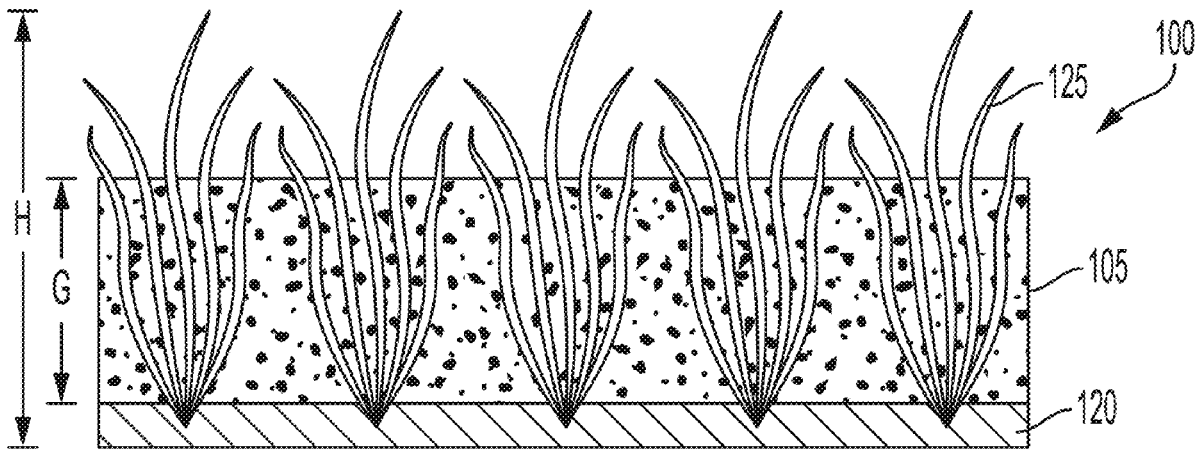




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(19) **United States**(12) **Patent Application Publication**
SMOLLETT et al.(10) **Pub. No.: US 2021/0254290 A1**(43) **Pub. Date: Aug. 19, 2021**(54) **OLIVE PITS INFILL SYSTEMS AND
ARTIFICIAL TURFS HAVING THE SAME**(52) **U.S. Cl.**
CPC **E01C 13/08** (2013.01)(71) Applicant: **FieldTurf, Inc.**, Montreal (CA)(72) Inventors: **Jason SMOLLETT**, Montreal (CA);
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KRAMER**, Montreal (CA)(21) Appl. No.: **16/795,540**(22) Filed: **Feb. 19, 2020****Publication Classification**(51) **Int. Cl.**
E01C 13/08 (2006.01)(57) **ABSTRACT**

The present invention relates to using olive pit particles as a portion of the infill for an artificial turf field. The olive pit particles are produced by crushing raw olive pits. The particles or pits are not treated with antimicrobial additives. Infills and artificial turf fields comprising such particles, or such particles in combination with the weight distributions and other materials disclosed in this application, exhibit superior properties compared to other infills and artificial turf fields comprising other organic materials and synthetic materials.



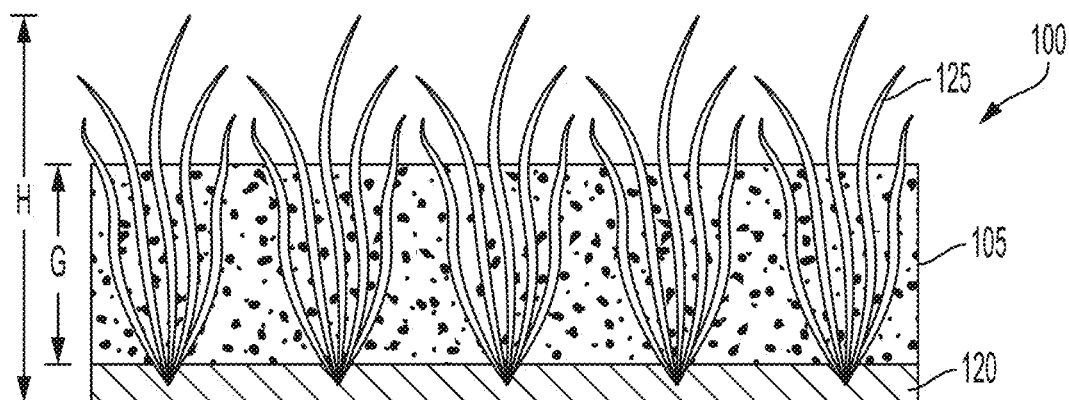


FIG. 1

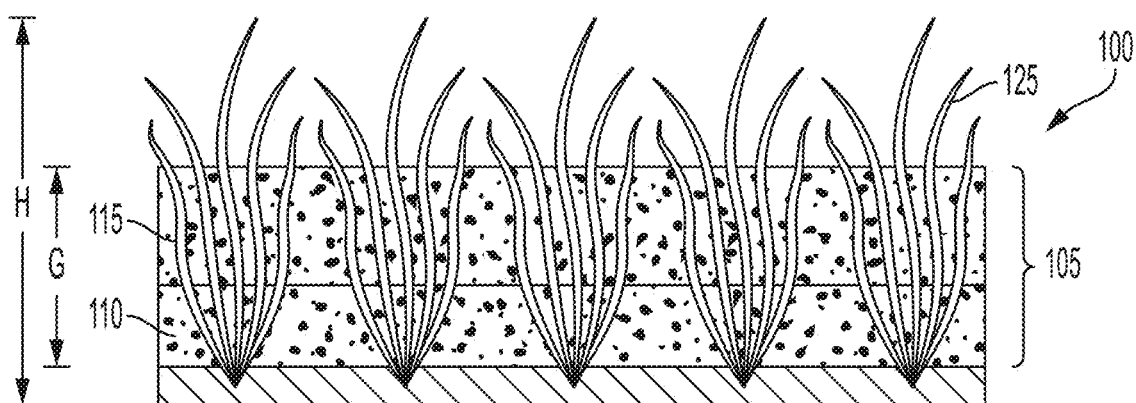


FIG. 2

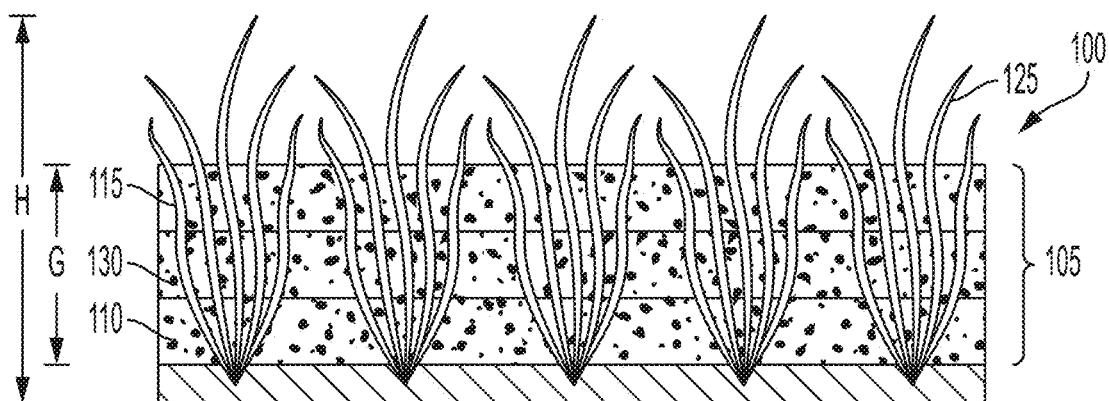


FIG. 3

Infill Systems

Name	Cork-based Infill	First Olive Stone-based Infill	Material
Stabilizing Infill	22 kg/m ²	22 kg/m ²	Sand
Performance Infill	6 kg/m ²	13 kg/m ²	Cork / Olive stones

Name	Composite 1	Composite 2	Second Olive Stone-based Infill	Material
Stabilizing Infill	5 kg/m ²	5 kg/m ²	5 kg/m ²	Sand
Mix layer	25 kg/m ² 12.5 kg/m ²	25 kg/m ² 12.5 kg/m ²	25 kg/m ² 12.5 kg/m ²	Sand / Cryo 14-30 Rubber
Performance Infill	2 kg/m ²	2 kg/m ²	2 kg/m ²	Composite 1 / Composite 2 / Olive

FIG. 4

Heat Test Results

Infill System	Cork	First Olive Stone-based Infill	First Composite System	Second Composite System	Second Olive Stone-based Infill
Temperature 2hrs	63°C / 145.4°F	58°C / 136.4°F	66°C / 150.8°F	72°C / 161.6°F	59°C / 138.2°F
Temperature 4hrs	65°C / 149°F	61°C / 141.8°F	69°C / 156.2°F	77°C / 170.6°F	62°C / 143.6°F

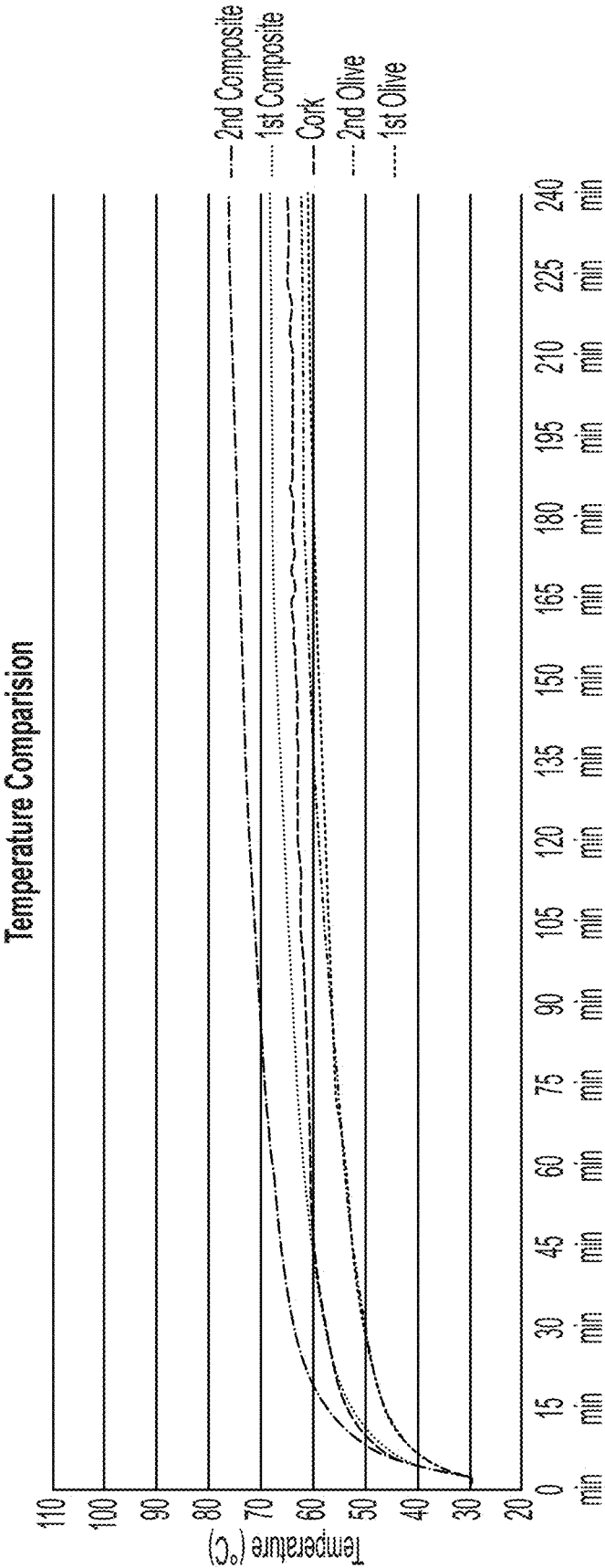


FIG. 5

Specific Gravity

Material Name	Olive	Cork	Coconut
Specific Gravity	1.29 g/cm ³	0.39 g/cm ³	0.45 g/cm ³

Friction Test Result

Material Name	Olive	Cork	Coconut (moisture 50%)
Temperature	45°C / 113°F	154°C / 309°F	44°C / 111°F

FIG. 6



Cork

Coconut

Olive

FIG. 7



FIG. 8

OLIVE PITS INFILL SYSTEMS AND ARTIFICIAL TURFS HAVING THE SAME

FIELD OF THE INVENTION

[0001] Embodiments of the present invention relate to organic infill systems and artificial turf fields having the same. More particularly, the embodiments relate to organic infill systems comprising olive pit particles and artificial turf fields comprising such infill systems.

BACKGROUND OF THE INVENTION

[0002] There is currently a potential trend and related search with respect to new infill materials and compositions for artificial turf fields. A particular focus has been towards developing an infill that uses organic materials. For example, some customers of infill materials have sought to reduce or eliminate the use of certain compounds such as synthetic materials, recycled rubber, or both for the infill of their artificial turf fields.

[0003] As a matter of background, a significant amount of engineering and development is devoted to developing artificial turf field systems. With respect to the infill, each kind of material often times has its own performance and structural characteristics. Obtaining the right composition and arrangement of materials can be challenging.

SUMMARY OF THE INVENTION

[0004] In accordance with principles of the invention, an artificial turf system is contemplated. The system comprises a turf backing, a plurality of turf fibers attached to the backing, and infill on the backing interspersed between the fibers supporting the fibers in an upright position and having a depth covering a portion of the fibers and exposing another portion of the fibers. The infill is made entirely of olive pit particles. The system has a pile height between about 15 mm and about 70 mm.

[0005] In one embodiment, the olive pit particles are raw crushed olive pits.

[0006] In one embodiment, the infill is untreated with antimicrobial additives.

[0007] In one embodiment, the infill has a height between about 2 mm and about 30 mm.

[0008] In one embodiment, the infill has a weight between about 1 kg per square meter and about 15 kg per square meter of olive pit particles.

[0009] In accordance with principles of the invention, another artificial turf system is contemplated. The system comprises a turf backing, a plurality of turf fibers attached to the backing, and infill on the backing interspersed between the fibers supporting the fibers in an upright position and having a depth covering a portion of the fibers and exposing another portion of the fibers. The infill comprises olive pit particles and another infill material. The system has a pile height between about 15 mm and about 70 mm.

[0010] In one embodiment, the other infill material is sand.

[0011] In one embodiment, the olive pit particles and the other infill material are formed as two separate layers in the infill. The olive pit particle layer has a weight between about 1 kg per square meter and about 15 kg per square meter of olive pit particles.

[0012] In one embodiment, the infill further comprises a third layer of infill material. The third layer of infill material comprises olive pit particles, extruded composite, cork,

SBR, EPDM rubber, or a combination thereof. The third layer of infill material comprises sand and rubber particles. The third layer is sandwiched between the olive pit particle layer and the other infill layer. The rubber particles have a sieve size of between 14 and 30 (0.6 mm-1.4 mm).

[0013] In one embodiment, the olive pit particles and the other infill material are intermixed.

[0014] In one embodiment, the olive pit particles are raw crushed olive pits.

[0015] In one embodiment, the infill is untreated with antimicrobial additives.

[0016] In one embodiment, the infill has a height between about 2 mm and about 30 mm.

[0017] In one embodiment, the infill has a weight between about 1 kg per square meter and about 15 kg per square meter of olive pit particles.

[0018] In accordance with principles of the invention, a method for preparing an artificial turf system is contemplated. The method comprises providing a turf backing, attaching a plurality of turf fibers to the backing, and disposing infill on the backing that is interspersed between the fibers and supporting the fibers in an upright position and that has a depth covering a portion of the fibers and exposing another portion of the fibers, wherein the infill is made entirely of olive pit particles. The turf backing, fibers, and infill form a pile height between about 15 mm and about 70 mm.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Various features of examples in accordance with the principles described herein may be more readily understood with reference to the following detailed description taken in conjunction with the accompanying drawings, where like reference numerals designate like structural elements, and in which:

[0020] FIG. 1 depicts an illustrative artificial turf system in accordance with some embodiments of the present invention;

[0021] FIG. 2 depicts another illustrative artificial turf system in accordance with some embodiments of the present invention;

[0022] FIG. 3 depicts yet another illustrative artificial turf system in accordance with some embodiments of the present invention;

[0023] FIG. 4 depicts illustrative infill systems in accordance with some embodiments of the present invention;

[0024] FIG. 5 depicts the results of an illustrative heat test conducted on the infill systems of FIG. 4 in accordance with some embodiments of the present invention;

[0025] FIG. 6 depicts the specific gravity of different materials and the results of an illustrative friction test conducted on those materials in accordance with some embodiments of the present invention;

[0026] FIG. 7 depicts the results of an illustrative floatation test conducted on the materials listed in FIG. 6 in accordance with some embodiments of the present invention; and

[0027] FIG. 8 depicts the results of an illustrative discoloration test conducted on the materials listed in FIG. 6 in accordance with some embodiments of the present invention.

[0028] The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, all illustrations are

intended to convey concepts, where relative sizes, shapes and other detailed attributes may be illustrated schematically rather than literally or precisely.

DETAIL DESCRIPTION OF THE INVENTION

[0029] In accordance with principles of the present invention, embodiments of the present invention are directed to using olive pit particles as a portion or a primary portion of the infill for an artificial turf field. Infill **105**, as shown in FIGS. 1-3, refers to material that is deposited over the turf backing **120** and forms a layer around the turf fibers **125**. Infill **105** is interspersed between the turf fibers **125** rising out of the turf backing **120**. Infill **105** generally has a depth that covers a portion of the turf fibers **125** (unexposed portion of the turf fiber) leaving part of the turf fibers **125** extending above the infill **105** (exposed portion of the turf fiber). Infill **105** helps support the turf fibers **125** in an upright position and is used to provide traction and shock absorption.

[0030] The turf fibers **125** are preferably synthetic fibers or man-made fibers. The turf fibers **125** can be made of materials comprising polyethylene ("PE"), polypropylene ("PP"), polyamide ("PA"), other types of polymers, or a combination thereof. The fibers **125** can be monofilament fibers, slit film fibers, fibrillated fibers, texturized fibers, or a combination thereof. In some embodiments, however, naturally occurring fibers, grass, vegetation, or plants may also be used, either alone or in combination with the synthetic fibers. The turf backing **120** can be made of woven or non-woven sheet material and one or more of sheets of such material. The turf backing **120** can be porous or permeable to provide water drainage. Woven or non-woven sheet material may be polypropylene, polyesters, or other synthetic materials. The pile height H of the artificial turf should have a measurement between about 15 mm and about 70 mm. The pile height H refers to the distance measured from the bottom surface of the turf backing **120** (the surface to be contacted by the ground or other installation surface) to the tip of the fibers **125**. Other heights of the fibers and pile are also contemplated depending on the height of the infill and thickness of the turf backing. The fibers **125** can be attached to the turf backing **120** by tufting, weaving (pile weave, flat weave, etc.), knitting, needle punching, fusion bonding and flocking, heating, pressurizing, adhering (e.g., using adhesive or other binder), or a combination thereof. The fibers **125** and the backing **120** can be held together only at the locations where they contact, e.g., applying adhesive to only locations where they are tufted, creating rows of adhesive and the areas in between are without adhesive. The system formed by the infill **105**, turf backing **120**, and fibers **125** may be referred to as the artificial turf system **100**. The artificial turf system **100** may further include a pad that is positioned under the turf backing **120** to provide additional shock absorption. An artificial turf field comprises one or more artificial turf systems **100**.

[0031] The infill **105** has a height G between about 2 mm and about 30 mm and a weight between about 1 kg per square meter and about 15 kg per square meter of olive pit particles. In other words, in a square meter of infill, the total weight of olive pit particles in that area is between about 1 kg per square meter and about 15 kg per square meter. The infill **105** may contain olive pit particles only (e.g., FIG. 1) or a combination of olive pit particles and other infill materials such as sand (e.g., FIGS. 2-3), whether they are

intermixed or deposited in separate layers. In the former case (olive pit particles only), the total weight of the infill equals the total weight of the olive pit particles, which is about 1 kg per square meter and about 15 kg per square meter. In the latter case (combination), the total weight of the infill is different or larger than the total weight of the olive pit particles. For example, the total weight of the infill **105** may be between about 3 kg per square meter and about 21 kg per square meter, if the total weight of the olive pit particles is between about 1 kg per square meter and about 15 kg per square meter and the total weight of the other infill material is between about 2 kg per square meter and about 6 kg per square meter. Other heights and weights of the infill and/or olive pit particles are also contemplated depending on the height of the fibers and thickness of the turf backing.

[0032] In one embodiment, the infill **105** comprises at least one layer of particles comprising olive pit particles (e.g., FIGS. 2-3). The olive pit particles include olive pit particles that have a sieve size of between 8 and 50 (0.3 mm-2.36 mm), or preferably between 10 and 35 (0.5 mm-2.0 mm). The olive pit particles that have a sieve size of between 8 and 50, or preferably between 10 and 35, are at least 1% by weight of the olive pit particles. Preferably, the olive pit particles of such sieve sizes are at least 1% and no more than 10% by weight of the olive pit particles (or between about 1% and about 10%). More preferably, the olive pit particles of such sieve sizes are at least 1% and no more than 5% by weight of the olive pit particles (or between about 1% and about 5%).

[0033] The olive pit particles described in this application are preferably raw or untreated crushed olive pits. For example, the preferred olive pit particles are naturally occurring olive pit particles or such particles that have not been treated with antimicrobial additives (whether it is chemical, artificial, organic, natural, non-toxic, or non-irritating antimicrobial additives). Antimicrobial additives may be agents used to prevent the growth of bacteria, fungi, mold, or other microorganisms and animals (e.g., to prevent decomposition, contamination, etc.), and/or to strengthen the mechanical properties of the materials or components being treated (e.g., can withstand larger amount of ultraviolet, larger amount of friction before they break, etc.). In some embodiments, the other layers or materials and components (e.g., turf fibers, turf backing, and infill) of the artificial turf system are also not treated with antimicrobial additives. In some embodiments, the infill, whether internally or externally, is not treated with antimicrobial additives. Olive pit particles are particles produced by applying mechanical force to raw or naturally occurring olive pits to break or crush the pits into smaller pieces of particles (e.g., using a grinder, granulator, or cracker mill). In some embodiments, raw or untreated olive pits (not crushed) may also be used. Olive pit and olive stone are used interchangeably in this application to refer to the same component. An olive pit or olive stone refers to a seed of an olive before it is crushed or an uncrushed seed. Olive pit particles refer to particles resulting from crushing the pit, stone, or seed. The olive pit particles, infill systems, or artificial turf systems are used or implemented without water or adding water to the particles or systems. The olive pit particles, infill systems, or artificial turf systems are dry, either completely dry (e.g., 0% of water, vapor, or moisture) or dry enough such that the amount of water, vapor, or moisture in these particles or systems are negligible or cannot be sensed or felt when a

person with ordinary skill in the art touches the particles or systems. Water-retaining particles, either particles containing only water or partially water (e.g., a percentage of water and another percentage of a different liquid, solid, or other material) are also not necessary (e.g., not added into the infill or artificial turf system or not used in crushing the olive pits).

[0034] In some embodiments, the infill may comprise extruded composite (e.g., thermoplastic elastomer (TPE), thermoplastic rubbers, mineral composite, or a combination thereof), cork, rubber (e.g., Styrene-butadiene rubber or SBR, or Ethylene Propylene Diene Monomer rubber or EPDM rubber), other organic materials, or a combination thereof. Mineral composite preferably includes carbonate mineral, carbonite mineral, or both. The different materials may be used as separated layers in the infill or intermixed to form the infill (one intermixed layer that makes up the entire infill). The infill may be prepared with or without rubber. When the infill is prepared without rubber, the infill is devoid of rubber, crumb rubber, rubber materials, or other similar materials (collectively referred to as rubber materials). The olive pit particles are used to replace rubber materials. Infill that is substantially devoid of rubber materials is also contemplated. For example, 65% or higher or 75% or higher by weight of the infill is not rubber materials. Infill that is primarily devoid of rubber materials is also contemplated. For example, 50% or higher by weight of the infill is not rubber materials. Rubber materials or the layer comprising rubber materials is directed to provide shock absorption. Depending on the amount of rubber materials used, these materials or layer may be substantially, primarily, or the only materials or layer that provides the function of shock absorption. The olive pit particles based on the aforementioned sieve sizes and weight percentages may also be used in combination with the materials stated in this paragraph (either intermixed or use as separate layers).

[0035] The infill materials and compositions described in this application have been tested and compared to other organic infills and compositions. The test results show that the described infill materials and compositions have significant better heat reduction capability compared to other organic infills and compositions. Such infill materials and compositions and improvement were not previously found and do not exist in artificial turf technology. The improvement is attributed to at least the described infill materials, compositions, or both. The improvement and/or the described infill materials and compositions that exhibit such property were not known to or expected by a person with ordinary skill in the art in the field of artificial turf and related fields until the embodiments of the present invention are developed. It should be noted the heat reduction characteristic is an improvement in addition to meeting or exceeding the required sports performance (such as the required ball bounce, ball roll, amount of vertical compression in response to applied force, and amount of shock absorption in EN 15330-1, EN 12235, EN 12234, EN 14808, EN14809, and other standards and methods) and exhibiting other properties.

[0036] FIG. 4 depicts several illustrative infills, infill compositions, or infill systems that are used in a heat test. The infill systems used in the test include a cork-based infill system, a first olive stone-based infill system (olive pits-based infill system), a first extruded composite-based infill system, a second extruded composite-based infill system, and a second olive stone-based infill system. The cork-based

infill system and the first olive stone-based infill system are dual layers or dual materials system and their pictorial illustrations are shown in FIG. 2. Each of the cork-based infill system and the first olive stone-based infill system includes a stabilizing infill (first layer or material) **110** and a performance infill (second layer or material) **115**. The stabilizing infill **110** includes sand only or primarily sand and the performance infill **115** includes olive stones (olive pits) only or primarily olive stones.

[0037] The other infill systems are triple layers or triple materials systems and their pictorial illustrations are shown in FIG. 3. These systems further include a mixed layer **130** (third layer or material) of sand and rubber only, or a mixed layer **130** of primarily sand and rubber. The mix layer **130** may be an intermixed layer of sand and rubber, or a layer of sand and another layer of rubber. Preferably, the rubber is rubber particles having a sieve size of between 14 and 30 (0.6 mm-1.4 mm). The first extruded composite-based infill system includes a first performance infill and the second extruded composite-based infill system includes a second performance infill. Each of the performance infills includes extruded composite infill and is referred to first extruded composite infill and second extruded composite infill. The first extruded composite infill includes a first amount of TPE and a first amount of carbonate mineral or carbonite mineral, and the second extruded composite infill include a second amount of TPE and a second amount of carbonate mineral or carbonite mineral. The first extruded composite infill and the second extruded composite infill differ in at least one of these amounts. The first and second extruded composite infills (and the stabilizing infill and mix layer) do not contain any olive pits or olive pit-based materials.

[0038] In the infill systems shown in FIG. 4, the performance infill is preferable the layer that is exposed to foot traffic. Therefore, in an artificial turf with the dual layer system, the artificial turf includes a backing layer, the stabilizing infill layer on top of (overlying) the backing layer, and the performance infill layer on top of (overlying) the stabilizing infill layer. In an artificial turf with the triple layer system, the artificial turf includes a backing layer, the stabilizing infill layer on top of the backing layer, the mix layer on top of the stabilizing infill layer, and the performance infill layer on top of the mix layer. The backing layer is the layer that contacts or is closer to the ground or an installation surface. It is understood all these infill systems may include additional layers or materials, be arranged in a different order, or have the described layers or materials substituted. The layers or materials in the infill system may also be intermixed and used as one layer. Other combinations are also possible. For convenience, the present description primarily focuses on two and three layer infill systems.

[0039] FIG. 4 also shows the weight of each infill material or layer in the infill system. For example, referring to the second olive stone-based infill system, the sand of the stabilizing infill is about 5 kg per square meter, the olive stones of the performance infill is about 2 kg per square meter, the sand of the mix layer is about 25 kg per square meter, and the rubber of the mix layer is about 12.5 kg per square meter.

[0040] FIG. 5 depicts the results of a heat test conducted on the infill systems show in FIG. 4. The same heat test is conducted (the same test setup is used) on each infill system. In each setup, the temperature of each infill system is measured from the same location, such as determined by a

(X,Y,Z) coordinate like the center of the infill system. For example, in an infill system having a length of 2 feet, a width of 2 feet, and a depth of 2 feet ((2, 2, 2)), the center point is a location where the length is 1 foot, the width is 1 foot, and the depth is 1 foot ((1,1,1)).

[0041] The results show that the olive stone-based infill systems based on the composition described in this application exhibit a lower temperature than the other organic infill systems after exposing to the same heat source or extreme temperature for the same period of time. After two hours, the temperature measured from the same location in the olive stone-based infill systems are 58° C. and 59° C. In contrast, the temperature measured from the same location in the other organic infill systems are 63° C., 66° C., and 72° C. After four hours, the temperature measured from the same location in the olive stone-based infill systems are 61° C. and 62° C. In contrast, the temperature measured from the same location in the other organic infill systems are 65° C., 69° C., and 62° C. Moreover, within the first several minutes (e.g., 10 minutes, 15 minutes) of the test, the olive stone-based infill systems also show a slower function or rate in reaching their highest or stable temperature from their initial temperature.

[0042] Tests over 4 hours long also have been conducted (e.g., days and weeks) and they all show that the olive stone-based infill systems based on the composition described in this application always exhibit a lower temperature and a slower heat absorbing function than the other organic infill systems. Tests also have been repeated and measured from other locations (e.g., (1, 0.75, 1.5) location from each infill system) and the same trends or characteristics also have been observed.

[0043] The olive stone-based infill systems based on the composition described in this application have a superior heat reduction or radiating capability than the other organic infill systems in FIG. 4 and other existing organic infill systems. A superior heat reduction or radiating capability keeps an artificial turf cooler (and thus keeps the overall sports field or stadium cooler to the players and audience), reduces heat damage to the tufted fibers, minimizes burning sensation to human skin when athletes fall, makes the artificial turf less susceptible to fire, allows the organic particles and other particles to degrade slower, and curtail other heat-related issues.

[0044] FIG. 6 depicts the specific gravity of three different types of organic materials (olive, cork, and coconut particles) and the result of the friction tests conducted on those materials. Olive particles have a specific gravity greater than 1 to prevent floating and below 1.5 to meet certain sports requirements. The tests are performed by a friction equipment that simulates the fall and sliding of an athlete on the surface of these materials by measuring the temperature of these materials, or the temperature elevation or burn felt by an athlete. The temperature also indicates or can be used to determine the amount of friction felt by the athlete (e.g., with the shoes, skin, or clothes). In the tests, conditions imitating athlete weights from 25 kg to 150 kg and falling or sliding speed up to 5 meter per second had been used on the materials in FIG. 6 (or artificial turf systems with such materials). The result shows the average temperatures of the conducted friction tests. The results shows that the olive pits have a lower temperature compared to that of cork. Although coconut particles also exhibit a low temperature, they require water or need to be wetted in order to achieve that

temperature (e.g., either 50% of the total coconut particles by weight had been soaked in water before they are tested or an amount of water equal to 50% of the total coconut particle weight had been added to the coconut particles.) This complicates the installation and preparation processes of an infill system and may make the artificial turf system incompatible with certain sports or disqualify the artificial turf system from meeting certain standards (EN 15330-1, EN 12235, etc.).

[0045] FIG. 7 depicts the result of a floatation test conducted on the olive, cork, and coconut particles. Each glassware is filled with about the same amount of olive, cork, and coconut particles (e.g., the total weight of the particles is about the same) and then about the same amount of water is poured into each glassware. After letting the combination sits for approximately 30 minutes, the test shows that the olive particles stay in the bottom of the glassware (do not float in the water) whereas the cork and coconut particles float on or toward the surface of the water. This shows that the olive particles are more stable than the cork and coconut particles when they are filled with water or their infill systems are filled water. The olive particles are more likely to stay in place on rainy days and are more difficult to be dislodged from the artificial turf. Therefore, olive pit particles infill system is a better option in maintaining the structure and look of the infill system and keeping an even surface when water is involved (e.g., olive particles are less likely to be moved from place to place).

[0046] FIG. 8 depicts the result of a discoloration test conducted on the olive, cork, and coconut particles. The discoloration test is conducted by placing olive, cork, and coconut particles in their respective containers with water and immersing or mixing the particles with water for several hours (e.g. about 2 hours). A new, white piece of clothes (e.g., made of cotton, polyester, nylon, or a combination thereof) is then dipped in each of the containers to absorb water therein and removed from the respective container. The test shows that the olive particles leave behind the lightest color or almost no color on its respective clothes compared to those of the cork and coconut particles. The coconut particles leave behind the darkest color. Therefore, the olive pit particles are more preferable and would make shirts, shorts, or other wears on the athletes less dirty, such as when they fall or slide.

[0047] In addition to using the term comprising or including to describe the above embodiments, embodiments based on the phrases consisting of and consisting essentially of are also contemplated. Infill systems, artificial turf systems, and their counterpart methods consist of or consist essentially of the elements (e.g., weights, layers, materials, compositions, steps, or a combination thereof) mentioned in this application are contemplated. The phrase consisting essentially of describes a combination that includes the discussed elements and other elements that do not materially affect the desired characteristics (does not make the temperature measured at the 4 hour mark exceeding 65° C. or does not make the temperature measured at the 2 hour mark exceeding 60° C. when the same test in FIG. 5 is conducted) and performance (pass the required ball bounce, ball roll, amount of vertical compression in response to applied force, and amount of shock absorption in EN 15330-1, EN 12235, EN 12234, EN 14808, EN14809, and other standards and methods, etc.) of the combination. The other elements should not exceed more

than 15% of the total weight of the combination. Other percentages are also possible depending on the specifics of the combination.

[0048] Counterpart method embodiments are also understood from the overall disclosure. Broader, narrower, or different combinations of such method embodiments are also contemplated such that, for example, steps can be removed or added in a broader or narrower way. In one embodiment, a method for preparing an artificial turf system is contemplated. The method comprises providing a turf backing, attaching a plurality of turf fibers to the turf backing, and disposing infill on the turf backing in a manner such that the infill is interspersed between the fibers and is supporting the fibers in an upright position. The infill has a depth covering a portion of the fibers and exposing another portion of the fibers. The infill may have materials, weight distribution, and other features that are discussed with respect to FIGS. 1-8. In one embodiment, the infill being disposed is made entirely of olive pit particles. The disposed infill or olive pit particles may be the only infill, layer, or particles that are above the turf backing and interspersed between the fibers. In another embodiment, as shown in FIG. 3, the step of disposing infill may comprise disposing a layer of sand on the turf backing, disposing a mix layer comprising sand and rubber particles on the layer of sand, and disposing a layer of olive pit particles on the mix layer. In another embodiment, the step of disposing infill may comprise intermixing one or more such layers, disposing the intermixed layer on the turf backing, and adding other layers if applicable. Similar concepts also apply to FIG. 2. Methods for preparing infill for an artificial turf system is also contemplated. For example, the infill can be pre-formed by pre-forming each layer and then attaching the layers together. The attached layers are then put on the turf backing before the turf fibers are attached to the turf backing. The turf fibers are subsequently installed on the turf backing (e.g., by penetrating the stem of the fiber through the infill and turf backing). For another example, the infill can be pre-formed by intermixing the materials from the multiple layers and storing the intermixed materials in a plastic bag or storage bag. The materials in the bag can be poured onto the artificial turf when necessary, before or after the fibers are attached to the turf backing.

[0049] In any of the above embodiments, the illustrative weight percentages can mean approximate weight percentages, instead of exact weight percentages. The term approximate or about means $\pm 0.5\%$, preferably $\pm 0.2\%$, and more preferably $\pm 0.1\%$ of the illustrative weight percentage. For example, approximate or about 5% by weight means between and including 4.9% and 5.1% by weight. Exemplary infills and artificial turf systems are described for illustrative purposes. Further, since numerous modifications and changes will readily be apparent to those having ordinary skill in the art, it is not desired to limit the invention to the exact constructions as demonstrated in this disclosure. Accordingly, all suitable modifications and equivalents may be resorted to falling within the scope of the invention. Applications of the technology to other fields are also contemplated.

[0050] The words “may” and “can” are used in the present description to indicate that this is one embodiment but the description should not be understood to be the only embodiment.

[0051] It should be understood that combinations of described features or steps are contemplated even if they are not described directly together or not in the same context.

[0052] It is to be understood that additional embodiments of the present invention described herein may be contemplated by one of ordinary skill in the art and that the scope of the present invention is not limited to the embodiments disclosed. While specific embodiments of the present invention have been illustrated and described, numerous modifications come to mind without significantly departing from the spirit of the invention, and the scope of protection is only limited by the scope of the accompanying claims.

1. An artificial turf system comprising:
 - a turf backing,
 - a plurality of turf fibers attached to the backing, and
 - infill on the backing interspersed between the fibers supporting the fibers in an upright position and having a depth covering a portion of the fibers and exposing another portion of the fibers, wherein the infill is made entirely of olive pit particles;
 - wherein the system has a pile height between about 15 mm and about 70 mm.
2. The system of claim 1, wherein the olive pit particles are raw crushed olive pits.
3. The system of claim 1, wherein the infill is untreated with antimicrobial additives.
4. The system of claim 1, wherein the infill has a height between about 2 mm and about 30 mm.
5. The system of claim 1, wherein the infill has a weight between about 1 kg per square meter and about 15 kg per square meter of olive pit particles.
6. An artificial turf system comprising:
 - a turf backing,
 - a plurality of turf fibers attached to the backing, and
 - infill on the backing interspersed between the fibers supporting the fibers in an upright position and having a depth covering a portion of the fibers and exposing another portion of the fibers, wherein the infill comprises olive pit particles and another infill material;
 - wherein the system has a pile height between about 15 mm and about 70 mm.
7. The system of claim 6, wherein the other infill material is sand.
8. The system of claim 6, wherein the olive pit particles and the other infill material are formed as two separate layers in the infill.
9. The system of claim 8, wherein the olive pit particle layer has a weight between about 1 kg per square meter and about 15 kg per square meter of olive pit particles.
10. The system of claim 8, wherein the infill further comprises a third layer of infill material.
11. The system of claim 10, wherein the third layer of infill material comprises olive pit particles, extruded composite, cork, SBR, EPDM rubber, or a combination thereof.
12. The system of claim 10, wherein the third layer of infill material comprises sand and rubber particles.
13. The system of claim 12, wherein the third layer is sandwiched between the olive pit particle layer and the other infill layer.
14. The system of claim 12, wherein the rubber particles have a sieve size of between 14 and 30 (0.6 mm-1.4 mm).
15. The system of claim 6, wherein the olive pit particles and the other infill material are intermixed.

16. The system of claim 6, wherein the olive pit particles are raw crushed olive pits.

17. The system of claim 6, wherein the infill is untreated with antimicrobial additives.

18. The system of claim 6, wherein the infill has a height between about 2 mm and about 30 mm.

19. The system of claim 6, wherein the infill has a weight between about 1 kg per square meter and about 15 kg per square meter of olive pit particles.

20. A method for preparing an artificial turf system comprising:

providing a turf backing,

attaching a plurality of turf fibers to the backing, and

disposing infill on the backing that is interspersed

between the fibers and supporting the fibers in an

upright position and that has a depth covering a portion

of the fibers and exposing another portion of the fibers,

wherein the infill is made entirely of olive pit particles;

wherein the turf backing, fibers, and infill form a pile

height between about 15 mm and about 70 mm.

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