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Synergistic Effects of Medical Plants on Probiotics and Their Applications in Poultry Nutrition

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Abstract

Medical plants and probiotics are important in preserving health because they contain natural therapeutic values and balance of microbes. Plant-derived bioactive compounds when combined with probiotics increase their growth, stability and efficacy. Through this synergistic interaction there is sustainable, antibiotic-free way of enhancing gut health, immunity and productivity especially in the case of poultry nutrition. The current research examines the synergistic interaction between probiotics and medicinal plants and its role in the shortcomings of human health, disease prevention, and nutritional and therapeutic effects. Strains of *Lactobacillus* and *Bifidobacterium* in particular are important in gut homeostasis, immune regulation and in the amelioration of oxidative stress. Their positive impacts have been extended in the management of diabetes, cardiovascular disorders, cystic fibrosis, colon cancer, skin diseases and obesity. Medicinal plants are also good sources of bioactive compounds, which include polyphenols, flavonoids, tannin and dietary fibre, and can be used as direct therapeutic agents, as well as natural prebiotics, which promote the growth and metabolic activity of probiotics. The joint action of the effects of plant-originated substances and probiotic organisms raises antioxidant potential, controls the metabolism of lipids and glucose, and improves the work of gastrointestinal and immune systems. Moreover, this synergistic mixture can provide a sustainable, non-toxic and cost-effective substitute of synthetic drugs and antibiotics, and has potential applications in human nutrition, functional foods, and medical management of poultry.

Keywords: Synergy, Medical Plants, Probiotics, Poultry, Disease Prevention, Microbiota Gut etc.

Introduction

The Indian traditional medical system relied entirely on natural materials, the majority of which were plants that were recognized for their therapeutic properties. There is several health advantages associated with various portions of the plant. There are around 4.5 million plant species in India, and it is believed that between 250,000 and 500,000 of those plant species possess pharmacological capabilities. There are bioactive compounds found in plant extracts, and these constituents conduct diverse pharmacological activities. Terpenes, glycosides, polyphenols, and alkaloids are the four primary categories of volatile compounds. When compared to manufactured substances, natural extracts from plants or isolated active compounds have a greater number of pharmacological activities and a lower

incidence of adverse effects. Consequently, the development of novel drugs derived from plants is also bringing about new help in the field of contemporary medicine. It is possible to employ plants for the aim of both sustaining health and healing sickness, which is a step towards achieving total health and wholeness.

The therapeutic value of use of medicinal plants in traditional medicine is not new as they are abundant in bioactive compounds including polyphenols, flavonoids, alkaloids, and tannins. These biological components have powerful antioxidant, antimicrobial and immunomodulatory effects that help to enhance good health and resistance to diseases. As new knowledge on the negative consequences of synthetic drugs and antibiotic remnants spread, the trend is moving towards natural healing in the form of plant-based

products that help to maintain healthy living.

Probiotics, which are live microorganisms with health benefits after taking them in appropriate quantities, are a key factor in the maintenance of the digestional tract, facilitation of digestion and reinforcement of the immune system. Some of the well-researched probiotic strains include *Lactobacillus* and *Bifidobacterium* that have been shown to have positive effects on both people and animals. Recent studies also point out that some phytochemicals in medicinal plants have the ability to induce growth and activity of probiotics and their combination can lead to a synergistic effect which makes them increasingly effective with regard to their therapeutic value.

Medicinal plants in combination with probiotics have the potential to be a powerful and environmentally friendly approach in the nutrition of chickens to enhance feed efficiency, gut well-being, and resistance to diseases and antibiotic dependence. This combined solution helps to improve the absorption of nutrients, reduce the load of pathogens, and increase productivity in general. Therefore, the synergistic interaction between the medicinal plant bioactives and probiotics is an untapped prospect of sustainable poultry production and the extended application in the animal and human health field.

Probiotics

Probiotics are any of a number of living microorganisms, usually bacteria or yeast, that are consumed or given in some other way with the goal of perhaps helping to prevent and cure a number of illnesses, most often gastrointestinal diseases. With the study of Russian-born naturalist and microbiologist Élie Metchnikoff, the idea that consuming certain microbes might improve immunological and digestive function first surfaced in the early 20th century. As more was discovered about the human microbiome in the early 21st century, interest in probiotics increased.

Lactic-acid bacteria, namely strains of *Lactobacillus* and *Streptococcus*, are among the most widely utilised probiotics. These bacteria are naturally occurring parts of the human microbiome and have been used for generations to make cheese, yoghurt, and various pickled foods. Certain strains of the bacteria *Bifidobacterium* and the yeast *Saccharomyces boulardii* are examples of other probiotics. In addition to being found naturally in certain foods, the different probiotic microbes are sometimes offered for sale over-the-counter as chewable pills, liquids, powders, and capsules.

Numerous gastrointestinal disorders, such as Crohn's disease, ulcerative colitis, and pouchitis (inflammation of a surgically formed rectum in people who have had their large intestine and rectum removed), have been investigated in relation to probiotics. These studies generally show that probiotics provide little to no discernible benefit for the

majority of individuals who are afflicted by or at risk for these illnesses. Studies on diarrhoeal illnesses, especially in children, provide the strongest support for their efficacy. For instance, in children with acute diarrhoea, the administration of *S. boulardii* has been linked to a decrease in the frequency of diarrhoeal episodes. Similarly, certain probiotic strains, such as *L. rhamnosus* GG, could have a little impact on how long infectious diarrhoea lasts. *S. boulardii* and *L. rhamnosus* GG may be useful in reducing antibiotic-associated diarrhoea in both adults and children.

The Importance of Probiotics

Probiotics and their health benefits for people have been talked about for a long time. When enough probiotics are taken in, they can have positive implications for the gut's resident microbe's system. In this case, *L. acidophilus* and *Bifidobacterium bifidum* are the most well-known probiotic bacteria. On the other hand, germs like *Saccharomyces cerevisiae*, *Bacillus cereus*, and *E. coli* in food to make people healthier. To improve the microbiota in the gut, beneficial probiotic bacteria need to be able to stick to the intestine epithelial very well. It looks like probiotic types that clump together can have a big effect on how bacteria stick to gut epithelial tissue, while pathogens that clump together can stop pathogens from colonizing the intestine.

Probiotics are thought to be a natural disease suppressor because they protect people from dangerous pathogens. It can protect the gut from getting precancerous tumors by getting rid of enzymes that can cause cancer, like azoductase. The first part of the study looked at how different amounts of garlic affected encouraging the development of *Lactobacillus acidophilus* and *Bifidobacterium bifidum*. In the second section, one liter of sterile low-fat milk was mixed with 0.33 grams of probiotic yoghurt. After that, we checked the samples' pH and microbial count while they were in heated storage to see how long they would last. Yoghurt samples cultured with *L. acidophilus* bacteria improved in texture, flavor, fragrance, and smell after increasing the amount of garlic extract. There was no discernible shift in the proportion of garlic containing *B. bifidum* bacteria. The blood cholesterol level of rats that were fed *B. bifidum* milk dropped more than those that were fed *L. acidophilus* milk. Also, milk with *L. acidophilus* worked better than milk with *B. bifidum* at lowering fats in the blood of rats. Lastly, it was found that lowering cholesterol and fat levels was directly linked to increasing the number to the probiotic milk containing garlic and the two bugs we already talked about. There were changes in triglycerides and cholesterol levels, as well as the presence milk with *Lactobacillus acidophilus* and *Bifidum* and yoghurt, as shown in Figure 1.

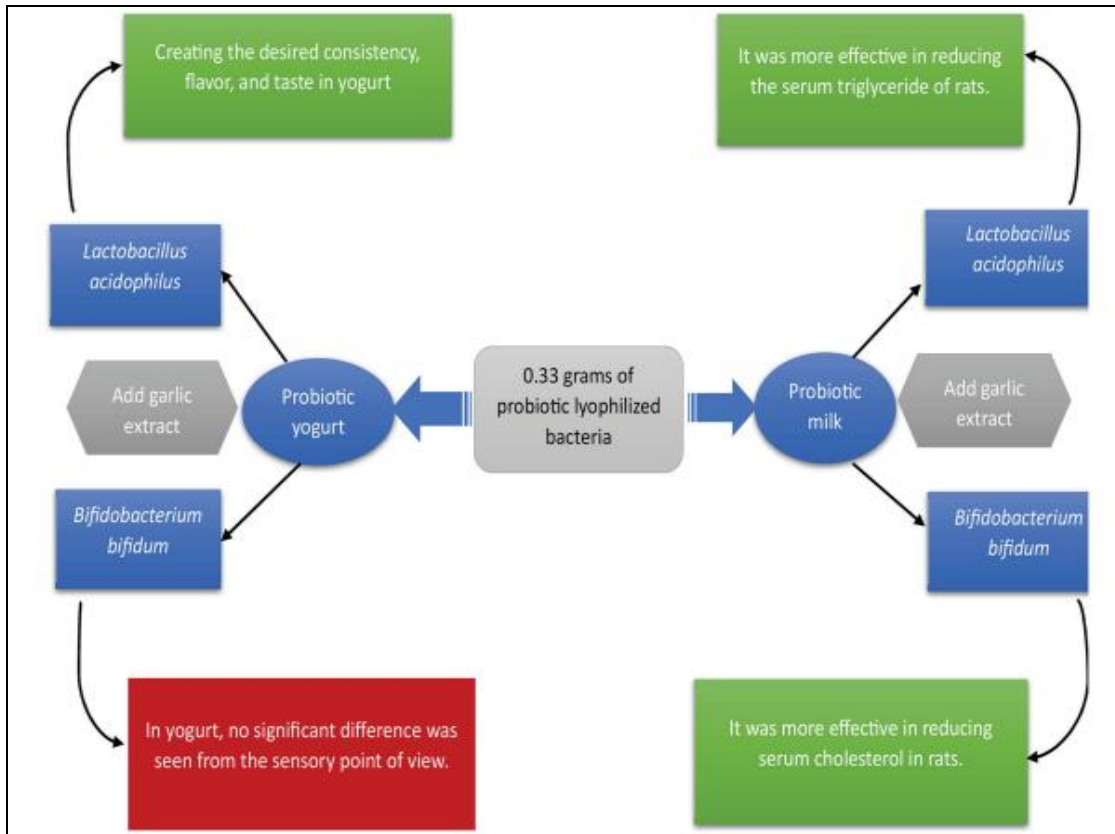


Fig 1: What happens when garlic products are added to yoghurt and milk that has *Lactobacillus acidophilus* and *Bifidobacterium bifidum* in it? What happens to the cholesterol and fat levels in rats?

A rise in the percentage of dill with a better taste than yoghurt was caused by garlic extract. While the yoghurt with 0.6% dill had the best flavor, the yoghurt with 0.2% dill and the control that didn't have any dill extract were more constant. When MRS agar culture medium was used to test *Microbe L. acidophilus* outgrew *B. bifidum* in the same culture. Therefore, in terms of reducing cholesterol and fat levels, milk samples containing *B. bifidum* outperformed milk samples containing *L. acidophilus*. Consequently, both humans and animals whose diets included probiotic-containing dairy products had significantly reduced blood cholesterol levels animals.

The Effect of Probiotics on Different Diseases

- Cystic fibrosis disease
- Diabetes
- Skin diseases (anti-aging)
- Acne
- Colon cancer
- Cardiovascular disease
- Urinary tract infections
- Atopic eczema syndrome
- Food allergy
- Lactose intolerance
- Probiotics in dentistry
- Obesity

Medicinal Plants

The phrase "medical plants" refers to a wide variety of plants that are employed in herbalism, some of which have therapeutic properties. These therapeutic plants are regarded as a wealth of components that may be used in the synthesis

and development of new drugs. In addition, these plants are essential to the evolution of human civilisations worldwide. Furthermore, certain plants are advised for their medicinal qualities since they are thought to be significant sources of nutrients. Among these plants are walnuts, ginger, green tea, and a few more. Other plants and their derivatives are regarded as a significant source of the active compounds found in toothpaste and aspirin [1]. Approximately 13,000 plant species are thought to have been used as traditional remedies by different societies worldwide for at least a century. There is a documented list of more than 20,000 medicinal plants, but there are probably many more.

Because they are antioxidants, medicinal plants used over an extended period to address a wide range of illnesses, such as burns, infectious diseases, and infertility. But these plants might still make you feel bad in some ways. It has been shown many times that medical plants can make conventional drugs less harmful. But they are still reasonably priced and have fewer side effects when used to treat many illnesses.

In many countries, traditional treatments have used medicinal plants (MPs) for a long time. Traditional medicine is all the different methods that come from the ideas, ideas, and the tales of individuals from many eras and nations. Both the explanation and the application of keep for better health, and to prevent, identify, and cure illnesses. The World Health Organization established explicit guidelines for the way in which study should be done and how to judge the success of traditional medicine. Over time, especially in the field of ethnobotany and ethnopharmacology, MP-based preparations have become an important part of modern medicine.

Importance of Medicinal Plants

It is called alternative medicine (AM) when plants are used to treat health problems. AM is used in almost every culture, but mostly in Asian and Western countries. Too bad that most people still think that the only reliable and effective medicine is one that comes in a dosage form, like pills, capsules, or other forms. Even though many pills and bottles we take every day are made from plant-based substances, like Among many others, aspirin, digoxin, paclitaxel, and many more exist. Ancestors of ours preserved food for longer periods of time by using herbs and plants add flavor. They also used them to ease pain, treat headaches, and even stop diseases like outbreaks before they happened.

The information that they can heal has been passed down through human groups for hundreds of years. The biological qualities of plant species used all over the world for many things, including treating infectious diseases, are generally due to the active chemicals that are made during secondary metabolism (3). At the moment, a lot of studies are warning people about the dangers of harmful bacteria that are now resistant to drugs that kill them. So far, empirical data on the antimicrobial activity of many plants has been scientifically confirmed. This means that many Further research is required to understand the exact composition of these plant-based antimicrobials and the processes by which they inhibit microbial growth, whether used alone or in conjunction with more traditional methods antimicrobials.

Interactions Between Medicinal Plants and Their Environments

It is important to define the regional areas of medical plant species in order to study how their distributions change with temperature. However, the combined biodiversity data that is needed to define the regional areas of these species are, at best, spread out in many different places. So, it's still hard to find and study medical plant species in the wild, figure out what biological factors affect their current patterns, or guess where they might go in the future as a result of changes humans have made to climate and land use. Species distribution models (SDMs) of *Dioscorea* and *Panax* are two notable cases. *Dioscorea* is a source of chemicals used in birth control, and *Panax* help alleviate diabetes, cancer, and other health issues according to traditional Chinese medicine. heart disease. While *Panax* shows some promise in treating circulatory and metabolic diseases in small-scale clinical trials, larger-scale trials are needed to prove its treatment usefulness.

By finding the right places and weather conditions where medical plant species are found now, SDMs can mark out places where these species might be found or grown in the future. For example, there is a good chance that medical plants will be able to grow in Egypt in the future. South Africa, on the other hand, is likely to see a smaller range of medical plants. These studies show how useful SDMs are and how important it is to update and make more accurate predictions about the climate and locations where these species live. They also show how phylogenomic studies can be connected to SDMs in new ways.

Plant-Derived Compounds That Enhance Probiotic Growth

Bioactive substances present in abundance in plants make a

big difference in how the gut microbiota lives and works. Among them, dietary fibers, polyphenols, flavonoids, and tannins stand out because of their ability to foster the development of probiotic microorganisms. and activity. Polyphenols are strong antioxidants that are frequently present in fruits, vegetables, tea, and medicinal plants. They include phenolic acids, flavonoids, stilbenes, and lignans.

Even though many polyphenols are not well absorbed After passing through the small intestine relatively intact, they are broken down in the colon by microorganisms. In addition to converting polyphenols into bioactive metabolites that are advantageous to the host, this interaction encourages the growth of lactobacillus and bifidobacterium, two kinds of good bacteria. Similarly, by encouraging the growth of probiotics and inhibiting opportunistic infections, flavonoids-a subclass of polyphenols present in high quantities in plants including holy basil, liquor ice, and turmeric-may change the make-up of the microbiota in the digestive tract.

Another type of polyphenolic chemicals, tannins, have antibacterial qualities that frequently work selectively. They frequently preserve or even increase the population of probiotics, even though they may prevent the formation of dangerous gut bacteria like *Clostridium perfringens*. Because of their selectivity, plants high in tannin are particularly useful for modifying the microbiota. Furthermore, probiotic fermentation uses dietary fibers such inulin, pectin, arabinoxylans, and resistant starch as direct substrates.

Bacteria that live in the colon break down these fibers and release short-chain fatty acids (SCFAs) such butyrate, acetate, and propionate. By lowering the pH of the intestinal environment, these SCFAs make it hostile to bacteria and other harmful microbes., but they also support intestinal barrier integrity and nourish colonocytes. Therefore, substances originating from plants provide an ecological habitat that is conducive to probiotic colonization and action. Plants and gut bacteria have a reciprocal and very dynamic connection.

The transformation of plant-derived chemicals by gut microorganisms and the control of microbial populations by these compounds are examples of plant-microbiota interactions. Microbial enzymes are necessary for the activation of several plant metabolites, including flavonoid glycosides, into their accessible forms. After being metabolized, these active substances have the ability to have immunomodulatory, antioxidant, anti-inflammatory, and all-around beneficial effects on development of good bacteria. Consequently, a healthy gut microbiome improves these phytochemicals' bio efficacy. The therapeutic potential of plant-based diets and herbal remedies is supported by this dynamic interplay, since they not only offer pharmacologically active compounds but also effect the microbes in the digestive tract so that supports general health.

The complementary effects of probiotics and have garnered much attention as of late plant extracts, particularly throughout the development of symbiotic formulations. The health advantages of some probiotic strains are frequently increased when they are taken with plant-based prebiotics. For example, probiotics' viability in the gastrointestinal system can be enhanced by polyphenols, which can shield

them from oxidative stress and aid in their survival during stomach transit. Probiotics can also break down complex plant chemicals into simpler bioactive that have better therapeutic effects. Both drugs' anti-inflammatory, antibacterial, and immunomodulatory actions are strengthened by this synergy. According to studies, these symbiotic combinations are more successful than each one alone in restoring gut dysbiosis, enhancing metabolic parameters, and boosting host immunity.

A natural, synergistic method of promoting probiotic development and activity is provided by the many and multipurpose substances extracted from medicinal plants. These plant-based compounds can be strategically used to enhance the efficacy of probiotic therapies and assist in the administration of a variety of lifestyle-related illnesses through both direct nutritional support and indirect ecological regulation.

Effects of Medicinal Plants on Probiotics

Since the European Union banned antibiotics in 2006, researchers have looked into how medical plants can be used in probiotics. They were hailed as a fresh approach to medicine that could fill in the gaps in vitamins and plant chemicals like flavonoids, alkaloids, phenols, and others. In this case, it was said that probiotics could control bacteria, lower death rates, and make all body processes work better. Researchers looked into how tarragon affects *L. casei* and *L. paracasei* and found the most acidic milk could be achieved by combining 3% tarragon with *L. casei*, bringing the temperature of the milk up to 84–87 degrees Dornic. During incubation, the most noticeable impact was on bacterial growth. The samples that included varying concentrations of tarragon essential oil-2%, 1%, 0%, and a combination of *L. casei* and *L. paracasei* could produce an acidity ranging from 84 to 87 degrees Dornic. Consequently, the culture-induced bacterial growth was least affected by milk containing zero *L. casei*. Samples of milk containing *L. casei* and *L. paracasei* that were stored in the fridge for 21 days revealed increased acidity levels in the 3% tarragon essential oil group compared to the 2%, 1%, and 0% essential oil groups. Refrigerated milk samples containing *L. casei* and *L. paracasei* showed greater acidity levels in the 3% tarragon essential oil sample compared to the 2%, 1%, and 0% essential oil samples of the same plant. This indicated that the samples containing 3% tarragon essential oil were the least stable while stored in the fridge, in contrast to the control samples stable.

Researchers cultured four different bacterial strains in borage flower extract: *L. paracasei*, *L. acidophilus*, *L. plantarum*, and *L. delbrueckii*. These microbes can develop in, according to the findings, extract from borage flowers without any further aid. Influence of thyme has also shown that *L. acidophilus* and *B. bifidum* samples bacteria, as well as samples with both types of bacteria, could not make yoghurt taste good. Increasing the amount of thyme didn't change the consistency of the yoghurt either. However, the 3% thyme-containing yoghurt samples were more colorful and smelt better. Also, studies on green tea found that adding more lactic acid bacteria in the digestive tract and improved the flavor of probiotic milk and yoghurt by including this plant milk and yoghurt.

Meanwhile, a crucial thing to check when making probiotic

products is that the bacteria are still alive so that they can keep working well until the end of their life cycle. This is why, in the tests that were done to see how *L. acidophilus* and *B. bifidum* responded to bran barley and bran-free barley, there was a direct link between the amount of barley added and the growth of the bacteria. The samples with 15% barley had the most acidity and the most live bacteria. It was found that the samples with the least number of beneficial bacteria grew and lived the least. This was because the phytic acid in the barley bran stopped the bacteria from growing. The climate had a bigger impact on *L. acidophilus* in all of the samples. This meant that the probiotic bacteria grew and survived at a rate of 1010 cfu/mL with bran-free barley extract, this exceeded the minimal need for a probiotic.

When used in small amounts, it was discovered that the growth rate and acid generation of *L. plantarum* may be accelerated by the essential oils of oregano and cumin. However, when used in large amounts, they stopped *L. plantarum* from growing. In a different study about oregano, however, a sample that had *B. bifidum* in it had a better taste than the other samples. All of the samples had a good taste, but the for the most flavor, try 0.1% oregano yoghurt. The lack of oregano in the control samples did not diminish their superior consistency compared to the others. Probiotic milk products with more of this plant had a superior flavor and more *L. acidophilus* and *B. bifidum* bacteria grew, according to the research.

By making *Achillea millefolium* grow more, it helped *L. plantarum* grow. But adding different amounts of plant products did not change the *L. rhamnoses* strains. The acidity and smoothness of the yoghurt got better when the quantity of soy extract went up during the making process. The texture of yoghurt yogurt made with malt extract outperformed that made with soy extract. Also, compared to yoghurt made with soy extract, the one made with malt extract tasted superior. When making probiotic milk and yoghurt, soybean extract had a much bigger impact on *L. acidophilus* and *B. bifidum* than malt extract, even though it was heated for a shorter amount of time. It might take less time for soybean extract to hit the right level of acidity because it contains nutrients that help plants grow, which malt extract did not.

Similar results were seen in another trial with soybean extract. Increasing the quantity of soybean extract shortened the time needed to make milk and yoghurt products more acidic, and it also made yoghurt more stable. A bitter taste was not found in yoghurt products when 6%, 4%, or 2% soybean extract was used, on the other hand. Researchers looked at sample containing olive leaf extract together with *L. acidophilus* and *B. bifidum*. They discovered that yogurt and milk might be improved in flavor by increasing the amount of olive leaf extract. Samples containing 6% olive leaf extract were found in dairy products including yogurts. had more stickiness than the other samples. It was found that adding chicory gel to probiotic bacteria made a big difference compared to a typical control group. The initiator bacteria were unaffected by the chicory content, whereas *L. acidophilus* and *B. bifidum* grew more rapidly in dairy products.

Results showed that cinnamon in banana milk had an effect on the probiotic bacteria *L. acidophilus* and *B. bifidum*.

Compared to other commodities and the control, *B. bifidum* cinnamon banana milk containing 0.6% cinnamon reached 30 degrees Dornic acidity sooner. Compared to the other products and controls, cinnamon banana milk samples containing 0.4% and 0.6% cinnamon attained 30 degrees Dornic acidity more quickly in *L. acidophilus*. The control sample attained 30 degrees Dornic acidity more quickly than the cinnamon banana milk samples that included 0.4% and 0.6% cinnamon in combination with the two types of bacteria. It is worth noting that samples of banana yoghurt containing a single kind of bacteria reached the proper acidity level after around 5 hours. After 8 hours, the banana-laced yogurt samples containing both types of bacteria had achieved the ideal acidity level. Note also that the pH of the cinnamon banana milk product made with *B. bifidum* did not go below 5, while it was stored in the fridge for 10 days. This is a good thing about the product. So, cinnamon made the germs listed above grow faster in dairy products. It was looked into how mint affected which *Lactobacillus acidophilus* and *Bifidobacterium* grow, and it was found that the mixture of these two types of bacteria in dairy products was stronger than cinnamon.



Fig 2: When medical plants and bacteria are mixed together, milk and yoghurt taste, smell, and be more consistent

This is because the bacteria in banana milk grow more slowly than in other manufactured products because they contain more fat. The effects Researchers explored the effects of essential celery oil on both harmful and beneficial microorganisms. In terms of probiotic bacterial growth, the oil was seen to have a suppressive effect on *L. casei*, *L. acidophilus*, *L. plantarum*, and *L. rhamnus*. At 2500 ppm for MBC and 1250 ppm for MIC, *L. rhamnus* exhibited the widest growth inhibition zone.

It was said that probiotic milk with 2% ginger hit Its influence on bacterial growth during incubation was the most notable, and it reached 42 degrees Dornic sooner than other samples. All three samples (1%, 3%, and control) achieved a Dornic temperature of 42 degrees. Thus, there was little effect on microbial development from the control

samples. This was true regardless of whether the samples were chilled or not. Additionally, the control samples exhibited the maximum shelf life, while the ones with 3% ginger exhibited the shortest. Accordingly, the 1% ginger control samples, the bacterium-free veggie yoghurt product, and the 2% and 3% ginger samples were more enjoyed than the others when it came to taste, smell, colour, thickness, and flavour. The yoghurt sample with 3% ginger and the control sample were both checked, and the amounts of protein found were 2.90 g in the control sample and 3.21 g in the yoghurt sample with 3% ginger. Because of this, ginger had a bigger effect depending on how much 3% ginger-containing samples had more probiotic yoghurt protein than the control samples. It was also found that using ginger powder to make dairy products was a good idea (1).

Probiotics and Medicinal Plants in Poultry Nutrition

In the past forty years, poultry production has grown a lot in order to reach a level of production that is sustainable. However, the industry still faces many problems, such as disease, the high cost of feed, and most lately, the unnecessary use of drugs. The use of antibiotics in chicken that is below what is recommended is harmful to public health because it leads to drug resistance and the presence of antibiotic leftovers in finished goods, which can cause health problems in people. As a result of these events, Antibiotic use was outlawed by the European Union. feed additives in 2006 to make sure food safety. As an alternative to antibiotics, medicinal plants (photobiotic/phytogenic) and probiotics may be used. Probiotics contain one or more helpful bacteria or yeast that helps keep the gut healthy and stops dysbiosis, which can happen when there is stress, prolonged lack of water, fasting between meals, or infections caused by viruses, bacteria, fungi, or protozoa, resulting in an imbalance of flora and the growth of undesirable microorganisms.

The GI tract (GIT) is a key part of digestion, uptake of nutrients, maintaining the health of the intestines, processing of nutrients, and fermentation. They thought that exposing the GI tract to dangerous bacteria or infectious agents (like *Escherichia coli*, *Clostridium*, *Pseudomonas*, *Blastomyces*, and *Salmonella*) could upset the balance of gut flora, lead to decreased output, and weaken the immune system. As an addition to chicken feed, probiotics are live cultures of organisms that can help the host animal by balancing the microbes in its gut.

They have shown promise in improving the performance of birds by changing the bacteria in their guts to improve food intake and reduce the number of harmful germs. The most common ones are *Lactobacillus acidophilus*, *Enterococci faecium*, and *Bacillus* spp. Giving probiotics replenishes the GI tract with good bacteria that stop viruses from spreading and keep their numbers in check. This is especially true after stressful events like big changes in food, fasting, or experiencing sudden changes in temperature, or after being exposed to harmful things like enteritis caused by bacteria or viruses in the microbiome and mycotoxin contamination in feed.

Conclusion

The conclusion made is that probiotics should be integrating

with bioactive compounds by using natural sources of medicinal plants as it presents a promising approach to maintaining health and preventing disease via natural processes. Probiotics, medicinal plants can improve the balance of the intestines, reduce oxidative stress and increase the power of immunity, and stress and improve the power of immunity, and strengthen immunity. The combination of them has synergistic advantages in metabolic regulation, inflammation control and gastrointestinal health, and has potential uses in functional food, pharmaceutical and animal nutrition industries. This natural practice is in line with the world-wide initiatives on sustainable health management and antibiotic-free treatment. Further work ought to be done on the optimization of strain-herb combinations, elucidate molecular mechanisms, and undertake extensive clinical trials to confirm its effectiveness and safety when used by humans in the long term. strain-plant combinations, elucidate the molecular mechanisms, and conduct comprehensive clinical trials to establish its effectiveness and safety in the long term when used by humans.

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