N, Tokuda H, Uchiyama H. Biofilm formation by lactic acid bacteria and resistance to environmental stress. Journal of Bioscience and Bioengineering. 2008;106(4):381-6.
[71]Heydari nasrabadi M, Tajabadi ebrahimi M, Dehghan Bonadaki S, Torabi kajousangi M, Zahedi F. Study the Probiotic Effects of Lactobacillus Plantarum on Cutaneous Wound Healing in Rat. New Cellularand Molecular Biotechnology Journal. 2011;1(1):21-7.
[72]Mitra HN, Helia A, Maryam TE, Farima Z. The healing effect of Lactobacillus plantarum isolated from Iranian traditional cheese on gastric ulcer in rats. African Journal of Pharmacy and Pharmacology. 2011;5(12):1446-51.
[73]Harandi Z, Beheshti Maal k, Monajemi R. The High Anti-cytotoxic Effects of Novel Lactobacillus Plantarum HBM-IAUF-1 and Lactococcus Lactis HBM-IAUF-8 against SK-BR-3 Breast Cancer Cell Line. Biological Journal of Microorganism. 2020;9(36):59-68.
[74] Heidari Nasrabadi M, Tajabadi Ebrahimi M, Bahrami H. Evaluation of colonization ability of lactobacilli isolated from traditional cheese and adherence to epithelial cells of human GI tract, Caco-2 cell line. Journal of Animal Biology. 2009;1(4):27-31.
[75]Ghaforiyan M, Ezzatpanah H, Mohammadi Nafchi A, Tajabadi Ebrahimi M. Lactic Fermentation of Camel Milk via some of Exopolysaccharide Bacteria Generator and Investigation of the Physicochemical and Antioxidant Properties of the Resulted Product. Journal of Food Technology and Nutrition. 2016;13(2):53-64.
[76]Palles T, Beresford T, Condon S, Cogan T. Citrate metabolism in Lactobacillus casei and Lactobacillus plantarum. Journal of Applied Microbiology. 1998.
[77]Abdollahi H, Rezazadeh Zarandi E. Antagonistic Effects of Lactobacillus against Helicobacter pylori in a Gel Stabilized Glucose-Gradient System. Journal of Rafsanjan University of Medical Sciences. 2006;5(2):97-102.
[78]Sikarchi A, Fozouni L. Inhibitory Effect of Probiotic Bacteria Isolated from Camel Milk on Clinical Strains of Drug-Resistant Helicobacter pylori. mljgoums. 2018;12(2):20-6.
[79]Zakipour Rhomabadi N, Sohrabvandi S, Ruzbeh Nasiraie L. Production of Synbiotic Malt Beverage Using Inulin and Different Probiotic Strains of Lactobacillus Bacteria. Iranian Journal of Nutrition Sciences and Food Technology. 2018;13(3):39-46.
[80]Noori F, TAJABADI EM, Jafari P. Growth Optimization of Lactobacillus plantarum

[Downloaded from fsct.modares.ac.ir on 2025-08-03]

[DOI: 10.22034/FSCT.22.160.258]

T5jq301796. 1, an Iranian Indigenous Probiotic in Lab Scale Fermenter. 2016.
[81]Zolfaghari H, Khezerlou A, Ehsani A, Yari Khosroushahi A. Detoxification of Aflatoxin B1 by Probiotic Yeasts and Bacteria Isolated From Dairy Products of Iran. Advanced pharmaceutical bulletin. 2020;10(3):482-7.
[82]Gobbetti M, Folkertsma B, Fox P, Corsetti A, Smacchi E, De Angelis M, et al. Microbiology and biochemistry of Fossa (pit) cheese. International Dairy Journal. 1999;9(11):763-73.
[83]Gandomi H, Farhangfar A, Akhondzadeh basti A, Misaghi A, Noori N. Auto and co-aggregation, hydrophobicity and adhesion properties of Lactobacillus plantarum strains isolated from Siahmazgi traditional cheese. 2019;2(1):1-5.
[84]Nezhad SJE, Dovom MRE, Najafi MBH, Yavarmanesh M, Mayo B. Technological characteristics of Lactobacillus spp. isolated from Iranian raw milk Motal cheese. LWT. 2020;133:110070.
[85]Tabatabai Yazdi F, AliZadeh Behbahani B, Mortazavi SA. Diversity of lactic acid bacteria isolated from yellow zabol kashk using 16S rRNA Gene Sequence Analysis. Journal of food science and technology (Iran). 2017;13(59):25-36.
[86]Behbahani BA, Noshad M, Falah F. Inhibition of Escherichia coli adhesion to human intestinal Caco-2 cells by probiotic candidate Lactobacillus plantarum strain L15. Microbial pathogenesis. 2019;136:103677.
[87]Farhangfar A, Gandomi H, Akhondzadeh Basti A, Misaghi A, Noori N. Study of growth kinetic and gastrointestinal stability of acid-bile resistant Lactobacillus plantarum strains isolated from Siahmazgi traditional cheese. Vet Res Forum. 2021;12(2):235-40.
[88]Khorasgani MR, Shafiei R. Traditional yogurt as a source of lactobacilli and other lactic acid bacteria in Iran. Yogurt in Health and Disease Prevention: Elsevier; 2017. p. 285-94.
[89]Joghataei M, Shahidi F, Pouladfar G, Mortazavi SA, Ghaderi A. Probiotic potential comparison of Lactobacillus strains isolated from Iranian traditional food products and human feces with standard probiotic strains. Journal of the Science of Food and Agriculture. 2019;99(15):6680-8.
[90]Shahrampour D, Khomeiri M, Razavi SMA, Kashiri M. Development and characterization of alginate/pectin edible films containing Lactobacillus plantarum KMC 45. LWT. 2020;118:108758.
[91]Abootaleb M, Mohammadi Bandari N. Isolation and Identification of Lactic Acid Bacteria from Iranian Camel Milk. International Journal of Advanced Biological and Biomedical Research. 2020;8(1):67-74.
[92]Edalati E, Saneei B, Alizadeh M, Hosseini SS, Bialvaei AZ, Taheri K. Isolation of probiotic bacteria from raw camel's milk and their antagonistic effects on two bacteria causing food poisoning. New microbes and new infections. 2019;27:64-8.
[93]Mousavizadeh M-u-S, Mehrabian S, Ashrafi F, Tajabadi Ebrahimi M. Molecular study and probiotic potency of lactic acid bacteria isolated from dairy products in Mazandaran province of Iran and it antagonistic effect on Pseudomonas aeruginosa. International Journal of Molecular and Clinical Microbiology. 2020;10(1):1248-57.
[94]Afzali S, Edalatian Dovom MR, Habibi Najafi MB, Mazaheri Tehrani M, editors. Evaluation of anti-yeast activity of Lactobacillus strains isolated from traditional Iranian cheeses. 6th Asian Federation of Societies for Lactic Acid Bacteria International Symposium (AFSLAB Sym 2018); 2018.
[95]Afzali S, Dovom MRE, Najafi MBH, Tehrani MM. Determination of the anti-yeast activity of Lactobacillus spp. isolated from traditional Iranian cheeses in vitro and in yogurt drink (Doogh). Scientific reports. 2020;10(1):1-11.

[Downloaded from fsct.modares.ac.ir on 2025-08-03]

[DOI: 10.22034/FSCT.22.160.258]

[96]Hajighasemi M, Mojghani N. Identification and Characterization of Probiotic Properties of Indigenous Lactic Acid Bacteria Based on Their Phenotypic and Genotypic Characteristics. Iranian Journal of Medical Microbiology. 2016;9(4):47-54.
[97]Vasiee A, Yazdi TF, Mortazavi A, Edalatian M. Isolation, identification and characterization of probiotic Lactobacilli spp. from Tarkhineh. International Food Research Journal. 2014;21(6):2487.
[98]Nami Y, Bakhshayesh RV, Manafi M, Hejazi MA. Hypocholesterolaemic activity of a novel autochthonous potential probiotic Lactobacillus plantarum YS5 isolated from yogurt. LWT. 2019;111:876-82.
[99]bahadori z, norozi j, akhavan sepahi a, sabzevari j, razavipoor r. Study of β-galactosidase activity in Lactobacilli separated from milk and cheese by biochemical and PCR methods. scientific magazine yafte. 2010;12(1):0-.
[100]MONAVAR-UL-SADAT MOUSAVIZADEH SM, ASHRAFI F, TAJABADI M. Biochemical study and molecular identification of bacteria with probiotic potential in traditional yogurt, kefir, and curd and their antimicrobial effect on Escherichia coli in Mazandaran Province of Iran.
[101]Ansariarab S, Aswathanarayan JB, Vittal RR. TECHNOLOGICAL AND FUNCTIONAL PROPERTIES OF LACTOBACILLUS PLANTARUM ISOLATED FROM IRANIAN FERMENTED FOOD.
[102]Hamzehlou P, Sepahy AA, Mehrabian S, Hosseini F. Production of vitamins B3, B6 and B9 by lactobacillus isolated from traditional yogurt samples from 3 cities in Iran, winter 2016. Applied Food Biotechnology. 2018;5(2):107-20.
[103]RoushanZadeh S, Eskandari M, Shekarforoush S, Hosseini A. Phenotypic and genotypic diversity of dominant lactic acid bacteria isolated from traditional yoghurts produced by tribes of Iran. Iranian journal of veterinary research. 2014;15(4):347.
[104]Jafari M, Rezaei M, Gheisari HR, Abhari K, Khaniki GJ, Noori N, et al. Application of cultivable lactic acid bacteria isolated from Iranian traditional dairy products for the production of liquid and dried kashks. LWT. 2019;116:108519.
[105]Soleimanifard F, Ghobadi Dana M, Piravivanak Z. Screening local Lactobacilli from Iran in terms of production of lactic acid and identification of superior strains. Biological Journal of Microorganisms. 2015;4(15):155-66.
[106]Kamruzzaman M, Khatun S, Islam S, Haque M. Characterization of some rhizospheric bacteria and their plant growth promoting potentialities in nutrient stress environment. International Journal of Innovative Science, Engineering & Technology. 2015;2(9):805-19.

[Downloaded from fsct.modares.ac.ir on 2025-08-03]

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ردیابی و سرنوشت *لاکتوباسیلوس پلانتاروم* جدا شده از لبنیات بومی ایران: مروری جامع

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چکیده

ایران کشوری پهناور و وسیع با تنوع اکوسیستمی و زیستی بالایی است؛ که در آن محصولات بومی خواه لبنی و غیر لبنی زیادی تولید می‌شوند. این محصولات و گیاهان بومی دارای باکتری‌های اسیدلاکتیک متنوعی هستند که می توان آن‌ها را جداسازی و شناسایی نمود. گروهی از این محصولات، فراورده‌های لبنی بوده و منبع غنی از باکتری *لاکتوباسیلوس پلانتاروم* هستند. این باکتری نقش اساسی در جلوگیری از رشد پاتوژن‌ها داشته و همچنین قادر به تحمل شرایط اسیدی، قلیایی و تولید اگزو پلی‌ساکاریدها می‌باشد. به عنوان یک پروبیوتیک، *لاکتوباسیلوس پلانتاروم* می تواند برای مصرف کنندگان سلامت محور باشد. مطالعه ما به ویژگی‌های باکتری *لاکتوباسیلوس پلانتاروم* بومی جداشده از فراورده‌های لبنی ایران، ذخایر ژنتیکی بومی این باکتری و دیگر باکتری‌های خانواده *لاکتوباسیلاسه* پرداخته است. این موضوع زمینه را برای مطالعات بعدی در راستای جداسازی، شناسایی و کاربرد صنعتی این باکتری فراهم نموده است. از نتایج مطالعات پژوهشگران پیشین می‌توان این‌چنین استنتاج کرد که از یک سو سویه‌های *لاکتوباسیلوس پلانتاروم* بومی نقاط مختلف ایران پروبیوتیک بوده و نقش استارتری دارند؛ لذا می‌توان با توجه به ویژگی‌های هر سویه جداسازی شده، آن‌ها را در مقیاس صنعتی برای تولید فراورده‌های پروبیوتیکی و کاربردهای استارتری مورداستفاده قرارداد. و از سوی دیگر باید توجه داشت که سویه های *لاکتوباسیلوس پلانتاروم* جداسازی شده از برخی از غذاهای بومی به دلیل ضعف تکنولوژیکی و پتانسیل رقابتی و آنتی میکروبی پایین توانایی صنعتی شدن ندارند. در نتیجه محققان و صنایع در صورت بهره برداری صنعتی از *لاکتوباسیلوس پلانتاروم* بومی باید در انتخاب نوع و منبع این میکروارگانیسم دقت نمایند. در این مطالعه مروری مطابق با اطلاعات بدست آمده مشخص شد که هر سویه جداسازی شده، دارای ویژگی های متفاوتی با دیگر سویه های جداسازی شده‌ی *لاکتوباسیلوس پلانتاروم* بومی می باشد و بهره برداری از این باکتری، چشم اندازی شگرف در تولید کمک استارترها، سینگل و میکس استارترها و سوپرفودهای آینده خواهد بود.

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