TOMATO PLANT, TOMATO FRUIT, AND METHOD OF CULTIVATING TOMATO PLANT

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present disclosure relates to a tomato plant, a tomato fruit, and a method of cultivating a tomato plant.

2. Description of the Related Art

[0002] In recent years, an artificial light type plant factory in which a plant such as a vegetable is cultivated by using an artificial light source such as an LED (Light Emitting Diode) in a closed space has attracted attention.

Cultivation of plants in an artificial light type plant factory is not affected by the climate and the weather, and the problem of labor shortage can be solved. Therefore, plants can be cultivated throughout a year under certain conditions.

[0003] For example, as the artificial light type plant factory, JP5330162B suggests a closed type plant factory suitable for cultivation of a tall (long-stem) plant such as tomato.

[0004] A tomato plant has a main branch, and after main leaves are differentiated in about eight stages, flower buds are differentiated and a first stage flower cluster (also referred to as first flower cluster) is settled, and JP2016-202072 suggests a light emitting device that reduces a number of stages of main leaves of a tomato plant, sets a settlement position of a first flower cluster at a low position, and can be used in an artificial light type plant factory and the like.

SUMMARY OF THE INVENTION

[0005] The present inventors found that a method of cultivating a tomato plant obtained by using a closed type plant factory disclosed in JP5330162B and a light emitting device disclosed in JP2016-202072 has room for improvement from a viewpoint of number of harvests per unit volume (space utilization efficiency) and quality of harvested tomatoes. Then, the present inventors newly found that by making a specific relationship between a sum (X) of the number of flower clusters and fruit clusters contained in one of a main branch or a side branch of the tomato plant and a length (L) in cm units from a planting surface to a growth point of the main branch or the side branch, it is possible to improve the space utilization efficiency and the quality of the harvested tomato fruit in cultivation of the tomato plant.

[0006] Embodiments of the present disclosure provide a tomato plant capable of being cultivated at a high space utilization efficiency and capable of harvesting a high-quality tomato fruit.

In addition, embodiments of the present disclosure provide a tomato fruit harvested from the tomato plant and a method of cultivating the tomato plant.

[0007] According to a first aspect of the present disclosure, there is provided a pinched tomato plant that satisfies Formula (1):

$6.0 \leq L/X \leq 22.0$ ... (1)

wherein in the formula, in a case where the tomato plant does not have a side branch, L represents a length in cm unit from a planting surface to a pinched point of a main branch of the pinched tomato plant, and X represents a sum of the number of flower clusters and fruit clusters of the main branch, and

in a case where the tomato plant has a side branch, L represents a length in cm unit from the planting surface to the pinched point of one main branch or side branch of the pinched tomato plant, and X represents a sum of the number of flower clusters and fruit clusters of the one main branch or side branch,

where, X is 3 or 4.

[0008] In an embodiment of the above tomato plant, in Formula (1), L is 100 or less.

[0009]

[0010]

In an embodiment, the above tomato plant satisfies Formula (2):

$11.0 \leq L/X \leq 22.0$ ... (2)

wherein in the formula, in a case where the tomato plant does not have a side branch, L represents a length in cm unit from a planting surface to a pinched point of a main branch, and X represents a sum of the number of flower clusters and fruit clusters of the main branch of the pinched tomato plant, and

in a case where the tomato plant has a side branch, L represents a length in cm unit from the planting surface to the pinched point of one main branch or side branch of the pinched tomato plant, and X represents a sum of the number of flower clusters and fruit clusters of the one main branch or side branch,

where, X is 3 or 4.

[0011]

[0012]

[0013] According to a second aspect of the present disclosure, there is provided a method of cultivating a tomato plant, at least comprising: a step of irradiating a ground part of a first tomato plant with artificial light having a light intensity of 200 $\mu mol/m^2 \cdot s$ to 800 $\mu mol/m^2 \cdot s$; and a step of pinching the tomato plant after the number of sums of the flower clusters and the fruit clusters reaches 3 or 4,

wherein a second tomato plant that satisfies Formula (1) is cultivated from the first tomato plant:

$6.0 \leq L/X \leq 22.0$ ... (1)

wherein in the formula, in a case where the second tomato plant does not have a side branch, L represents a length in cm unit from a planting surface to a growth point of a main branch of the pinched tomato plant at the time of the pinching, and X represents a sum of flower clusters and fruit clusters of the main branch, and

in a case where the second tomato plant has a side branch, L represents a length in cm unit from the planting surface to the growth point of one main branch or side branch of the pinched tomato plant at the time of the pinching, and X represents a sum of the number of flower clusters and fruit clusters of the one main branch or side branch,

where, X is 3 or 4.

[0014] In an embodiment of the above method of cultivating a tomato plant, irradiation of the ground part of the first tomato plant with the artificial light is performed from a side surface direction of the tomato plant.

[0015] In an embodiment of the above method of cultivating a tomato plant, a light-dark cycle of the artificial light with which the ground part of the first tomato plant is irradiated is controlled, and a ratio of a light period time to a dark period time is 1 to 3.

[0016] In an embodiment of the above method of cultivating a tomato plant, a cultivation temperature of the first tomato plant in a light period is 23°C to 33°C, and the cultivation temperature of the first tomato plant in a dark period is 15°C to 22°C.

[0017] In an embodiment of the above method of cultivating a tomato plant, a carbon dioxide concentration of the first tomato plant in a cultivation environment is 300 ppm or more.

[0018] In an embodiment of the above method of cultivating a tomato plant, a cultivation device including one or more selected from a light source for irradiating the ground part of the first tomato plant with the artificial light from at least one of an upper surface direction or a side surface direction, a hydroponic cultivation mechanism, and a temperature/humidity control mechanism is used.

According to a third aspect of the present disclosure, there is provided a method of producing a second tomato plant that satisfies Formula (1) from a first tomato plant, at least comprising: a step of irradiating a ground part of a first tomato plant with artificial light having a light intensity of 200 μ mol/m^{2}· s to 800 μ mol/m^{2}· s; and a step of pinching the first tomato plant after the number of sums of the flower clusters and the fruit clusters reaches 3 or 4,

$$6.0 \leq L/X \leq 22.0 \quad \text{... (1)}$$

wherein in the formula, in a case where the second tomato plant does not have a side branch, L represents a length in cm unit from a planting surface to a growth point of a main branch of the pinched tomato plant at the time of the pinching, and X represents a sum of flower clusters and fruit clusters of the main branch, and

in a case where the second tomato plant has a side branch, L represents a length in cm unit from the planting surface to the growth point of one main branch or side branch of the pinched tomato plant at the time of the pinching, and X represents a sum of the number of flower clusters and fruit clusters of the one main branch or side branch,

where, X is 3 or 4.

[0019] According to embodiments of the present disclosure, it is possible to provide a tomato plant capable of being cultivated with high space utilization efficiency and capable of harvesting

a high-quality tomato fruit.

In addition, according to embodiments of the present disclosure, it is possible to provide a tomato fruit harvested from the tomato plant and a method of cultivating the tomato plant.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Fig. 1 is a schematic diagram showing an example of a tomato plant according to the present disclosure.

Fig. 2 is a schematic diagram for explaining a method of measuring a light intensity.

Fig. 3 is a schematic diagram for explaining a method of measuring a light intensity.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] Hereinafter, embodiments for carrying out the present disclosure will be described in detail. However, the present invention is not limited to the following embodiments. In the following embodiments, the components are not essential unless otherwise specified. The same applies to numerical values and the ranges, and does not limit the present disclosure.

[0022] In the present disclosure, the “tomato plant” and the “second tomato plant” are tomato plants that satisfy Formula (1), and as shown in Fig. 1 (tomato plant in Fig. 1 is represented by reference numeral 10), has at least two main branches 20 and has two or more flower clusters and fruit clusters. In addition, in Fig. 1, reference numeral 40 indicates a flower cluster or fruit cluster, and reference numeral 50 indicates a main leaf. In addition, in Fig. 1, reference numeral 60 indicates a contact point between the tomato plant and the planting surface.

In the present disclosure, the “first tomato plant” means a plant after germination of tomato seeds and before becoming the tomato plant or the second tomato plant according to the present disclosure. The first tomato plant includes a first tomato plant before planting and a first tomato plant that does not satisfy Formula (1) even after planting. In addition, the planting means that a temporarily planted first tomato plant is transferred to a final place where main cultivation is performed.

In the present disclosure, the “side branch” means a branch in which a lateral bud generated from a leaf of a main branch or a base of a stem is extended, and a state in which a side branch is not present is referred to as one-tailoring, a state in which one or more side branches are included is referred to as a plurality of tailoring, a state in which one side branch is included is referred to as two-tailoring, and a state in which two side branches are included is referred to as three-tailoring.

In the present disclosure, as shown in Figs. 1 to 3, the “planting surface” means a surface of a support in which a tomato plant 10, a first tomato plant 90, or a second tomato

CLAIMS

1. A pinched tomato plant that satisfies Formula (1):

$6.0 \leq L/X \leq 22.0$ ... (1)

wherein in the formula, in a case where the tomato plant does not have a side branch, L represents a length in cm unit from a planting surface to a pinched point of a main branch of the pinched tomato plant, and X represents a sum of the number of flower clusters and fruit clusters of the main branch, and

in a case where the tomato plant has a side branch, L represents a length in cm unit from the planting surface to the pinched point of one main branch or side branch of the pinched tomato plant, and X represents a sum of the number of flower clusters and fruit clusters of the one main branch or side branch,

where, X is 3 or 4.

2. The tomato plant according to claim 1,

wherein in Formula (1), L is 100 or less.

3. The tomato plant according to any one of claim 1 or 2, which satisfies Formula (2):

$11.0 \leq L/X \leq 22.0$ ... (2)

wherein in the formula, in a case where the tomato plant does not have a side branch, L represents a length in cm unit from a planting surface to a pinched point of a main branch, and X represents a sum of the number of flower clusters and fruit clusters of the main branch of the pinched tomato plant, and

in a case where the tomato plant has a side branch, L represents a length in cm unit from the planting surface to the pinched point of one main branch or side branch of the pinched tomato plant, and X represents a sum of the number of flower clusters and fruit clusters of the one main branch or side branch,

where, X is 3 or 4.

4. A method of cultivating a tomato plant, at least comprising: a step of irradiating a ground part of a first tomato plant with artificial light having a light intensity of 200 $\mu mol/m^2 \cdot s$ to 800 $\mu mol/m^2 \cdot s$; and a step of pinching the tomato plant after the number of sums of the flower clusters and the fruit clusters reaches 3 or 4,

wherein a second tomato plant that satisfies Formula (1) is cultivated from the first

tomato plant:

$6.0 \leq L/X \leq 22.0$ ... (1)

wherein in the formula, in a case where the second tomato plant does not have a side branch, L represents a length in cm unit from a planting surface to a growth point of a main branch of the pinched tomato plant at the time of the pinching, and X represents a sum of flower clusters and fruit clusters of the main branch, and

in a case where the second tomato plant has a side branch, L represents a length in cm unit from the planting surface to the growth point of one main branch or side branch of the pinched tomato plant at the time of the pinching, and X represents a sum of the number of flower clusters and fruit clusters of the one main branch or side branch,

where, X is 3 or 4.

5. The method of cultivating a tomato plant according to claim 4,

wherein irradiation of the ground part of the first tomato plant with the artificial light is performed from a side surface direction of the first tomato plant.

6. The method of cultivating a tomato plant according to claim 4 or 5,

wherein a light-dark cycle of the artificial light with which the ground part of the first tomato plant is irradiated is controlled, and a ratio of a light period time to a dark period time is 1 to 3.

7. The method of cultivating a tomato plant according to any one of claims 4 to 6,

wherein a cultivation temperature of the first tomato plant in a light period is 23°C to 33°C, and the cultivation temperature of the first tomato plant in a dark period is 15°C to 22°C.

8. The method of cultivating a tomato plant according to any one of claims 4 to 7,

wherein a carbon dioxide concentration of the first tomato plant in a cultivation environment is 300 ppm or more.

9. The method of cultivating a tomato plant according to any one of claims 4 to 8,

wherein a cultivation device comprising one or more selected from the group consisting of a light source for irradiating the ground part of the first tomato plant with the artificial light from at least one of an upper surface direction or a side surface direction, a

hydroponic cultivation mechanism, and a temperature/humidity control mechanism is used.

10. The method of cultivating a tomato plant according to any one of claims 4 to 9,

wherein the artificial light is a synthetic light from an element that emits light having a peak wavelength in a wavelength range of 400 nm to 500 nm and an element that emits light having a peak wavelength in a wavelength range of 600 nm to 700 nm,

wherein a ratio of a light intensity of light having a peak wavelength in a wavelength range of 600 nm to 700 nm to a light intensity of light having a peak wavelength in a wavelength range of 400 nm to 500 nm (i.e., light intensity of light having peak wavelength in wavelength range of 600 nm to 700 nm/light intensity of light having peak wavelength in wavelength range of 400 nm to 500 nm) is 1.5 to 4.

11. A method of producing a second tomato plant that satisfies Formula (1) from a first tomato plant, at least comprising: a step of irradiating a ground part of a first tomato plant with artificial light having a light intensity of 200 μ mol/m^{2}· s to 800 μ mol/m^{2}· s; and a step of pinching the first tomato plant after the number of sums of the flower clusters and the fruit clusters reaches 3 or 4,

$6.0 \leq L/X \leq 22.0$ ... (1)

wherein in the formula, in a case where the second tomato plant does not have a side branch, L represents a length in cm unit from a planting surface to a growth point of a main branch of the pinched tomato plant at the time of the pinching, and X represents a sum of flower clusters and fruit clusters of the main branch, and

in a case where the second tomato plant has a side branch, L represents a length in cm unit from the planting surface to the growth point of one main branch or side branch of the pinched tomato plant at the time of the pinching, and X represents a sum of the number of flower clusters and fruit clusters of the one main branch or side branch,

where, X is 3 or 4.