[0008a] According to embodiments of the disclosures, a method for operating one or more drive units in a controlled agricultural environment includes for each of the one or more drive units, increasing a distance between an alignment element and a drive element; receiving a plant support structure that is oriented non-vertically so that the plant support structure rests on the drive element or the alignment element of each of the one or more drive units; and for each of the one or more drive units, decreasing the distance between the alignment element and the drive element so that the alignment element or the drive element rests on the plant support structure.

CLAIMS

What is claimed is:

1. A method for operating one or more drive units in a controlled agricultural environment, the method comprising:

(a) for each of the one or more drive units, increasing a distance between an alignment element and a drive element;

(b) receiving a plant support structure that is oriented non-vertically so that the plant support structure rests on the drive element or the alignment element of each of the one or more drive units; and

(c) for each of the one or more drive units, decreasing the distance between the alignment element and the drive element so that the alignment element or the drive element rests on the plant support structure.

2. The method of claim 1 further comprising, for each of the one or more drive units, driving the drive element to convey the plant support structure.

3. The method of claim 1, wherein the plant support structure comprises a grow tower.

4. The method of any one of the preceding claims, wherein the plant support structure includes a groove that rests on the drive element or the alignment element.

5. The method of any one of the preceding claims, wherein decreasing the distance is performed in response to sensing the presence of the plant support structure in the drive unit.

6. The method of any one of the preceding claims, further comprising applying a force via the alignment element or the drive element to force the plant support structure against the drive element or the alignment element, respectively.

7. The method of any one of the preceding claims, wherein:

a. the alignment element comprises one or more rollers, one or more wheels, a linear bearing element, a belt, a tread, one or more gears, or a fixed material that has a coefficient of friction against the plant support structure less than a coefficient of friction of the drive element against the plant support structure; and

b. the drive element comprises one or more rollers, one or more wheels, a belt, a tread, a linear actuator, or one or more gears.

8. The method of any one of the preceding claims, further comprising generating a slippage detection signal based at least in part upon a comparison of a measured position or motion of the plant support structure with a desired position or motion of the plant support structure.

9. The method of claim 8, further comprising triggering an action based at least in part upon the slippage detection signal.

10. A drive unit in a controlled agricultural environment, the drive unit comprising:

(a) an alignment element;

(b) a drive element; and

(c) an actuator for adjusting a distance between the alignment element and the drive element,

wherein the actuator is operable to increase the distance to enable reception of a plant support structure, and to decrease the distance to cause the alignment element and the drive element to contact opposing sides of the plant support structure.

11. The drive unit of claim 10, further comprising a second actuator for driving the drive element to convey the plant support structure.

12. The drive unit of claim 10 or 11, wherein the plant support structure comprises a grow tower.

13. The drive unit of any one of claims 10 to 12, wherein the plant support structure includes a groove that rests upon the drive element or the alignment element.

14. The drive unit of any one of claims 10 to 13, wherein the actuator is operable to decrease the distance in response to one or more sensors sensing the presence of the plant support structure in the drive unit.

15. The drive unit of any one of claims 10 to 14, wherein the actuator is operable to apply a force via the alignment element or the drive element to force the plant support structure against the drive element or the alignment element, respectively.

16. The drive unit of any one of claims 10 to 15, wherein:

a. the alignment element comprises one or more rollers, one or more wheels, a linear bearing element, a belt, a tread, one or more gears, or a fixed material that has a coefficient of friction against the plant support structure less than a coefficient of friction of the drive element against the plant support structure; and

b. the drive element comprises one or more rollers, one or more wheels, a belt, a tread, a linear actuator, or one or more gears.

17. The drive unit of any one of claims 10 to 16, further comprising:

a. one or more sensors;

b. one or more memories storing instructions; and

c. one or more processors, coupled to the one or more memories, that execute the instructions to cause performance of:

i. commanding the drive element to achieve a desired position or motion of the plant support structure;

ii. determining a measured position or motion of the plant support structure, wherein the measured position or motion is based at least in part upon a signal from the one or more sensors; and

iii. generating a slippage detection signal based at least in part upon comparing the measured position or motion with the desired position or motion.