The game-changing potential of the EU's Farm to Fork Strategy.

Aloe vera edible coating for fresh fruits, and vegetables from post-harvest to your table.

#postaharvest , # fruits, # vegetables, # leafyvegetables, #farmlosses, #shelflife, #ediblecoating, #coatingmatrix, #farmtofork, #F2F, # biodiversity, #Sustantability, # sustainabledevelopment, # food systems, #supplychain, #foodsecurity, #aloecoating, #aloeediblecoating,#naturalcoating, #produce, # perishableproducts, # reducefoodwaste,#plasticpackaging, # postharvestfoodloss, #staygreen, # Circular concept.

The main function is not a full replacement for traditional packaging, but also to provide further properties and add benefits by functionality through natural additives used for food storage or enrichment. Edible coatings can play a major role in the preservation of food products because they are a vehicle of functional compounds that are necessary to humans' health and well-being. The most common are nutraceuticals, phytochemicals (antioxidants and antimicrobials), flavors, bacteriocins, and probiotics. In addition, coatings regulate moisture control and oil transport, mechanical and gas barrier properties of coated foodstuff. When the functional compounds are incorporated into the edible coating/film to perform their functions, they become a benefit for the food as well as the consumers. Because the climate and biodiversity crises are staring us in the face. And every citizen is seeing this daily now, wherever you live. Let's also be quite straightforward: the science is very clear: this is what threatens food security. This is what threatens our long-term food security. Prices of pesticides and fertilizers have gone up dramatically over the past 20 years. Agribusiness makes huge profits, and farmers and biodiversity literally die out. The scientists write that "it is worrying to observe that a number of member state governments and MEPs have called for the delay and/or watering down of the new pesticides regulation. Citing questionable 'food security' and 'resilience' concerns". Extending fruit shelf life is imperative to reduce postharvest losses, minimize supply and price volatility, and increase profits at the farmgate and downstream markets. Several techniques are available to extend fruit shelf life, but techniques that pose no hazard to people and the environment are highly desirable and are gaining more emphasis in the global drive toward sustainable development. Among safe and environment-friendly postharvest techniques for horticultural produce is the use of edible coatings. The Farm to Fork Strategy(F2F) is at the heart of the European Green Deal aiming to make food systems fair, healthy, and environmentally friendly. Food systems cannot be resilient to crises such as the COVID-19 pandemic if they are not sustainable. We need to redesign our food systems which today account for nearly one-third of Global GHG Emissions, consume large amounts of natural resources, resulting in biodiversity loss and negative health impacts (due to both under- and over-nutrition), and do not allow fair economic returns and livelihoods for all actors, for primary producers. AMB Wellness will support the global transition to sustainable agri-food systems through its trade policies and international cooperation instruments, creating a customized edible coating with several natural biopolymers plant-based, such as aloe vera, chitosan, tamarind kernel, alginate, guar, etc., aloe vera edible coatings for fresh produce approval from the European Union (EU) can be used on whole and cut fresh fruit, with skins that are either edible or inedible peels. Fresh fruits and vegetables are perishable products with high post-harvest food loss. There is a growing market demand for organic solutions to increase the shelf life of fresh products and reduce food waste. Edible coatings are the most promising solutions to prevent vegetable food loss and extend vegetable shelf life. However, synthetic additives are present in most of them. The EU-funded ALOEco project will commercialize a 100 % organic, effective, safe, and sustainable Aloe vera-based post-harvest edible coating. The product extends a 40 % shelf life of vegetables, eliminates the need for post-harvest fungicides, and reduces the energetic requirements for post-harvest conservation, the residue levels on fresh vegetables, and the need for synthetic packaging. The demand for fresh fruits and vegetables is increasing gradually. However, fresh fruit and vegetables are perishable products whose freshness is difficult to maintain along the supply chain. There is a need for the reduction of post-harvest food loss by increasing the efficiency of the whole food chain, as one of the first means to fight imbalances and reduce tensions between the increase in food consumption and the challenging increase in food production. At the same time, primary producers are facing the challenge of reducing the use of chemicals to comply with ever-stricter regulations. Therefore, there is a market need for 100% organic solutions to increase the shelf life of fresh products and reduce food waste. Among the existing solutions, edible coatings are the most promising to prevent vegetable food loss and extend vegetable shelf life. However, there are very few solutions free of synthetic additives and suitable for the organic market. Innovaloe is organically certified by ECOCERT, USDA NOP. The coating extends the shelf-life of the fruits by up to three times the normal length, delaying ripening and cutting back on the moisture. It stops bacteria and fungi from growing, helping maintain the fruit's firmness and texture. This plug-and-play solution is clean label and non-GMO and can ultimately lower the chances of food waste and ultimately, profit loss. AMB delivers the 100% natural, fresh, and safe produce your consumers and grocers demand, offering sustainable plant-based, edible coatings to deliver better, safer, longer-lasting, and tastier produce and eliminate the need for plastic packaging. Other new coatings have not received broad or even any EU approval. Approvals to date have been limited to fresh produce that must be peeled before eating, a lower standard.

Build a barrier.

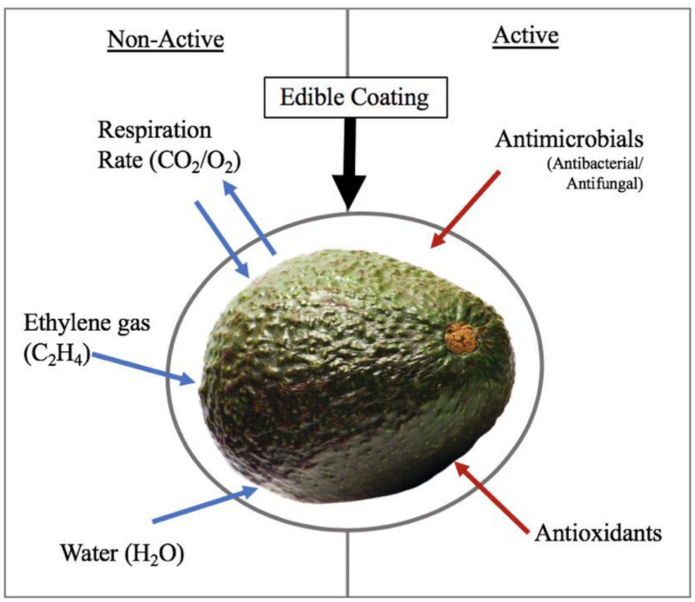
One potentially promising technology is edible coating: covering fruits and vegetables in a film of protective material that can be consumed with the food. Today, the natural coating is applied by dipping, brushing, or spraying, to form a thin membrane on the surface of fruits and vegetables, reducing the transfer of gas and water vapor, limiting browning and aroma loss, and ultimately prolonging shelf life. Ideally, such coatings should keep the fruit or the vegetable well sealed, but not too sealed – otherwise you risk inducing anaerobic fermentation (that's when your apple turns into cider, for example).

Biological defense.

Postharvest losses which result in the degradation of quantity and quality of the fruits after harvest constitute a serious challenge, fresh food products are susceptible to dehydration, mechanical injury, environmental stress, pathological breakdown, and enzymatic attacks which lead to some nutritional, functional, and sensorial losses and production of off flavor and also posing a level of threat in terms of possessing a level of toxicity, reduction of the edible quality of the food products due to biochemical changes, physiological aging and microbial infections during storage and transportation, gas composition greatly affects the shelf life of the products, an extension of the supply time of fruits and vegetables besides preserving their quality would have economic profits, fruits are either climacteric or un-climacteric. The latter cannot ripen once removed from the plant but the former can ripen after being picked and produce more ethylene which makes them more susceptible to spoilage, and inhibit the rate of deterioration of these fruits, these are a need to alter the gaseous environment or control it, for instance making use of packaging materials with low water vapor and oxygen permeability to reduce respiration but not a too low oxygenated environment which can lead to anaerobic respiration which can also produce off-flavors, an edible coating which can control and inhibit the deteriorative changes as well as increasing the shelf life of the products. Eventually the fruit and vegetable will shift to partial anaerobic respiration that requires less oxygen. With less oxygen, the production of ethylene (which accelerates the ripening process) is disrupted, and the physiological loss of water is minimized. Thus, the fruits and vegetables remain firm, fresh, and nutritious for a longer period and their shelf life almost doubles. The natural barrier on fruit and vegetable, and the type and amount of coating will influence the extent to which the internal atmosphere (oxygen and carbon dioxide) are modified and the level of reduction in weight loss. The properties of edible coating depend primarily on molecular structure rather than molecular size and chemical constitution. Specific requirements for edible films and coatings are: The coating should be water-resistant so that it remains intact and covers a product adequately, when applied, it should not deplete oxygen or build up excessive carbon dioxide. A minimum of 1–3% oxygen is required around a commodity to avoid a shift from aerobic to anaerobic respiration. It should reduce water vapor permeability. It should improve appearance, maintain structural integrity, improve mechanical handling properties, carry active agents (antioxidants, vitamins, etc.), and retain volatile flavor compounds. It should melt above 40◦C without decomposition. It should be easily emulsifiable, non-sticky, or should not be tacky, and have efficient drying performance. It should never interfere with the quality of fresh fruit or vegetable and not impart undesirable order. It should have low viscosity and be economical. It should be translucent to opaque but not like glass and capable to tolerate slight pressure. Edible coating/films are a good candidate to help solve the cases of postharvest losses since it has mechanical, thermal, antimicrobial, and even antioxidant properties, Edible coating or films are biopolymers, provide a barrier against moisture, gases, and solute movement, the edible coating is liquid form while the former usually forming a thin layer around the food product, a significant decrease in the weight loss and ripening rate, lower microbial growth and lower mass loss, Edible coatings/films helps to improve the appearance of horticultural produce by giving shine, hiding scars, suppressing decay and physiological disorder developments, edible coatings can be generally classified into three main groups; protein-based edible coatings, polysaccharide-based coatings, and lipid-based coatings, active or functional compounds; antioxidants, antimicrobials, nutrients, vitamins, anti-browning agents, enzymes and probiotics that could be applied into coating matrix.

Edible coating matrix preparation

The ability of Aloe vera gel coatings as a matrix or additive carrier is influenced by structure, molecular size, and chemical content, the advantages of using additives on Aloe vera gel coating base, include antimicrobial ability, emulsion system stability, barrier properties, and bioavailability. Additives on coating also expand the surface such that it can improve stability such as solubility, absorption of active compounds, and controlled release. Edible films serve as a conveyance for delivering active components, flavors, drugs, and nutraceuticals, active components are trapped in the biopolymer matrix and remain stable until reaching the consumer's table, edible films are fabricated from biopolymers using wet and dry processes, edible coatings are generally prepared from the substance pertaining to film-forming properties, raw material for formulating the edible coating must be able to be dispersed and dissolved in the desired solvent, plasticizers, antimicrobial agents, flavor-enhancing substances, vitamins, colors, and spices can also be incorporated, edible coating to increase the mechanical strength, water acts as a natural plasticizer for edible coatings and films.



Carboxymethylcellulose, casein, casein derivates with beeswax and fatty acids, locust bean gum, guar gum, ethyl cellulose, Mesquite gum, gelatin with glycerol, sorbitol, and sucrose, gelatin-casein cross-linked with transglutaminase, Pectin, Cassava starch, Pre-gelatinized maize starch, Wheat gluten, Sodium alginate and pectin cross-linked with CaCl2, HPMC with fatty acids, Beeswax, Carnauba wax, Chitosan, Chitosan-gelatin, Maize starch-chitosan-glycerin, HPMC-tea tree essential oil, Cashew gum, Galactomannans, Galactomannans-collagen-glycerol, sorbitol, fatty acids, sucrose, polyethylene glycol (PEG), propylene glycol (PG), and monoglycerides are good options to provide flexibility and plasticizers, polysaccharides are widely used for the fabrication of edible coatings and films to enhance the shelf life and quality retention of food products.

Benefits of edible coatings/films,

Edible coatings/films act as a moisture barrier, oxygen scavengers, ethylene scavengers, antimicrobial properties, anti-browning and antioxidant properties, texture modifiers for inhibition of physical damages, nutraceuticals for the preservation of nutritional quality, improved shelf life, delayed loss of firmness and weight, fewer changes in color, pH and brix value, controlled rate of respiration, weight loss retention, delay in ripening index, firmness and weight loss retention, reduce the respiration rate, antimicrobial and prevention of fungal infection. An edible film or coating is any material with a thickness of less than 0.3 mm , which is formed from a combination of biopolymers and different additives dispersed in aqueous media, edible film is previously made and then adhered to the product, edible films and coatings can present, protection against UV light, transport of solutes (e.g., salts, additives, and pigments), water vapor, organic vapors (e.g., aromas and solvents), and gases (e.g., oxygen, carbon dioxide, nitrogen, and ethylene) between food and the atmosphere, barrier against mechanical damage (e.g., dents or cuts) , increase the shelf-life of the product, bioactive components (e.g., antioxidants),antimicrobial effect against bacterial reproduction and fungal contamination (e.g., silver nanoparticles), healthy microorganisms (e.g., probiotics) that confer benefits to the consumer; and biodegradable natural materials, edible films and coatings are often evaluated for their mechanical properties, such as elasticity modulus (EM), elongation at break (E), and tensile strength (TS), which refer to their elasticity and rigidity, and the force necessary to break them, further, they display similar mass transfer phenomena (i.e., permeation, adsorption, and diffusion), which is related to the transport of solutes between food and the atmosphere, structures of biopolymeric matrices, biopolymers and additives in the production of edible films and coatings, function in edible films and coatings, polysaccharides, starch, cellulose, pectin, gums, chitosan, agar, aloe vera gel, alginate, dextran, properties, thickeners, gellants, emulsifiers, stabilizers, coating, form the base structure of a solid polymer matrix, additives plasticizers, glycerol, aloe, resins, viscosity, resistance, flexibility, decrease the intermolecular force and the melting temperature in the mixture, modify the viscosity and the rheological properties.

Circular concept, edible coating alternative to plastic packaging.

With aloe vera edible coating customized to your fruit or vegetable, AMB is pursuing the circular concept and bringing waste materials a new added value for the consumer, avoiding plastic wrapping. In this way, we prevent food waste, require fewer petroleum-based packaging materials, and thus contribute to decarbonization. coating suggests a possible solution that both reduces food waste and eliminates some of the issues associated with plastic packaging, coating suggests a possible solution that both reduces food waste and eliminates some of the issues associated with plastic packaging, Edible coatings, therefore, present an alternative to modified atmosphere storage. Many studies investigated the various effects of coatings on product physiology. These include the reduction of water losses, respiration, ethylene production, and the connected metabolic degradation of *value-added compounds*. Coatings may also lower loss of tissue firmness and retard solute movement, enzymatic oxidation, browning discoloration, and microbial decay. In addition, coatings may protect from physical damage. With the protective film, we not only reduce food waste and packaging material on a large scale but also extend the shelf life of the food at our customers' homes. Aloe vera edible coating is this the answer to zero plastic packaging for fruit and vegetables. provides a protective barrier for fresh fruit and vegetables to prevent water loss and improve product quality, with *zero plastic packaging*. The coatings slow down both the respiration and diffusion of carbon dioxide and oxygen of the fruit and vegetables, creating a modified atmosphere inside the fruit tissue which is effective in delaying the ripening process – effectively putting the produce to sleep and therefore reducing spoilage in fruit and vegetables.

Logistics matter

The export of fruits to long-distance markets is via refrigerated sea shipment. Coatings to improving the state of the roads, there is a plethora of ways we can reduce the amount of fruit and veg that goes bad before it reaches our plates. Due to long-distance shipping and the time required to reach the retail department stores, postharvest losses, due to postharvest decay occurring during the supply chain, affect the fruit quality on arrival at the long-distance distribution points. The entire marketing time frame includes approximately 30 days until it reaches the consumers. During transport, due to cold storage and shelf life at the retail outlet, fruits develop postharvest decay caused by fungi. This type of coating can be a biodegradable alternative to the use of plastic packages, since they can create a protective barrier, semi-permeable to gases and water vapor, and could reduce microbiological proliferation. One of the main food applications of edible coatings is on the fruit surface, such as strawberry, berries, grapes, pepper, bean, tomato, eggplant, cucumber, muskmelon, watermelon, pumpkin, spinach, pitaya, pea, potato, avocados, mangoes, banana, cashews, guava, pineapple, papaya, banana, longan, papayas, apples, Kinnow, grapefruit, passion fruit, orange, kiwi, lime, Jujube fruits, Sapota (Manilkara zapota), peach, lemon. Vegetables: cucumber, bell pepper. Fresh-cut products are highly perishable, the main reason being the removal of skin (the natural protective layer) from their surface area and the physical stress they undergo while peeling, cutting, slicing, shredding, trimming, coring, etc. Fresh-cut fruits and vegetables on which coating is used commercially include Fruits: Fresh-cut apples, fresh-cut pear, and fresh-cut peach. Vegetables: Minimally processed carrot, fresh-cut lettuce, fresh-cut cabbage, minimally processed onion, fresh-cut potato, fresh-cut tomato slices, fresh-cut muskmelon, and cantaloupe among others. The purpose is to create a more efficient system for fruit storage, aiming to reduce the degradation of qualitative aspects in the postharvest period and lower loss rates to extend shelf-life.

General Methods for edible coating.

Edible films and coatings can be obtained and applied to foods in different ways , to help preserving products quality, dipping technique is by immersing the fresh food produce into the coating solution to allow complete wetting of the surface of the food material, Layer by layer method is based on alternate deposition of oppositely charged polyelectrolytes that result in a more effective control of the coating properties and functionality, Vacuum impregnation technique, food material is subjected to atmospheric restoration while it remains immersed in the coating solution under atmospheric pressure, Spraying method is more suitable for less viscous coating solutions which can be sprayed at high pressure, surface area of the liquid coating increase through the formation of droplets and distribution over the fruit surface, dipping technique is by immersing the fresh food produce into the coating solution to allow complete wetting of the surface of the food material, Layer by layer method is based on alternate deposition of oppositely charged polyelectrolytes that result in a more effective control of the coating properties and functionality, Vacuum impregnation technique, food material is subjected to atmospheric restoration while it remains immersed in the coating solution under atmospheric pressure, simple joining, complex joining and gelation mechanisms are used, draining excess coating material on product surface, providing the formation of film and allowing them to dry at room conditions or in a dryer, air blast systems in order to coat a certain part of the product's surface or obtain a uniform thin layer, other method could be pouring method, which is applied by pouring the film solution onto the region to be coated, drying the food on the rotating brush bearings by the help of fans, foaming method which the foam applied to foodstuff moving on the cylinder is distributed on the surface by the help of brush, Improving the appearance by providing brightness to the surface of fruit , reducing losses of weight protecting fruit texture, reducing respiration speed and ethylene production and thus delaying the ripening, protecting fruits and vegetables from chilling injuries, providing basis for post-harvest chemical applications and reducing the usage of synthetic materials, reducing microbiological degradation , protecting aroma components, vitamins and antioxidants, pigments and reducing their browning reactions , improving the organoleptic properties of coated food by incorporating various additives as coating matrix, replacing of chemical origin package materials create positive effects both on environment and on people, by this application, in perishable and aspirating products like fruits and vegetables, both ripening is delayed by reducing the respiration and shelf life can be prolonged.


After coating

Moisture reduces food quality and shelf life. The wettability stage is important because it is a measure of compatibility between the suspension and the fruit; it affects the coating’s time and film thickness on the food surface, in order to develop and apply edible coatings in fresh and minimally-processed fruits is very important to evaluate the physical properties of suspensions (density, viscosity, and surface tension), because the mechanical, thermal, optical and barrier properties of the coatings are directly related to their microstructure developed. To evaluate the efficacy and quality of edible coatings, different parameters of the storage-coated fruits can be determined, such as water loss, respiration rate, texture, color, the concentration of microorganisms, total acidity, and content of soluble solids, these parameters should not affect flavor and surface appearance must be attractive in order to improve consumer acceptance, Edible coatings can be applied using various techniques such as dipping, panning, fluidized-bed coating, and spraying.

Spray coating is one of the most common methods applied to coat fruits at industrial levels, it has many advantages, such as control of thickness, uniform coating, no pollution, and controlled temperature of the coating solution; furthermore, automation is facilitated in continuous processes. Edible packaging can be characterized through different techniques, depending on whether a coating or a film is considered. Guar gum; pea/ potato starch +/- potassium sorbate Anti-microbial, Candelilla wax-based Anti-oxidative; anti-microbial; quality, Pectin-base; alginate; carboxymethyl cellulose Anti-oxidative; water barrier , Beeswax; coconut and sunflower oil Anti-oxidative; anti-microbial; overall quality, Chitosan; methyl cellulose Anti-oxidative; anti-microbial; oxygen/carbon dioxide/water, Shellac +/- Aloe vera gel Keeping quality, coatings have long been used on citrus, apples (shellac and carnauba wax), tomatoes (mineral oil) and cucumbers (various waxes), these coatings are less studied for use on apricots, pineapples, bananas, cherries, dates, guavas, mangoes, melons, nectarines and peaches, postharvest use of polysaccharide and protein coating materials on several types of fruit has been developed in the past few years including cellulose-sucrose fatty acid esters on apricot, guava and cellulose on mango, which has proven many beneficial effects in the context of value addition and shelf life extension of fresh produce, edible films and coatings are produced from edible bio polymers and food grade additives, edible films are classified into three categories taking into account the nature of their components namely hydrocolloids (containing proteins, polysaccharides or alginates), lipids (constituted by fatty acids, acylglycerols or waxes) and composites, edible materials have different barrier properties against gases and physico-chemical and mechanical characteristics, edible coatings may be composed of polysaccharides, proteins, lipids or a blend of these compounds, most coatings are made of more than one material with the addition of low molecular weight molecules that serves as plasticizers and some active compound to serve as value addition property in edible film, low-molecular-weight compounds that increased strength and flexibility to coatings, but also increase coating permeability to water vapor and gases, plasticizers include polyols such as glycerol, sorbitol, mannitol, propylene glycol, and polyethylene glycol (molecular weight: 200-9500), sucrose, sucrose fatty acid esters, and acetylated monoglycerides can be used as plasticizers, these, glycerol, sorbitol, and propylene glycol are considered GRAS. In the case of a coating, it should be guaranteed that it will spread on the food surface and form a film after drying, with adequate adhesion and durability. In this case, wettability is one of the most important properties. Wettability is determined by the balance between the adhesive forces of the liquid on the solid and the cohesive forces of the liquid, in which adhesive forces cause the liquid to spread over the solid surface, whereas cohesive forces cause it to shrink.

The adhesive forces are determined by the measurement of the contact angle between the coating and the food surface, and the cohesive forces are determined by the liquid–vapor tension of the coating. In practical terms, the closer the wettability values are to zero, the better the surface will be coated. Another characteristic that influences the coating performance is the surface properties of the food. Therefore, the surface properties of the food (e.g., surface tension) should also be determined. The surface tension of a surface is determined by the measurement of the contact angles between several standard liquids and the material's surface. Thus, it is possible to correlate the surface tension of the liquids with the obtained contact angle values and determine the so-called critical surface tension of the surface. In the case of coatings, another the important aspect that should be determined is the viscosity, which will greatly influence the method chosen (i.e., dipping or spraying) for the coating application.

They are not yet meant to replace conventional packaging; in fact, they are currently used with no-edible materials to protect and improve food shelf life. There are important factors that need to be considered when selecting edible materials for food packaging applications: their ability to function as a barrier to the environment; their capability to improve food preservation and processing techniques and to be an effective carrier for bioactive compounds. Edible films are in general good moisture barriers, able to inhibit moisture exchange between food products and the atmosphere, preventing, therefore, microbial growth, texture changes, and undesirable chemical and enzymatic reactions. Edible materials are also good oxygen barriers, able to preserve quality and extend the shelf life of oxygen-sensitive products. Materials such as chitosan and carrageenan, polysaccharide-based edible film, have the advantage to be an effective barrier to nonpolar aroma compounds, preventing aroma loss and oxidation. Hydrocolloid-based edible coatings, such as alginate and carboxymethylcellulose, can be used to retain moisture and reduce fat uptake in deep-fat fried food. Edible materials with high water vapor permeability can be used to minimize salt migration into food during brine-freezing processes, while materials with selective permeability can help limit flavor and aroma loss during freeze-drying operations.


Another important factor to be considered, when selecting edible packaging material for food applications, is the ability to be an effective carrier for antimicrobial and/or antioxidant compounds and to be able to control the migration of molecules from the package to the product. Edible materials have shown good delivery properties; therefore, several researchers have explored this promising area for food preservation.

In films, barrier and mechanical properties are the most important properties. Barrier properties, the ease or difficulty of permeation through barrier materials by such environmental substances as water vapor, oxygen, and carbon dioxide, give information about the film's capacity to provide a barrier to gases and other volatile compounds between food and the external environment. A film with good barrier properties protects foods against moisture and aroma losses as well as oxygen and carbon dioxide permeation, thus increasing the shelf life and quality of foods. The mechanical properties also give useful information about film performance because films with low mechanical strength values will have limited applications. Normally, the mechanical properties of films are evaluated through the determination of tensile strength, elongation at break, and elastic modulus.

The coating is an integral part of the food which can be eaten as a part of the whole food product , edible coatings can offer the following advantages to the fresh fruits and vegetables industry, improved retention of color, acids, sugar and flavor components, maintenance of quality during shipping and storage, reduction of storage disorders; and improved consumer appeal , edible coatings have also a high potential to carry active ingredients such as anti-browning agents, colorants, flavors, nutrients, spices and antimicrobial compounds that can extend product shelf life and reduce the risk of pathogen growth on food surfaces, formulations of edible coating, Applications of lipid based coatings on fresh fruits and vegetables, Resisted the leaching effects, Less decay, Best fruit quality, better the organoleptic properties, increased shelf life, highest acidity and TSS under the treatment with 6 to 9 %It delayed ripening and reduced the water loss and decay incidence. Little effect on TSS, total titratable acidity, and ascorbic acid, Retard water loss, prevent desiccation, Effective in retarding fruit ripening, retaining fruit firmness, and improving fruit quality attributes including levels of fatty acids and aroma volatiles, Reduced weight loss, and shrivel; increase shelf life; increase ground skin coloration, Slightly delayed fruit ripening but reduced fruit aroma volatile development, Decreased soluble solids, titratable acidity and ascorbic acid loss; increase storage life up to 34 days, Prolongs and improves the shelf life, excellent antifungal barrier inhibiting the growth of natural phytopathogenic fungal strains and slow weight loss, Reduced the rate of physico-chemical changes; retained the best quality, Lower the fresh matter loss percentage and higher the relative water retention; peel percentage decreased and pulp and pulp/peel percentages increased, Extended the green life, delayed ripening, Reduced softening of arils, weight loss and % of browning index, loss of vitamin C, loss of anthocyanin and delayed microbial decay, Prevent oxidative and hydrolytic rancidity, improved their smoothness and taste and improved sensory characteristics, Retaining texture (especially for brittleness); also maintained higher POD activity and lower activities of cell wall hydrolases such as PE, PG, and cellulase,

Delayed ripening, retained higher TSS: acid ratio in storage, Delayed ripening, loss of firmness and reduced PLW, Preserving the quality and extending the shelf life, reduced the weight and firmness losses, Retaining higher contents of Vit. 'C' and total 'chlorophyll', Reduced moisture loss, maintaining fruit firmness and fruit freshness, Reduced physiological loss in weight and shrinkage, aloe vera edible coating was able to reduce the initial microbial counts for both mesophilic aerobic and yeast and molds in cv. Crimson Seedless table grapes, aloe in general positive effect of this edible coatings is based on their hygroscopic properties, which enables formation of O2 and CO2 and creating modified atmosphere (MA) and acting as moisture barrier between the fruit and the environment, and thus reduced weight loss, browning, softening, and growth of yeast and molds, Papaya , Aloe vera gel edible coating , Control PLW, ripening process (chemical changes, color development and softening of fruit tissue) and decay, increase the shelf life, cherry , Aloe vera gel Prevent loss of moisture and firmness, control respiratory rate and maturation development, delay oxidative browning and reduce microorganism proliferation, apple , Aloe vera gel Delayed the loss of total phenolics and ascorbic acid, Delayed the weight loss, color changes, accelerated softening and ripening, rachis browning, and high incidence of berry decay, extend the storage life and reduce the initial microbial counts, grapes, Aloe vera gel Prevent loss of moisture and firmness, control respiratory rate and maturation development, delay oxidative browning and reduce microorganism proliferation

Premium fruit quality is the responsibility of everyone along the supply chain and begins with good management to limit infections from fungi causing anthracnose and stem-end rot during fruit development, enhance the robustness of fruit through extended storage and transport chains, resulting in premium quality fruit at point-of-sale and a pleasurable experience for the consumer.

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We will be glad if you contact us, please visit our web page www.amb-wellness.com, or email with our global sales manager, Mr. Oscar Lozano, at oscar@amb-wellness.com or by WhatsApp mobile at +52 871 315 4092.

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