CLAIMS

1. An aeroponics apparatus (1,201) comprising a grow bed (3,203) with a reservoir (11,211) for containing a liquid or a solution and an ultrasonic nebulizer module (5,205) attached to the grow bed (3,203), the ultrasonic nebulizer module (5,205) comprising an ultrasonic horn (23,223) having an input end (25,225) connected to an ultrasonic transducer (27,227), in which the ultrasonic transducer (27,227) is between the ultrasonic horn (23,223) and an outer casing (29,229) which partially surrounds the ultrasonic horn (23,223) and the ultrasonic transducer (27,227), and an output tip (35,235), in which the ultrasonic horn (23,223) is in contact with a wall (33,233) of the reservoir (11,211).

2. An aeroponics apparatus (1,201) according to Claim 1, in which the output tip (35,235) of the ultrasonic horn (23,223) is located within an aperture (31,231) that passes through the wall (33,233) of the reservoir (11,211), such that in use of the apparatus (1,201), the output tip (35,235) is in contact with the liquid or the solution contained within the reservoir (11,211).

3. An aeroponics apparatus (201) according to Claim 1, in which the output tip (235) of the ultrasonic horn (223) is in contact with the external side of the wall (233) of the reservoir (211).

4. An aeroponics apparatus (201) according to Claim 3, in which the output tip (235) of the ultrasonic horn (223) is located within a recess (251) extending from the external side of the wall (233) of the reservoir (211).

5. An aeroponics apparatus (201) according to Claim 4, in which the thickness of the wall (233) at the recess is reduced.

6. An aeroponics apparatus (1,201) according to any preceding claim, further comprising a switching circuit (7,207) that can supply electrical power to the ultrasonic nebulizer module (5,205) or that can remove that supply of electrical power to the ultrasonic nebulizer module (5,205).

7. An aeroponics apparatus (1,201) according to any preceding claim, in which the reservoir (11,211) is in the form of a tray having a bottom wall (33,233) and at least one side wall (15,215) protruding upwardly from the bottom wall (33,233).

8. An aeroponics apparatus (1,201) according to any preceding claim, in which the ultrasonic horn (23,223) is made from a metal.

9. An aeroponics apparatus (1,201) according to any preceding claim, in which the ultrasonic horn (23,223) is adhesively bonded to the ultrasonic transducer (27,227).

10. An aeroponics apparatus (1,201) according to any preceding claim, in which the longitudinal length of the ultrasonic horn (23,223) is one quarter of, or an odd multiple of one quarter of, the wavelength of the ultrasound waves that, in use, travel within the ultrasonic horn (23,223).

11. An aeroponics apparatus (1,201) according to any of Claims 1 to 9, in which the longitudinal length of the ultrasonic horn (23,223) is one half, or an odd multiple of one half of, the wavelength of the ultrasound waves that, in use, travel within the ultrasonic horn (23,223).

12. An aeroponics apparatus (1,201) according to any preceding claim, in which the ultrasonic transducer (27,227) is a poled piezoelectric transducer (27,227) and the direction of poling is aligned with the longitudinal axis X-X of the ultrasonic horn (23,223).

13. An aeroponics apparatus (1,201) as claimed in any preceding claim, in which the solution is a nutrient solution formed from a mixture of water and nutrients.

14. An aeroponics apparatus (1,201) according to any of Claims 1, 2 and 6 to 12, in which the ultrasonic horn (23,223) is formed integrally with the reservoir (11,211).

15. An aeroponics apparatus (1, 201) according to any preceding claim, in which the ultrasonic horn (23, 223) is a solid, one-piece, body and has an upper half (24, 224) that is of lower mass than a lower half (26, 226), in which the height of the upper half is substantially the same as the height of the lower half.

16. An aeroponics apparatus (1, 201) according to any preceding claim, in which the ultrasonic horn (23, 223) is a solid, one-piece, body with a cylindrical upper half (24, 224) and a cylindrical lower half (26, 226) in which the diameter of the upper half (24, 224) is smaller than the diameter of the lower half (26, 226) and in which the upper half (24, 224) and the lower half (26, 226) are coaxially aligned.

CLAIMS

1. An aeroponics apparatus (1,201) comprising a grow bed (3,203) with a reservoir (11,211) for containing a liquid or a solution and an ultrasonic nebulizer module (5,205) attached to the grow bed (3,203), the ultrasonic nebulizer module (5,205) comprising an ultrasonic horn (23,223) having an input end (25,225) connected to an ultrasonic transducer (27,227), in which the ultrasonic transducer (27,227) is between the ultrasonic horn (23,223) and an outer casing (29,229) which partially surrounds the ultrasonic horn (23,223) and the ultrasonic transducer (27,227), and an output tip (35,235), in which the ultrasonic horn (23,223) is in contact with a wall (33,233) of the reservoir (11,211).

2. An aeroponics apparatus (1,201) according to Claim 1, in which the output tip (35,235) of the ultrasonic horn (23,223) is located within an aperture (31,231) that passes through the wall (33,233) of the reservoir (11,211), such that in use of the apparatus (1,201), the output tip (35,235) is in contact with the liquid or the solution contained within the reservoir (11,211).

3. An aeroponics apparatus (201) according to Claim 1, in which the output tip (235) of the ultrasonic horn (223) is in contact with an external side of the wall (233) of the reservoir (211).

4. An aeroponics apparatus (201) according to Claim 3, in which the output tip (235) of the ultrasonic horn (223) is located within a recess (251) extending from the external side of the wall (233) of the reservoir (211).

5. An aeroponics apparatus (201) according to Claim 4, in which the thickness of the wall (233) at the recess is reduced.

6. An aeroponics apparatus (1,201) according to any preceding claim, further comprising a switching circuit (7,207) that can supply electrical power to the ultrasonic nebulizer module (5,205) or that can remove that supply of electrical power to the ultrasonic nebulizer module (5,205).

7. An aeroponics apparatus (1,201) according to any preceding claim, in which the reservoir (11,211) is in the form of a tray having a bottom wall (33,233) and at least one side wall (15,215) protruding upwardly from the bottom wall (33,233).

8. An aeroponics apparatus (1,201) according to any preceding claim, in which the ultrasonic horn (23,223) is made from a metal.

9. An aeroponics apparatus (1,201) according to any preceding claim, in which the ultrasonic horn (23,223) is adhesively bonded to the ultrasonic transducer (27,227).

10. An aeroponics apparatus (1,201) according to any preceding claim, in which the ultrasonic horn (23,223) has a longitudinal length running from the input end (25,225) to the output tip (35, 235), in which the longitudinal length of the ultrasonic horn (23,223) is one quarter of, or an odd multiple of one quarter of, the wavelength of the ultrasound waves that, in use, travel within the ultrasonic horn (23,223).

11. An aeroponics apparatus (1,201) according to any of Claims 1 to 9, in which the ultrasonic horn (23,223) has a longitudinal length running from the input end (25,225) to the output tip (35, 235), in which the longitudinal length of the ultrasonic horn (23,223) is one half, or an odd multiple of one half of, the wavelength of the ultrasound waves that, in use, travel within the ultrasonic horn (23,223).

12. An aeroponics apparatus (1,201) according to any preceding claim, in which the ultrasonic transducer (27,227) is a poled piezoelectric transducer (27,227) and the direction of poling is aligned with a longitudinal axis X-X of the ultrasonic horn (23,223).

13. An aeroponics apparatus (1,201) as claimed in any preceding claim, in which the solution is a nutrient solution formed from a mixture of water and nutrients.

14. An aeroponics apparatus (1,201) according to any of Claims 1, 2 and 6 to 12, in which the ultrasonic horn (23,223) is formed integrally with the reservoir (11,211).

15. An aeroponics apparatus (1, 201) according to any preceding claim, in which the ultrasonic horn (23, 223) is a solid, one-piece, body and has an upper half (24, 224) that is of lower mass than a lower half (26, 226), in which the height of the upper half is substantially the same as the height of the lower half.

16. An aeroponics apparatus (1, 201) according to any preceding claim, in which the ultrasonic horn (23, 223) is a solid, one-piece, body with a cylindrical upper half (24, 224) and a cylindrical lower half (26, 226) in which the diameter of the upper half (24, 224) is smaller

than the diameter of the lower half (26, 226) and in which the upper half (24, 224) and the lower half (26, 226) are coaxially aligned.