

[FY2023 Open Innovation Research and Commercialization Promotion Project: Development Research Stage (Commercialization Type)]

05012c1

Practical application of a rapid and simple batch testing method for multiple pathogens in vegetable seeds.

1. Representative Institution/Research Director

Takashi Tanabe, Toyo Seikan Group Holdings Co., Ltd.

2 Research period: FY2020 to FY2020 (5 years)

3. Research Objectives:

To develop a rapid and simple simultaneous testing method for multiple pathogens in seeds of four vegetable families, introduce it to users, and promote its international standardization through international standardization activities, thereby promoting its social implementation.

4. Research Content and Implementation Structure

ÿ Development of testing methods for seed-borne pathogens in Brassicaceae seeds

We have developed a DNA chip testing method capable of simultaneously detecting five types of bacteria and filamentous fungi, and have commercialized it as a kit.

The plan involves conducting evaluation tests at inspection sites and then implementing the system. (National Agriculture and Food

Research Organization, Plant Protection Research Division; Toyo Seikan GHD Co., Ltd.; Sakata Seed Corporation)

ÿ Development of a testing method for seed-borne pathogens of Solanaceae seeds:

A DNA chip testing method capable of simultaneously detecting all 18 types of pathogens—6 types of bacteria and filamentous fungi, 6 types of viruses, and 6 types of viroids—will be developed and kitted, and introduced to testing sites as in ÿ. (National Agriculture and Food Research

Organization, Plant Protection Research Division; Toyo Seikan GHD Co., Ltd.; Sakata Seed Corporation)

ÿ Development of a testing method for seed-borne pathogens of cucurbitaceous seeds: DNA

testing capable of simultaneously detecting all 8 types of pathogens, including bacteria/filamentous fungi (3 types), viruses (5 types), and all 8 types.

We will develop a test kit and introduce it to testing sites, similar to method ÿ. (National Agriculture and Food Research Organization,

Plant Protection Research Division; Toyo Seikan GHD Co., Ltd.; Sakata Seed Corporation)

ÿ Development of a testing method for seed-borne pathogens of Apiaceae seeds: A DNA

chip testing method that simultaneously detects three types of bacteria and filamentous fungi will be developed and made into a kit, and introduced to testing sites as in ÿ. (National Agriculture and Food Research

Organization, Plant Protection Research Division; Toyo Seikan GHD Co., Ltd.; Sakata Seed Corporation)

ÿ Introduction of an automated DNA chip testing system

We will install mass-production automated DNA chip testing machines manufactured by Toyo Seikan GHD at multiple joint research institutions, conduct performance evaluations, and confirm their practicality.

(Toyo Seikan GHD Co., Ltd.)

ÿ International Standardization Activities:

Aiming to achieve international standardization that is advantageous to one's own country, a standardization strategy will be formulated, the proposed content will be documented, and a symposium or exhibition held in conjunction with a conference will be organized.

(Biomeasurement Technology Consortium)

5. Final Goals: • To

implement a simple, rapid, and inexpensive batch testing method for multiple pathogens in vegetable seeds distributed domestically and internationally

(sales of 9 kits for 4 species and commencement of use in actual testing sites). • To complete a draft international standard

(ISO) document and prepare for proposal to promote the widespread adoption of this testing method.

6. Expected Effects and Contributions: - Providing

safe and high-quality vegetable seeds to domestic and international markets. - Preventing

disease outbreaks caused by contaminated seeds and preventing contamination of farmland. -

Improving farmland productivity, reducing the use of chemical pesticides, and expanding the area of organic farming.

[Contact: Toyo Seikan Group Holdings Co., Ltd., New Business Development Office, 044-329-1715]

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background

If pathogen-contaminated seeds are distributed...

Economic losses for farmers:

decreased yield and profits, increased decontamination costs.

The current seed health test is

Seed manufacturers face a significant

burden in terms of increased effort, time, and costs.



Crops grown from contaminated seeds

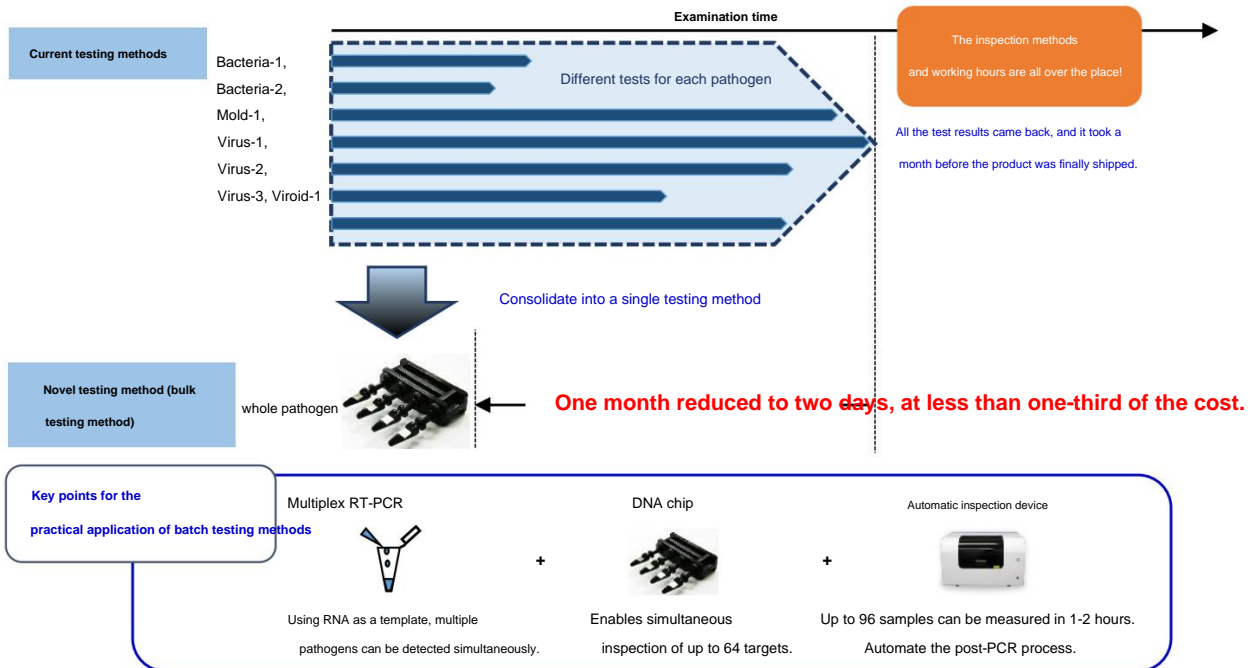
Research objectives

- (1) Practical application of a simple, rapid, and inexpensive batch testing method for multiple pathogens in vegetable seeds = **Practical application of 9 test kits for 4 vegetable species = Elimination of diseased seeds from the market** (2)

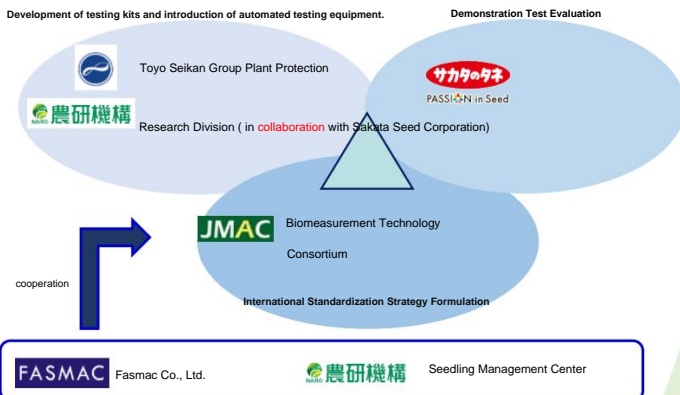
Completion of a draft document for international standards (ISO) and completion of preparation for proposal to promote the dissemination and recognition of this testing method

Research topic:

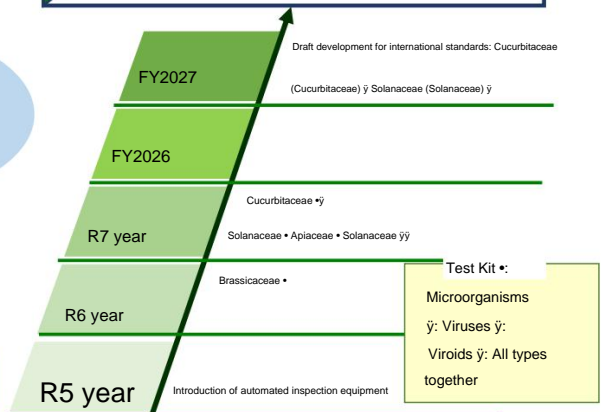
Development of a unified RNA testing method for multiple harmful pathogens in four vegetable seed families (rapeseed, melon, eggplant, and celery).



Implementation structure



Commercialization period (= customer adoption period)



Expected effects

- y Providing safe and high-quality vegetable seeds to domestic and international markets.
- y Preventing disease outbreaks caused by contaminated seeds and preventing contamination of farmland.
- y Improve farmland productivity, reduce the use of chemical pesticides, and expand the area dedicated to organic farming.