

HAIR SUPPLEMENT FORMULATION AND METHOD FOR USE IN TREATMENT OF HAIR LOSS

FIELD

[0001] The present disclosure relates generally to hair supplement formulations and methods for making and using the same for treating hair loss.

BACKGROUND

[0002] The following discussion of the background to the invention is intended to facilitate an understanding of the present invention only. It should be appreciated that the discussion is not an acknowledgement or admission that any of the material referred to was published, known or part of the common general knowledge of the person skilled in the art in any jurisdiction as at the priority date of the invention.

[0003] Hair loss is a very prevalent condition amongst both men and women and across all races. However, there are very limited options available. Multiple factors contribute to hair loss, including genetics, hormones, environmental exposure, medications and nutrition. "Alopecia" is the medical term for hair loss in humans for both male and female. There are no suitable treatments available that would be effective against different types of alopecia.

[0004] Alopecia can be caused by a number of factors and be manifested in a number of different ways. For example, androgenic alopecia, often known as male pattern baldness, typically begins in men above the temples and then affects the top of the head. Androgenic alopecia can often be the result of overproduction of dihydrotestosterone (DHT). The syndrome often results in a ring of hair that leaves the center of the scalp bald in the so-called "Hippocratic balding" pattern. Women experiencing androgenic alopecia, while balding, are not necessarily subjected to this particular pattern of hair loss but instead may undergo thinning across the entire scalp. While not widely talked about 2 out of 3 men start losing hair before they are 35 years old. For men, they will usually have to turn to medications (like Propecia/Finasteride) which have adverse side effects, and for women, usually only topical applications. Use of natural DHT inhibitors such as those from Saw Palmetto must be used in very high concentrations to be able to demonstrate similar effects DHT inhibitors like Propecia/Finasteride. Generally, inhibitors of DHT are not recommended for use in women.

[0005] For women, menopause, stress, post childbearing, nutritional deficiencies, may also be a cause. About 40% of women have visible hair loss by the age of 40 years. Hair loss can be a cause for emotional distress and other social implications. There are no suitable treatments available for both men and women and several treatments

5 recommended for men are not suitable for women and vice versa.

[0006] There exists a need to have alternative compositions and methods to alleviate at least one of the aforementioned problems.

SUMMARY

[0007] Surprisingly, the nutritional supplement formulation could effectively be used for both men and women who are suffering from hair loss and may increase hair growth in most groups suffering from hair loss.

[0008] Accordingly, an aspect of the invention relates to a formulation for treatment of hair loss comprising: (a) at least one tocotrienol; (b) an extract of *Serenoa repens* fruit.

15 **[0009]** According to another aspect there is a method of treating hair loss in a subject in need of treatment comprising administering a formulation as disclosed herein above.

[0010] According to another aspect there is use of the formulation as disclosed herein above in the manufacture of a medicament for the treatment of hair loss.

20 **[0011]** According to another aspect there is a method of manufacturing a formulation for treatment of hair loss comprising: (a) extracting an oily fraction of the fatty portion of dried *Serenoa repens* fruit (b) combining at least one tocotrienol to the extract resulting in the formulation.

25 **[0012]** Other aspects and features of the present invention will become apparent to those of ordinary skill in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] In the figures, which illustrate, by way of non-limiting examples only, embodiments of the present invention,

[0014] **Figure 1:** Schematic of various embodiments of the formulation.

[0015] **Figure 2:** Comparison of the formulations 1) extract of *Serenoa repens* fruit, in men over 1 year; 2) tocotrienol, in women over 8 months 3); extract of *Serenoa repens* fruit, and tocotrienol; 4) extract of *Serenoa repens* fruit, tocotrienol, and tripeptide GXY; 5) extract of *Serenoa repens* fruit, tocotrienol, and keratin composition; 6) extract of *Serenoa repens* fruit, tocotrienol, and biotin; 7) extract of *Serenoa repens* fruit, tocotrienol, tripeptide GXY, keratin composition and biotin in men and women over 3 months.

[0016] **Figure 3:** Selection of images before and after images of different test subjects taking formulation 7 at 3 weeks, 4 weeks, 5 weeks and 6 weeks after taking formulation 7 twice daily.

DETAILED DESCRIPTION

[0017] Throughout this document, unless otherwise indicated to the contrary, the terms “comprising”, “consisting of”, “having” and the like, are to be construed as non-exhaustive, or in other words, as meaning “including, but not limited to”.

[0018] Furthermore, throughout the document, unless the context requires otherwise, the word “include” or variations such as “includes” or “including” will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

[0019] Throughout the description, it is to be appreciated that the term “treat”, “treatment” or “treating” and its’ plural forms as used herein is intended to refer to providing an effective amount of a formulation comprising at least one tocotrienol, a saw palmetto extract; and at least one additional component sufficient to reduce or slow the progression of hair loss and/or providing a subject or patient with a sufficient amount of the formulation or medicament thereof so as to alleviate or eliminate hair loss and/or stimulate hair growth. Examples of treatment include reducing the loss of hair over an area of the scalp of an individual, or reducing the loss of volume of hair over an area of the scalp of an individual, or stopping or slowing the loss of hair particularly over an area of the scalp of an individual or reducing the loss of hair particularly over an area of the scalp of an individual or an increase in total hair count over an area of the scalp of an individual, or reduction of hair

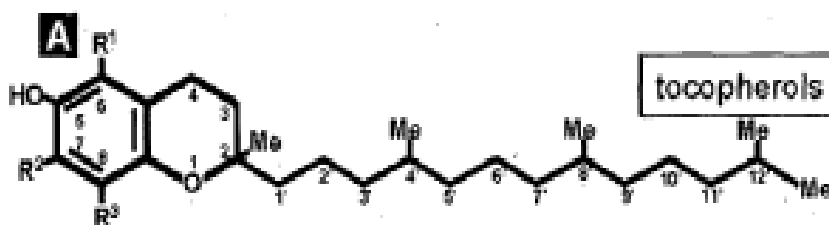
shedding in an individual over time. In various embodiments an individual includes a group of individuals or an average of a group of individuals.

[0020] According to various embodiments there is a formulation for use in treatment of hair loss comprising: (a) at least one tocotrienol; (b) an extract of *Serenoa repens* fruit.

[0021] Tocotrienols (T3) are found mainly in palm oil but can also be found in other sources including but not limited to in annatto, rice bran etc. Together with tocopherols (T), they provide a significant source of anti-oxidant activity to all living cells. This common anti-oxidant attribute reflects the similarity in chemical structures of the tocotrienols and the tocopherols, which differ only in their structural side chain (contains farnesyl for tocotrienol or saturated phytyl side chain for tocopherol). The common hydrogen atom from the hydroxyl group on the chromanol ring acts to scavenge the chain-propagating peroxy free radicals. Depending on the locations of methyl groups on their chromanol ring, tocopherols and tocotrienols can be distinguished into four isomeric forms: alpha (α), beta (β), gamma (γ), and delta (δ). Tocotrienols rarely exist on its own and will generally always have some tocopherols present. Consequently, in various embodiments at least one tocotrienol may include a tocopherol.

[0022] Different tocopherol and tocotrienol iso forms exist (see Formula I and II). Tocopherols consist of a chromanol ring and a 15-carbon tail derived from homogentisate (HGA) and phytyl diphosphate, respectively. On the other hand, tocotrienols differ structurally from tocopherols by the presence of three trans double bonds in the hydrocarbon tail. Formula I and Formula II and the description following it provide an overview about the known isoforms of tocopherols (T) and tocotrienols (T3).

[0023] Formula I

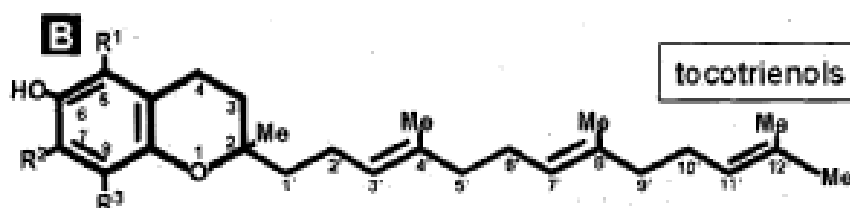


[0024] Where Formula I (A): R¹, R² and R³ are Me (CH₃), the compound is known as (alpha)-tocopherol. This compound may also be designated α-tocopherol or 5,7,8-

trimethyltocol. Where Formula I (A): R^1 and R^3 are Me; and R^2 is H, the compound is known as (beta)- tocopherol. This compound may also be designated, β -tocopherol or 5,8-dimethyltocol. Where Formula I (A): R^1 is H; R^2 and R^3 Me, the compound is known as (gamma)-tocopherol. This compound may also be designated γ -tocopherol or 7,8-dimethyltocol. Where Formula I (A): R^1 and R^2 are H; and R^3 is Me, the compound is known as (delta)-tocopherol. This compound may also be designated δ -tocopherol or 8-methyltocol.

[0025]

Formula II



[0026]

Where Formula II (B): R^1 , R^2 and R^3 are H, 2-methyl-2-(4,8,12-trimethyltrideca-3,7, 11-trienyl)chroman-6-ol, the compound is a tocotrienol. Where Formula II (B): R^1 , R^2 and R^3 are Me, the compound may be known as 5,7,8-trimethyltocotrienol or (alpha)-tocotrienol or α -tocotrienol. The name tocochromanol-3 has also been used. Where Formula II (B): R^1 and R^3 are Me; and R^2 is H, the compound may be known as ϵ -tocopherol, is designated 5,8-dimethyltocotrienol or (beta)-tocotrienol or, β -tocotrienol. Where Formula II (B): R^1 is H; R^2 and R^3 are Me, the compound may be known as γ -tocotrienol, or 7,8-dimethyltocotrienol or (gamma)-tocotrienol. The name plastochroman-3 has also been used. Where Formula II (B): R^1 and R^2 are H; R^3 is Me the compound may be known as 8-methyltocotrienol or (delta)-tocotrienol or δ -tocotrienol.

[0027]

The at least one tocotrienol used in the composition referred to herein can comprise or consist of at least one of tocotrienol, or a mixture of tocopherol, and tocotrienol. In some embodiments, the at least one tocotrienol used herein can be a mixture of at least one at least one tocotrienol or a tocotrienol-rich fraction (TRF). A tocotrienol-rich fraction typically refers to a mixture of different isomers of tocotrienol and tocopherols, for example, α -tocopherol, α -tocotrienol, β -tocotrienol, γ -tocotrienol, and δ -tocotrienol. The tocotrienol-rich fraction can further include other components such as plant phytosterols, carotenoids and squalene to name only a few. Tocotrienol-rich fraction can for example be obtained from palm oil, rice bran, annatto, or grape seed. Typically, a TRF comprises less than 30%, preferably less than 10% tocopherols of the total weight of the fraction. As such when the

composition comprises a TRF the composition comprises less than 30%, preferably less than 10% tocopherol of the total weight of the composition.

[0028] In some embodiments, the at least one tocotrienol used in the composition referred to herein can comprise, consist essentially of or consist of γ -tocotrienol, δ -tocotrienol, tocotrienol-rich fraction (TRF), or mixtures thereof.

[0029] An extract from *Serenoa repens* fruit, also known as Saw Palmetto extract, is an extract of the fruit or berries of *Serenoa repens*, a small palm tree sometimes known as American dwarf palm tree. In various embodiments the extract from *Serenoa repens* fruit is an oily extract of the fatty portion of dried berries. In various embodiments the extract comprises phytosterols such as β -sitosterol, fatty acids, β -carotene, and polysaccharides. In various embodiments a lipid/sterol extract of saw palmetto fruit (LESP) may be prepared by extraction with n hexane (100 percent). In various embodiments a lipid/sterol extract of saw palmetto fruit (LESP) may be prepared by extraction with ethanol (70–95 percent, w/w). In various embodiments a lipid/sterol extract of saw palmetto fruit (LESP) may be prepared by extraction by supercritical fluid extraction with liquid carbon dioxide. In various embodiments a lipid/sterol extract of saw palmetto fruit (LESP) may be quantifiable or standardized by the total fatty acid content such as 65%, 70%, 75%, 80%, 85%, 90%, 95%, 98%. (usually 70–95 percent, w/w). In various embodiments a lipid/sterol extract of saw palmetto fruit (LESP) comprises dried powder of the extract. In various embodiments a powdered extract is combined with other ingredients in the formulation. In various embodiments other forms of saw palmetto may be used including powdered dried fruit, dried whole fruit.

[0030] It is speculated that β -sitosterol is a non-competitive and non-selective inhibitor of 5 α -reductase. The Extract may block nuclear uptake of DHT in hair follicle cells and decrease DHT binding to androgen receptors by approximately 50%. The extract may also increase 3 α -hydroxysteroid-dehydrogenase activity, increasing the conversion of DHT to its weaker metabolite, andro-stanediol. The pharmacodynamic profile of an extract from *Serenoa repens* fruit differs from other known inhibitors of DHT such as finasteride.

[0031] Generally, inhibitors of DHT are not recommended for use in women. By combining the at least one tocotrienol with the extract of *Serenoa repens* fruit less *Serenoa repens* fruit extract is required to be effective. This allows a formulation that may be used by both men and women. In various embodiments 100mg or less of the extract of *Serenoa*

repens fruit may be used in the formulation for each dosage. In various embodiments 50mg to 100mg of the extract of *Serenoa repens* fruit may be used in the formulation for each dosage. In various embodiments 50mg to 90mg of the extract of *Serenoa repens* fruit may be used in the formulation for each dosage. In various embodiments 60mg to 80mg of the extract of *Serenoa repens* fruit may be used in the formulation for each dosage.

[0032] In various embodiments, the formulation may further comprise at least one additional component comprising or selected from the group consisting of tripeptide Gly-Xaa-Yaa whereby Xaa or Yaa are either Proline or Hydroxyproline; keratin forte, biotin and/or a combination thereof.

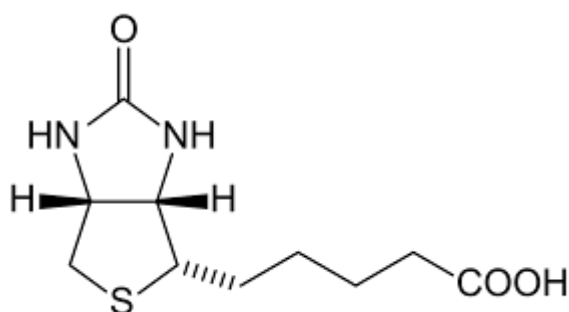
[0033] Throughout the description, it is to be appreciated that the term ‘tripeptide GXY’ or ‘tripeptide Gly-Xaa-Yaa whereby Xaa or Yaa are either Proline or Hydroxyproline’ and its’ plural forms as used herein is intended to refer to a peptide having amino acids Gly-Xaa-Yaa (GXY) whereby Gly is glycine, and Xaa or Yaa are either Proline or Hydroxyproline. In various embodiments the tripeptide GXY comprises Gly-Pro-Hyp (GPO). In various embodiments the tripeptide GXY comprises Gly-Hyp-Pro (GOP). In various embodiments, the tripeptide GXY comprises Gly-Hyp-Hyp (GOO). In various embodiments the tripeptide GXY comprises a combination of any two or more tripeptides Gly-Pro-Hyp (GPO), Gly-Hyp-Pro (GOP), and Gly-Hyp-Hyp (GOO). In various embodiments, the tripeptide is formed from a Gly-Pro-Pro (GPP) peptide where one of the prolines is then hydroxylated by an enzyme prolyl hydroxylase or an enzyme collagenolytic enzyme isolated from *Bacillus subtilis*. Hydroxyproline and proline play key roles for collagen stability as they permit the sharp twisting of a collagen triple helix.

[0034] Throughout the description, it is to be appreciated that the term ‘keratin composition’ and its’ plural forms as used herein is intended to refer to a source of any known keratin protein and may include minerals and/or vitamins that enhance the keratin protein activity. In various embodiments, the keratin protein comprises an alpha-keratin. In various embodiments the keratin protein is isolated from sheep’s wool. In various embodiments the keratin protein comprises a high cysteine content. In various embodiments, the keratin composition comprises keratin, zinc and copper. In various embodiments, the keratin composition comprises keratin, and vitamin B wherein the vitamin B may be selected from any one of vitamin B3, vitamin B5, vitamin B6, Biotin and a combination thereof. In various embodiments the keratin composition includes, alpha Keratin isolated from sheep wool, zinc, vitamin B3, copper, vitamin B5, vitamin B6, and

Biotin.

[0035] Throughout the description, it is to be appreciated that the term 'Biotin', and its plural forms as used herein is intended to refer to formula III. Biotin may also be known as vitamin B₇ or vitamin H, or vitamin B₈. Biotin is a water-soluble B-complex vitamin and cofactor for carboxylase enzymes involved in fatty acid synthesis, amino acid catabolism, gluconeogenesis and mitochondrial function. Biotin deficiency has been reported to cause alopecia (Zempleni et al. 2008 Metab; 3:715-724).

[0036] Formula III



[0037] In various embodiments the formulation for treatment of hair loss comprise: (a) at least one tocotrienol; (b) an extract of *Serenoa repens* fruit; and (c) tripeptide Gly-Xaa-Yaa wherein the Xaa and Yaa are proline or hydroxyproline. In various embodiments, the formulation comprises at least one tocotrienol comprises a tocotrienol-rich fraction (TRF), an oily extract of the fatty portion of dried berries and the other component comprises tripeptide Gly-Xaa-Yaa wherein the Xaa and Yaa are proline or hydroxyproline.

[0038] In various embodiments the formulation for treatment of hair loss comprise: (a) at least one tocotrienol; (b) an extract of *Serenoa repens* fruit; and (c); keratin forte. In various embodiments, the formulation comprises at least one tocotrienol comprises at least one tocotrienol comprises a tocotrienol-rich fraction (TRF), an oily extract of the fatty portion of dried berries and the other component comprises keratin forte.

[0039] In various embodiments the formulation for treatment of hair loss comprise: (a) at least one tocotrienol; (b) an extract of *Serenoa repens* fruit; and (c) biotin. In various embodiments, the formulation comprises at least one tocotrienol comprises a tocotrienol-rich fraction (TRF), an oily extract of the fatty portion of dried berries and the other component comprises biotin.

[0040] In various embodiments, the formulation comprises at least one tocotrienol comprises a tocotrienol-rich fraction (TRF), an oily extract of the fatty portion of dried berries and the other component comprises a combination of tripeptide Gly-Xaa-Yaa wherein the Xaa and Yaa are proline or hydroxyproline; keratin forte and biotin.

5 **[0041]** In various embodiments, the formulation further comprising a carrier. In various embodiments the carrier comprises a lipophilic carrier. In various embodiments the carrier comprises a gel such as alginate or gelatin. In various embodiments the carrier comprises an emulsion. In various embodiments the carrier comprises a gum such as a guar gum. Any carrier that is able to make the formulation palatable for oral administration would be
10 suitable.

[0042] According to various embodiments there is a method of treating hair loss in a subject in need of treatment comprising administering a formulation as disclosed herein above.

[0043] In various embodiments a subject in need of treatment is an individual suffering
15 from alopecia.

[0044] In various embodiments the administration is for oral administration.

[0045] According to various embodiments there is use of the formulation as disclosed herein above in the manufacture of a medicament for the treatment of hair loss.

[0046] According to various embodiments there is a method of manufacturing a
20 formulation for treatment of hair loss comprising: (a) extracting an oily fraction of the fatty portion of dried *Serenoa repens* fruit (b) combining at least one tocotrienol to the extract resulting in the formulation.

[0047] In various embodiments, the at least one tocotrienol comprises any one of γ -tocotrienol, δ -tocotrienol, tocotrienol-rich fraction (TRF), or mixtures thereof.

25 **[0048]** In various embodiments, the extract of *Serenoa repens* fruit comprises an oily extract of the fatty portion of dried berries or a lipid/sterol extract of saw palmetto fruit.

[0049] In various embodiments, the method further comprising adding at least one additional component to the formulation, wherein the least one additional component

comprises or is selected from the group consisting of tripeptide Gly-Xaa-Yaa wherein the Xaa and Yaa are proline or hydroxyproline; keratin composition, biotin and/or a combination thereof.

[0050] In various embodiments, the method further comprising adding a carrier.

5 **[0051]** In various embodiments, the carrier comprises a fat-based carrier. In various embodiments the carrier comprises a gel such as alginate or gelatin. In various embodiments the carrier comprises an emulsion. In various embodiments the carrier comprises a gum such as a guar gum. Any carrier that is able to make the formulation palatable for oral administration would be suitable.

10 **[0052]** Unless defined otherwise, all other technical and scientific terms used herein have the same meaning as is commonly understood by a skilled person to which the subject matter herein belongs.

[0053] EXAMPLES

[0054] Figure 2 depicts the results of prior art formulations 1 and 2 reported in the literature compared to various embodiments of the formulations 3-7. The formulations of reported in the prior art were taken for a longer period of time and were at much higher concentrations than the various embodiments of the formulations 3-7. The results demonstrate that there is a synergistic effect when *Serenoa repens* fruit extract is used in combination with tocotrienols. This permits formulations with a much lower amount of both *Serenoa repens* fruit extract and tocotrienol to be used creating formulations that are suitable for both men and women.

[0055] Formulation 1

[0056] A lipid/sterol extract from dried *Serenoa repens* fruit was prepared by extraction with n hexane (100 percent). The extract was combined with a carrier. A total of 320mg of the formulation 1 or 200mg of a placebo were administered to 50 men in each cohort daily for 1 year. The test group demonstrated a 38% increase in hair growth and the control group demonstrated 9% increase in hair growth.

[0057] Formulation 2

[0058] A total of 50mg of a tocotrienol rich fraction or a placebo were administered to 38 women in each cohort daily for 8 months. The test group demonstrated a 34% increase in hair growth and the control group demonstrated 0.1% decrease in hair growth.

[0059] Formulation 3

5 **[0060]** A lipid/sterol extract from dried *Serenoa repens* fruit was prepared by extraction with n hexane (100 percent). The extract was combined with a tocotrienol rich fraction (Davos life sciences) and carrier (guar gum) in a ratio of 1:1:2 on a weight basis. A total of 200mg of the formulation 3, or 200mg of a guar gum placebo were administered to 5 men and 5 women in each cohort daily for 3 months. The test group demonstrated a 64.8%
10 increase in hair growth and the control group demonstrated 4.5% increase in hair growth.

[0061] Formulation 4

[0062] A lipid/sterol extract from dried *Serenoa repens* fruit was prepared by extraction with n hexane (100 percent). The extract was combined with a tocotrienol rich fraction (Davos life sciences) tripeptide GPO (Collagen-Tripep20, Amicogen Inc), and carrier
15 (guar gum) in a ratio of 2:2:1:4 on a weight basis. A total of 200mg of the formulation 4, or 200mg of a guar gum placebo were administered to 5 men and 5 women in each cohort daily for 3 months. The test group demonstrated a 67% increase in hair growth and the control group demonstrated 9% increase in hair growth.

[0063] Formulation 5

20 **[0064]** A lipid/sterol extract from dried *Serenoa repens* fruit was prepared by extraction with n hexane (100 percent). The extract was combined with a tocotrienol rich fraction (Davos life sciences), keratin composition (Cynatine HNS Roxlor Global, LLC) and carrier (guar gum) in a ratio of 2:2:1:4 on a weight basis. A total of 200mg of the formulation 5 or 200mg of a guar gum placebo were administered to 5 men and 5 women in each cohort
25 daily for 3 months. The test group demonstrated a 65.2% increase in hair growth and the control group demonstrated 4.5% increase in hair growth.

[0065] Formulation 6

[0066] A lipid/sterol extract from dried *Serenoa repens* fruit was prepared by extraction with n hexane (100 percent). The extract was combined with a tocotrienol rich

faction (Davos life sciences), biotin and carrier (guar gum) in a ratio of 2:2:1:4 on a weight basis. A total of 200mg of the formulation 6 or 200mg of a guar gum placebo were administered to 5 men and 5 women in each cohort daily for 3 months. The test group demonstrated a 68% increase in hair growth and the control group demonstrated 4.5% increase in hair growth.

[0067] Formulation 7

[0068] A lipid/sterol extract from dried *Serenoa repens* fruit was prepared by extraction with n hexane (100 percent). The extract was combined with a tocotrienol rich faction (Davos life sciences), tripeptide GPO (Collagen-Tripep20, Amicogen Inc), keratin composition (Cynatine HNS Roxlor Global, LLC), biotin and carrier (guar gum) in a ratio of 2:2:1:1:1:4 on a weight basis. A total of 200mg of the formulation 7 or 200mg of a guar gum placebo were administered to 5 men and 5 women in each cohort twice daily for 3 months. The test group demonstrated a 79% increase in hair growth and the control group demonstrated 4.5% increase in hair growth.

[0069] Based on the effective results achieved for formulation 7 further studies were conducted in 15 test subject given formulation 7 twice daily for 3 months.

[0070] The test group perceived 94% greatly improved or improved when asked if they felt there was a reduction in hair loss after consuming formulation 7 twice daily for 3 months. The test group perceived 77% greatly improved or improved when asked if they felt there was an improvement in overall hair volume after consuming formulation 7 twice daily for 3 months. The test group perceived an 80% effective or greatly effective increase in hair growth and a 100% effective or greatly effective slowing down of hair loss.

[0071] The summary of the survey results of the test subjects taking formulation 7 twice daily for 3 months are listed in table 1 below.

Table 1: perception of the test subjects taking formulation 7, n=15

No.	Self-perception of:	Greatly improved	improved	No change
1	Reduction in hair loss	33%	60%	7%
2	Overall hair volume	27%	47%	27%

		Greatly effective	effective	No change
1	Slowing down hair loss	40%	60%	0%
2	Increasing hair growth	40%	40%	20%

[0072] 100% of the test subjects taking formulation 7 twice daily for 3 months said they would recommend the supplement to others. Less than 5% of the control subjects (taking the placebo) said they would recommend the supplement to others.

[0073] Figure 3 shows before and after images of different test subjects at 3 weeks, 4 weeks, 5 weeks and 6 weeks after taking formulation 7 twice daily. Densitometry results of these images demonstrate up to 80% increase in scalp coverage after at least 5 weeks of taking formulation 7 twice daily.

[0074] Prospective studies over a longer period of time are ongoing for formulation 7.

[0075] It should be further appreciated by the person skilled in the art that variations and combinations of features described above, not being alternatives or substitutes, may be combined to form yet further embodiments falling within the intended scope of the invention.

[0076] As would be understood by a person skilled in the art, each embodiment, may be used in combination with other embodiment or several embodiments.

Claims

[Claim 1.] A formulation for treatment of hair loss comprising:

- a. at least one tocotrienol;
- b. an extract of *Serenoa repens* fruit; and
- c. tripeptide Gly-Xaa-Yaa whereby Xaa or Yaa are either Proline or Hydroxyproline, wherein the formulation comprises 100mg or less of the extract of *Serenoa repens* fruit.

[Claim 2.] The formulation according to claim 1, wherein the at least one tocotrienol comprises any one of γ -tocotrienol, δ -tocotrienol, tocotrienol-rich fraction (TRF), or mixtures thereof.

[Claim 3.] The formulation according to claim 1 or 2, wherein the extract of *Serenoa repens* fruit comprises an oily extract of the fatty portion of dried berries or a lipid/sterol extract of saw palmetto fruit.

[Claim 4.] The formulation according to any one of claims 1 to 3, wherein the formulation comprises 50mg to 90mg of the extract of *Serenoa repens* fruit.

[Claim 5.] The formulation according to any one of claims 1 to 4, further comprising at least one additional component comprising keratin composition, biotin or a combination thereof.

[Claim 6.] The formulation according to claim 5, wherein the at least one tocotrienol comprises a tocotrienol-rich fraction (TRF), the extract of *Serenoa repens* fruit comprises an oily extract of the fatty portion of dried berries and the other component comprises tripeptide Gly-Xaa-Yaa wherein the Xaa and Yaa are proline or hydroxyproline.

[Claim 7.] The formulation according to claim 5, wherein the at least one tocotrienol comprises a tocotrienol-rich fraction (TRF), the extract of *Serenoa repens* fruit comprises an oily extract of the fatty portion of dried berries and the other component comprises keratin composition.

[Claim 8.] The formulation according to claim 5, wherein the at least one tocotrienol comprises a tocotrienol-rich fraction (TRF), the extract of *Serenoa repens* fruit comprises an oily extract of the fatty portion of dried berries and the other component comprises biotin.

[Claim 9.] The formulation according to claim 5, wherein the at least one tocotrienol comprises a tocotrienol-rich fraction (TRF), the extract of *Serenoa repens* fruit comprises an oily extract of the fatty portion of dried berries and the other component comprises a combination of tripeptide Gly-Xaa-Yaa wherein the Xaa and Yaa are proline or hydroxyproline; keratin composition and biotin.

[Claim 10.] The formulation according to any one of claims 1 to 9, further comprising a carrier.

[Claim 11] The formulation of claim 1, further comprising a keratin composition, a biotin and a carrier.

[Claim 12.] A non-therapeutic method of treating hair loss in a subject in need of treatment comprising administering a formulation according to any one of claims 1 to 11.

[Claim 13.] Use of the formulation comprising a tocotrienol-rich fraction (TRF), an oily extract of the fatty portion of dried berries of *Serenoa repens* fruit, a tripeptide Gly-Xaa-Yaa wherein the Xaa and Yaa are proline or hydroxyproline; keratin composition, biotin and a carrier in a ratio of 2:2:1:1:1:4 on a weight basis in the manufacture of a medicament for the treatment of alopecia, wherein the formulation comprises 100mg or less of the extract of *Serenoa repens* fruit.

[Claim 14.] A method of manufacturing a formulation for treatment of hair loss comprising:

- a. extracting an oily fraction of the fatty portion of dried *Serenoa repens* fruit;
 - b. combining at least one tocotrienol to the extract resulting in the formulation;
- and
- c. adding a tripeptide Gly-Xaa-Yaa wherein the Xaa and Yaa are proline or hydroxyproline, wherein the formulation comprises 100mg or less of the extract of *Serenoa repens* fruit.

[Claim 15.] The method according to claim 14, wherein the at least one tocotrienol comprises any one of γ -tocotrienol, δ -tocotrienol, tocotrienol-rich fraction (TRF), or mixtures thereof.

[Claim 16.] The method according to claim 14 or 15, wherein the extract of *Serenoa repens* fruit comprises an oily extract of the fatty portion of dried berries or a lipid/sterol extract of saw palmetto fruit.

[Claim 17.] The method according to claim 14 or 16, wherein formulation comprises 50mg to 90mg of the extract of *Serenoa repens* fruit.

[Claim 18.] The method according to any one of claims 14 to 17, wherein at least one additional component is added to the formulation, wherein the least one additional component comprising keratin composition, biotin or a combination thereof.

[Claim 19.] The method according to any one of claims 14 to 18, further comprising adding a carrier.