and have found that the isolated cell line is a homogeneous cell line, which has an unlimited ability to divide, has been isolated without a dedifferentiation process to have no somaclonal variation, and thus is genetically highly stable and physiologically uniform, thereby completing the present invention.

SUMMARY ~~OF INVENTION~~

It is an object of the present disclosure~~invention~~ to provide a cell line derived from the cambium of herbaceous plant storage roots, which has the ability to divide, is homogeneous and can stably proliferate during culture.

Another object of the present disclosure~~invention~~ is to provide a method of isolating said cell line without a dedifferentiation process.

In one aspect, there is provided a method for isolating a cell line derived from the cambium of an herbaceous plant having a storage root, the method comprising:

(a) obtaining storage root tissue of an herbaceous plant having a storage root, wherein the tissue comprises cambium;

(b) treating the tissue with an agent which produces osmotic stress such that differentiated, non-cambium cells lose the ability to divide; and

(c) inducing cambium cell proliferation and non-cambium cell necrosis by culturing the obtained cambium-containing storage root tissue in an induction medium comprising a cambium-division-specific hormone.

To achieve the above object, in one embodiment~~aspect~~, the present disclosure~~invention~~ provides a method for isolating a cell line derived from the cambium of an herbaceous plant having a storage root, the method comprising the steps of:

(a) obtaining storage root tissue containing the cambium of an herbaceous plant having a storage root;

(b) inducing a cambium-derived cell line by culturing the obtained cambium-containing storage root tissue in a medium containing IAA (indole-3-acetic acid) or IBA (indole-3-butyric acid), wherein osmotic stress is applied to the cambium-containing storage root tissue during, before or after the culture; and

(c) collecting the induced cambium-derived cell line.

In another embodiment~~aspect~~, the present disclosure~~invention~~ provides a cell line, which is derived from the cambium of an herbaceous plant having a storage root and has the following characteristics:

(a) it is in an innately undifferentiated state;

(b) it is a homogeneous cell line; and

(c) it is morphologically characterized by numerous vacuoles.

In still another object, the present disclosure~~invention~~ provides a method for preserving an herbaceous plant cell line, comprising freezing a cell line derived from the cambium of an herbaceous plant having a storage root.

Other features and embodiment~~aspects~~ of the present disclosure~~invention~~ will be apparent from the following detailed description and the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 shows the typical feature of an outdoor-cultivated ginseng used in the present invention.

FIG. 2 shows the feature of a prepared explant containing the cambium of a ginseng storage root among plant storage tissues.

FIG. 3(a) shows that a homogeneous cell line having the ability to divide was induced specifically in the cambium of an explant containing the cambium of a ginseng root, and FIG. 3(b) shows that cells were induced throughout the cross section of an explant, when a general culture system was used.

FIG. 4(a) shows that a cell line derived from the cambium of a ginseng root was induced, isolated and allowed to proliferate in a growth medium, which is before it was isolated from the medium, FIG. 4(b) shows that the cambium-derived cell line was isolated and allowed to proliferate in a large amount, FIG. 4(c) shows that the cambium-derived cell line was observed under an optical microscope at the single-cell level, and FIG. 4(d) shows that a ginseng cotyledon-derived callus (KCTC 10224) was observed under an optical microscope at the single-cell level.