出國報告（出國類別：研究）

食品生物性攙偽檢測技術研習

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摘　要

生物技術發展日新月異，食品生物性攙偽為近年來影響食品安全的議題，其中基因改造食品之分析亦為我國民眾關心之重點項目，為了解國際間對於基因改造食品管理規範，持續精進相關分析檢驗技術，並建立與維繫國際聯絡人脈，以因應科技發展的快速變遷，筆者奉派赴日本筑波食品研究部門研習基因改造食品研究檢驗技術及進行國際交流，研習內容包括交流我國與日本基因改造食品法規管理、及交流基因改造食品研究檢驗技術，如應用環型恆溫核酸增幅法(Loop mediated isothermal amplification, LAMP)進行基因改造黃豆品系檢驗及參與該方法之偵測極限研究，學習以玉米群分析、以 Real-time PCR array 分析未知基因改造玉米樣本，此外亦與日本農林水產省橫濱植物防疫所進行業務交流，分享我國基因改造食品管理法規、建立檢驗技術、調查情況及監測情形等，也與食品研究部門信賴性評價單元實驗室建立友誼，期望維繫資訊聯絡管道，作為本署掌握國際資訊重要的橋梁，協助本署快速掌握因應國際間基因改造食品突發事件與發展趨勢。

壹、目 的

提供民眾食的安全為本署成立之宗旨，保障消費者於選購食品時提供產品正確資訊，維護其標示的正確性更為本署之義務。食品攙偽為近年來影響食品安全的議題，其中基因改造食品之分析亦為我國民眾關心之重點項目，因此本署不斷致力研發相關生物性檢驗技術，進行基因改造食品成分分析以確認其正確性避免有攙偽的可能性。我國有關基因改造食品規範係自民國 92 年 1 月 1 日起，基因改造黃豆及玉米須經查驗登記始得作為食品用途，且自 92 年 1 月 1 日至 94 年 1 月 1 日起，依照產品加工程度分三年三階段針對基因改造黃豆或玉米產品進行強制標示。然而因近年商業化之基因改造作物已逾上百種，且基因改造食品議題一直以來亦受國際及國內關注，故於 103 年 2 月 5 日修訂之食品安全衛生管理法，擴大基因改造食品查驗登記範圍，除原基因改造黃豆及玉米須查驗登記外，所有基因改造食品皆應辦理查驗登記和食品安全性審查；同時，規範業者應依貨品號列進口基因改造或非基因改造食品，並建置基因改造食品的追溯追蹤系統；基因改造食品標示規範，依據 104 年 5 月 29 日部授食字的 1041301628 號公告修正，非基因改造食品因為採收、儲運或其他因素等非有意摻入基因改造食品原料之非故意摻雜率下修至 3%，規範對象為包裝、散

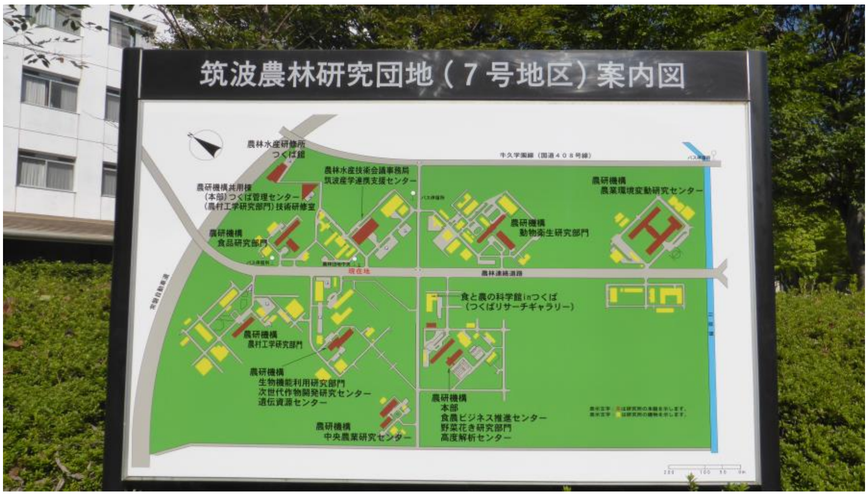
裝及食品添加物食品含基因改造食品原料，散裝對象標示實施時程自104 年 7 月 1 日起分階段實施，而自 104 年 12 月 31 日所有規範對象強制施行。此外，國際間對於未核准上市基因改造作物流出事件也相當重視，如 2013 年美國奧勒岡州田間發現耐嘉磷賽基因改造小麥，而 2016 年美國華盛頓州亦發現未核准上市耐嘉磷賽基因改造小麥，兩起流出事件皆影響日本、韓國對於出口國採取暫時停止進口或加強檢驗等措施避免基因改造小麥流入。因此，透過積極與國際交流資訊的傳遞，持續研習並建立基因改造食品檢驗技術，以維繫基因改造食品管理及技術發展之感度。

本「食品生物性攙偽檢測技術研習」研習單位為日本國立研究農業・食品產業技術総合研究機構(NARO)轄下食品研究部門中食品分析研究領域的「信賴性評價單元實驗室」，本實驗室不僅為日本基因改造研究及檢驗技術之核心實驗室，更於國際間基因改造檢驗研究領域上佔有一席之地，經聯繫食品研究部門「信賴性評價單元實驗室」實驗室負責人橘田和美博士，得知該實驗室於今(105)年將有來自農林水產省橫濱植物防疫所植物防疫官蚊爪竜一先生於 10 月 3 日起一同進行研習工作，橘田博士非常歡迎筆者一同參與完整訓練課程，同時亦與日方交流學習生物性基因改造食品檢驗技術。

貳、過　程

本次出國研習機會筆者可與國際具有重要研究地位的日本茨城縣筑波市國立研究農業・食品產業技術総合研究機構(NARO)進行交流，很感謝署內各位長官的支持。

國立研究農業・食品產業技術総合研究機構(National Agriculture and Food Research Organization, NARO)，於 2001 年 4 月建立原機關名稱為農業技術研究，包含 12 個國立研究機關如農業研究中心及各地實驗場等。歷經 2003 及 2006 年經過二次機關整併後，該機關於 2015 年 4 月後正名為國立研究農業・食品產業技術総合研究機構，簡稱農研機構。而在 2016 年 4 月再次經過組織整併後農研機構下包含 13 個研究中心及 7 個研究部門。



圖一、農業研究中心分布地圖

本次研習單位為農研機構轄下食品研究部門(原食品總合研究所，附件一)[1]，食品研究部門下包含 6 個研究領域，如食品健康機能研

究領域、食品加工流通研究領域、食品安全研究領域、食品分析研究領域、食品生物機能開發研究領域及食品研究管理領域。

圖二、食品研究部門

本次筆者研習單位為該部門轄下食品分析研究領域之「信賴性評價單元實驗室」，實驗室長為<u>橘田和美</u>博士。食品信賴性單元實驗室原名為農研機構轄下食品総合研究所的食品GMO検知解析單元實驗室，經整併後稱「信賴性評價單元實驗室」，其設立宗旨為保障民眾對於農產品及食品的知的權利，並賦予該農產品具信賴性價值，因此<u>橘田</u>博士實驗室主要利用生物性技術進行檢驗技術開發，避免發生農產品及食品發生攙偽問題。

<u>橘田</u>博士實驗室為一層樓的白色建築，內部結構區分為多個工作區塊，包含研究員辦公區、相談室(會議室)、標準品儲存區、樣品磨粉區、多個實驗區及儀器室等。

圖三、信賴性評價單元實驗室外觀

研習當日筆者自松山國際機場出發搭乘早上 7:45 長榮航空班機飛往東京羽田國際機場，經由機場東京單軌電車搭往東京都內，再轉乘 JR 山手線到秋葉原站後，即搭乘連接東京都和茨城縣的筑波快線前往於筑波市。隨著筑波快線電車越接近筑波市筆者心裡越是緊張，但緊張感隨著與橋田博士見面後消除了不少，在此很感謝橋田博士在先前書信往來表示將在筑波車站接筆者前往 NARO，途中筆者向橋田博士表達感謝之意，感謝橋田博士給予筆者此次研習技術機會，並簡單介紹台灣目前基因改造食品管理規範跟管理方式。

抵達 NARO 後，由橋田博士秘書倉嶋たけ代女士帶領筆者先行辦理住宿事宜並介紹宿舍環境及注意事項，而後由倉嶋女士帶領筆者到信賴性評價單元實驗室與大家簡單打招呼和交換名片後，由於已接近下班時間便隨即前往宿舍整頓行李，在此很感激橋田博士帶領筆者至鄰近地區了解生活機能並解決晚餐事宜。

隔日上午八點半抵達實驗室並與大家寒暄互道早安後，九點整橋

田博士招集大家聚集在相談室向大家正式介紹筆者，筆者再次表達對橘田博士的感謝之意提供此次難得的機會讓我可以至國際權威實驗室研習，並有此殊榮與實驗室的各位一同進行研究，也很期待研習期間的收穫，本次研習除了筆者外，也有來自農林水產省橫濱植物防疫所植物防疫官蚊爪竜一先生一同進行研習。

因出國前有準備本署致贈外賓的公務禮品贈送給橘田博士，感激橘田博士提供這次難得的機會，不僅促進台灣和日本間有基因改造食品研究發展交流，也維持台灣和日本的學術及管理層面的交流。橘田博士亦表示很歡迎筆者這次的到來，並向實驗室成員說明國際性交流是很難得且重要的請好好把握此次交流機會。

橘田博士表示原本實驗室內有兩位負責基因改造食品主任研究員高畠令王奈博士及真野潤一博士，由於今年 4 月的組織整併的關係真野博士已經離開實驗室，所以實驗室目前由上級研究員高畠博士負責基因改造食品研究。橘田博士向筆者表示感到抱歉因為組織異動的關係，此次研習內容將僅由高畠博士安排與指導，而真野博士負責研究的部分可能在此次研習期間無法接觸，筆者亦向橘田博士表達感謝之意，希望未來仍有機會再次進行拜訪學習交流。

本次研習內容可以大致分為三個部分，包含基因改造食品管理與研究、基因改造食品研究技術及與日本農林水產省植物防疫所業務交流。

1. 基因改造食品管理與研究

首先，橘田博士及高畠博士介紹基因改造作物全球發展現況，並簡介日本基因改造食品規範，基因改造食品由日本厚生勞動省(Ministry of Health, Labour and Welfare, MHLW)規範，自 2001 年 4 月起基因改造食品在日本需要通過安全性評估審查才可做為食品原料使用。截至 2016 年 10 月 12 日，日本通過安全性評估審查的基因改造食品共有 309 種，包含玉米、黃豆、甜菜、馬鈴薯、油菜、棉花、苜蓿及木瓜等[2]。

而日本對於基因改造食品標示規範依據厚生勞動省的日本食品衛生法及農林水產省「農林物資の規格化等に関する法律」(Japanese Agricultural Standards, JAS)規範，其基因改造標示係依其基因改造食品特性分為二類，第一類為與傳統對照食品在組成或營養方面等同，其中若產品加工後殘存基因改造核酸片段或蛋白質者，需標示「遺伝子組換え」、「遺伝子組換え不分別」或「遺伝子組換えでない」。「遺伝子組換え」為產品生產時可明確區分且證明使用基因改造原料;「遺伝子組換え不分別」為產品生產時無法明確區分且證明使用基因改造

或非基因改造原料；「遺伝子組換えでない」為產品生產時可明確區分且證明使用非基因改造原料。若產品加工後無殘存基因改造核酸片段或蛋白質者可自由標示。第二類為與傳統對照食品在組成或營養方面極為不同，如高油酸黃豆與高離胺酸玉米。其中若產品主要使用高油酸黃豆製成黃豆油須標示為「大豆(高オレイン酸遺伝子組換え)」。此類標示前提為，產品若含基因改造作物原料佔整體產品重量前 3 位，且非基因改造食品之非故意摻雜率佔總重 5%以上才需標示〔3〕，且若加工產品包裝面積小於 30 cm^2 以下，依據加工食品品質表示基準第 3 條第 7 項可免除標示基因改造字樣〔4〕。

有關基因改造作物檢測技術，由橘田博士介紹實驗室有關基因改造食品定量 PCR 原理與分析計算、Real-time PCR array 檢測未知基因改造作物、利用玉米粒群組檢測及統計方式來估算樣本中的基因改造玉米含量等技術。而高畠博士則介紹基因改造玉米和黃豆基因體的特性、定量檢驗方法的研發與參考質體的使用、環型恆溫核酸增幅法檢驗方法等項目。

而令筆者覺得可惜的是隨著真野博士的離開，部分技術正處於交接時期故筆者此次無法學習交流。但感謝負責此次研習的高畠博士提供筆者相關文獻參考，讓筆者了解實驗室研究方向與重點。

2. 基因改造食品檢測技術交流

高畠博士主要負責以環型恆溫核酸增幅法(Loop mediated isothermal amplification, LAMP)技術開發基因改造食品相關檢驗技術，而鍵屋ゆかり小姐則協助 LAMP 方法確效及應用。

LAMP 為日本榮研化學公司(Eiken Chemical Co. Ltd)所研發〔5〕，其特點是可於恆溫下利用增幅目標核酸片段，反應過程需 4~6 條引子與 DNA 模板進行作用，過程中不同引子與 DNA 模板結合並經由聚合酶 polymerase 反應形成 DNA 雙股環狀結構，並會隨著反應時間增加環狀結構 DNA 產物越多造成沉澱，或環形結構雙股 DNA 產物與可結合雙股 DNA 的螢光染劑如 SYBR Green 產生螢光〔6〕，因此可藉由測定吸光值及增幅曲線判定反應結果。

本次 LAMP 試驗分為 2 大部分，(一)測試基因改造作物中 P35S 和 tE9 基因序列，分別由我負責 P35S 測試液的配置而蚊爪先生負責 tE9 測試液的配置。(二)利用高畠博士提供樣品測試多種基改標的基因反應偵測極限(Limit of detection, LOD)，此次實驗由我及蚊爪先生參與研究。

(一) 測試基因改造作物中 P35S 和 tE9 基因序列

使用 LAMP 法測定基因改造作物中 P35S 和 tE9 前，鍵屋小姐先行帶領我們進行桌面及器具的清洗作業以避免實驗有汙染情形。首先，分別以 5% NaClO 及 75%酒精擦拭桌面後，「平整」地將保鮮膜鋪在實驗桌上，依序拆解並同樣以 5% NaClO 及 75%酒精擦拭 Pipette 後蓋上保鮮膜備用。

首先，製備 LAMP 使用之 DNA 萃取液，鍵屋小姐教導我們使用 2 種萃取方法製備 DNA 萃取液，分別使用(1)GM quicker – GMO DNA Extraction Kit for Grain (NIPPON GENE CO., LTD)試劑套組萃取由大西真理小姐配置的 0%和 5%基因改造黃豆檢體，及使用(2)GenCheck® DNA Extraction Reagent (FASMAC CO., LTD)試劑套組萃取 0%和 0.5%基因改造黃豆檢體。

(1) GM quicker 為針對黃豆及玉米萃取 DNA 之試劑套組，萃取步驟依據操作流程手冊逐一進行〔7〕〔8〕。除此試劑套組外，亦有針對米、油菜、馬鈴薯(GM quicker 2)及食物(GM quicker 3, 4) DNA 萃取之試劑套組〔9〕。

此次實驗由蚊爪先生負責已裝置在 50 ml 離心管之 0%基因改造黃豆檢體，而由我負責裝在褐色玻璃罐中的 5%基因改造黃豆檢體。過程中不時的將溶液分裝到 50 ml 離心管後再進行吸取，此舉

動作是為避免汙染試劑原液。萃取過程所剩之 DNA 粗萃液可以置於 4℃冰箱保存備用。萃取後以 NanoDrop® ND-1000 分別測定 0% 及 5%DNA 濃度後，分別稀釋至 50 ng/uL 及 20 ng/uL，而 DNA 原液亦經電泳試驗檢視萃取結果。

(2) GenCheck® DNA Extraction Reagent 萃取步驟十分的簡易〔10〕，本次實驗由蚊爪先生負責 0%基因改造黃豆檢體，由我負責 0.5%基因改造黃豆檢體。分別將試劑與檢體混合後以 100℃加熱 10 分鐘，經冷卻離心即可獲得 DNA 萃取液。

本次檢測標的基因為 P35S 和 tE9，實驗過程我與蚊爪先生依據鍵屋小姐提供的實驗流程逐一完成試劑的配置與混合。實驗流程先將 6 種引子配置成引子混合液(primer mix)，再將 isothermal amplification mix、10 倍 primer mix 和無菌水混合配置成反應混合液，本次實驗共配置 P35S 和 tE9 2 種反應混合液。此次實驗使用 OptiGene Genie® II 儀器進行 LAMP 反應〔11〕，此機器中一次可以反應 2 組 8 連排反應管(Block A 和 Block B)共 16 個反應管，蚊爪先生負責 Block A 的試驗，而 Block B 試驗由我進行。

實驗過程先將 8 連排分別置入保冷座後，於 8 連排中分別注入 P35S 和 tE9 反應混合液，再依序加入反應空白組(NTC)及 2 種萃取方法獲得的 DNA 萃取液樣品後，蓋上蓋後混合離心後上機反應檢測。

本次 LAMP 反應過程，此儀器可即時顯示擴增曲線反應，且本次使用螢光染劑增測反應增幅曲線，故增幅反應結束後需要再進行解離曲線(Annealing Curves)檢測，可確認增幅反應的專一性。而 LAMP 反應後的產物，鍵屋小姐帶我們使用 3%洋菜膠(agarose gel)進行電泳和 EtBr 染色，分析確認 LAMP 反應增幅核酸情況。

(二)以 LAMP 為技術檢測基改標的基因之檢驗極限

本次實驗利用高畠博士提供之檢體，針對其基改標的基因進行種 LAMP 反應測試並檢測其偵測極限。由於本試驗結果仍未發表公開，故高畠博士提醒我們實驗結果與流程需要保密避免洩漏，而筆者感到相當榮幸可參與此項研究過程，並為尊重研究目的及未來發展，故在此筆者不加以詳述此試驗。

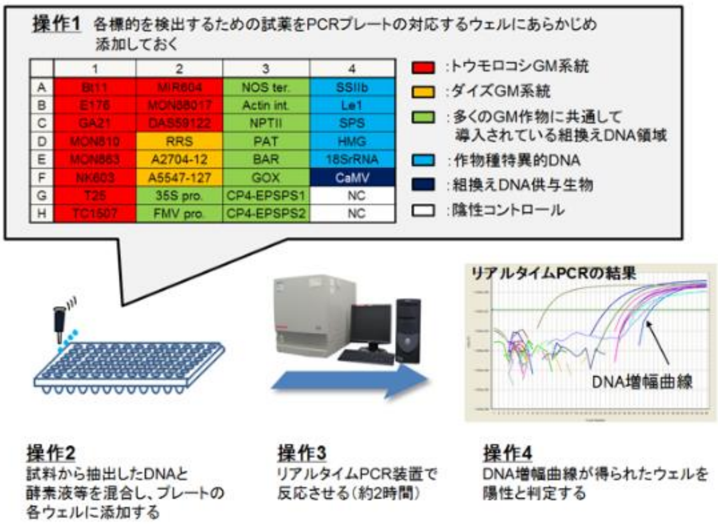
此試驗為我及蚊爪先生此次研習過程的主要課題，實驗過程輪流配置反應測試試劑並以 LAMP 進行檢測結果，經由 LAMP 實驗的過程，我與蚊爪先生不斷發現 LAMP 反應的細節，而向鍵屋小姐不斷互相討論及解決問題，最後實驗成果則與高畠博士討論影響實驗結果的因素及探討實驗設計目的等。

此次研習中筆者藉由高畠博士提供給筆者文獻了解已離開實驗室真野博士關於基因改造作物的研究，真野博士研究方向主要為（一）未知基因改造作物的檢測技術，以及（二）玉米粒群組檢測。

(一)未知基因改造作物的檢測技術

即時聚合酶連鎖反應陣列(Real-time PCR array)技術係為真野博士於 2009 年發表文獻公開[12]，此試驗設計為食品総合研究所、日本國立醫藥品食品衛生研究所及日本 FASMAC 公司共同合作開發。此 Real-time array 平台可用於針對檢體中多項基因改造作物及轉殖品系，並可得知其檢體中含有已核准、未核准或未知基因改造作物。

Real-time PCR array 即時聚合酶連鎖反應陣列為利用不同基因改造作物的轉殖特異性(event-specific)、構造特異性(construct-specific)或是篩選性基因片段的引子對(primers)或螢光探針(TaqMan probe)於 96 孔 PCR 反應盤進行 real-time PCR 反應。Real-time PCR array 盤的設計可依據檢驗標的需求彈性設計，如圖四已公布於信賴性單元評價實驗室網頁(舊稱 GMO 解知單元實驗室)，詳細操作步驟依據步驟 1~4 完成，依序將配置好的反應試劑分別注入 96 反應盤中，再加入檢體後經儀器反應後分析反應曲線判定。



リアルタイムPCRアレイ法の概要

圖四、即時聚合酶連鎖反應陣列(Real-time PCR array)實驗流程步驟
圖片來源：食品總合研究所 GMO 檢知解析單元實驗室網頁
http://www.naro.affrc.go.jp/nfri/introduction/chart/0507/index.html

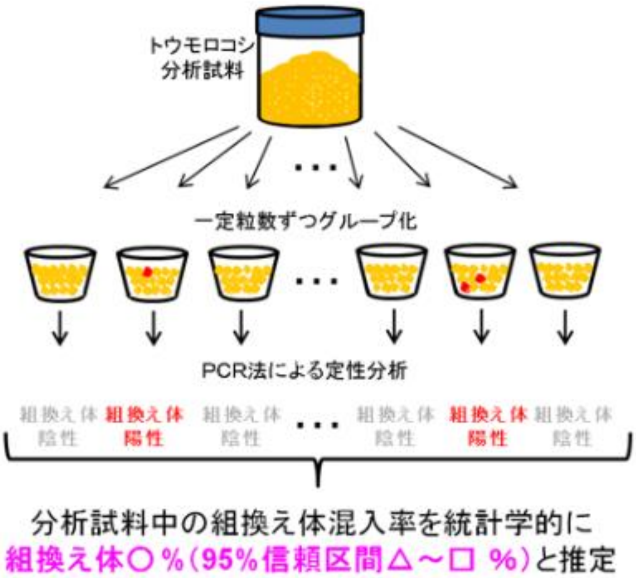
(二)玉米粒群組檢測

由於日本基因改造食品標示制度規範，產品若含基因改造作物原料佔整體產品重量前 3 位，且非基因改造食品之非故意摻雜率佔總重 5%以上才需標示，為了能夠快速準確的估算檢體中基因改造玉米的重量百分比，橘田博士的實驗室研發了此玉米粒群組檢測技術。透過橘田博士的介紹及真野博士發表的文獻〔13〕〔14〕，了解此試驗係將每 20 粒玉米穀粒分成一組，磨碎後加入 lysis buffer 萃取 DNA，離心後取上清液稀釋濃度後進行 Real-time PCR 反應。利用多組玉米粒群組反應結果，比較正反應與負反應組別數量進行統計分析，進而判斷檢體是否符合非故意摻雜率 5%的規定，相關實驗流程及原理已公開於食品研究部門網頁(圖五、六)。

圖五、玉米粒群組檢測實驗步驟

圖片來源：美國化學學會 Journal of Agricultural and Food Chemistry 期刊網頁

http://pubs.acs.org/doi/abs/10.1021/jf200212v



圖六、玉米粒群組檢測技術的原理

圖片來源：食品研究部門信賴性評價單元實驗室網頁

(舊稱食品總合研究所 GMO 檢知解析單元實驗室)

http://www.naro.affrc.go.jp/nfri/introduction/chart/0507/index.html

3. 台灣基因改造食品管理及日本農林水產省植物防疫所業務交流

由於橘田博士對於台灣基因改造食品管理十分有興趣，邀請我對於台灣基因改造食品管理現況及檢驗發展狀況進行解說，另外，橘田博士也希望來自橫濱植物防疫所蚊爪先生介紹其任職單位農林水產省植物防疫所執掌範圍進行解說，以達到互相交流目的，因此今天早上例行會議就分別由我以「Regulatory and Analysis of Genetically Modified Food in Taiwan」為題進行解說，蚊爪先生則以「Protecting Japanese Agriculture and Forests」[15](附件二)為題進行演說。

一開始就由筆者先行演說，演講內容分別針對台灣食品安全衛生管理法、台灣基因改造食品管理法規歷史演進、自基改法規施行以來執行基因改造食品研究和調查結果，以及台灣基因改造食品檢驗研究等議題。而後續由蚊爪先生接續進行演說，演說內容分別針對日本植物檢疫所組織目的和架構、海外農產品輸入檢疫、國內農產品輸出檢疫、日本國內機場與港埠檢疫分布情形、及海外輸入農產品實施基因改造措施及檢疫等議題。雖然演說內容為日文敘述，但是很感謝蚊爪先生特別請橫濱同事寄來日英文版簡介，好讓筆者更加了解內容。

會後討論時間，大家對於台灣近年有關基因改造食品實施多項法規相當有興趣，向筆者提出許多問題如針對現行基因改造食品規範對象、基因改造食品標示新制與基因改造非故意摻雜率下修對於台灣的

影響、基因改造食品標示調查執行和後續處理結果，及有關法規定義等議題。

而筆者亦對於蚊爪先生任職的植物防疫所工作職掌相當感興趣，藉由蚊爪先生介紹了解日本國內邊境包含港口和機場可區分為 5 個植物防疫所，如那霸植物防疫事務所、門司植物防疫所、神戶植物防疫所、橫濱植物防疫所及名古屋植物防疫所。而 5 個植物防疫所轄下包含 71 個港口和機場的防疫單位負責全日本邊境植物輸入及輸出檢疫事務。

而蚊爪先生表示今年才剛調至橫濱植物防疫所，先前曾分別在北海道及名古屋植物防疫所任職，而在北海道植物防疫所及名古屋植物防疫所工作內容主要為農產品輸出及輸入檢疫，蚊爪先生有趣的表示在北海道植物防疫所工作時，由於台灣進口相當多的北海道山藥因此蚊爪先生每天都要檢查很多山藥農產品。而筆者近一步詢問關於基因改造食品的檢查是否在這些檢疫所同時執行，而蚊爪先生表示全日本只有橫濱植物防疫所對於基因改造食品進行檢查與檢驗，因此日本其他地區進口的基因改造食品都必須運送到橫濱植物防疫所進行查驗。同時也表示因為要配合基因改造食品研究發展技術，橫濱檢疫所的職員必須持續接受基因改造食品檢驗相關訓練，因此植物防疫所不定期會派員到負責基因改造技術研發的橘田博士實驗室進行研習。

參、心得及建議

基因改造作物發展與管理為國際間相當關注的議題，隨著近年基因改造作物開發技術日趨新穎及發展相當迅速，基因改造食品管理及檢驗技術也持續精進發展。我國近年來針對基因改造食品制定相關法律加以規範，如擴大基因改造食品查驗登記範圍、基因改造食品港部邊境進口分流制度、建立基因改造食品追蹤追朔系統、擴大食品含基因改造食品原料標示規範及下修非基因改造食品非故意摻雜率等。另本署也不斷精進基因改造食品檢測技術，除精進新興基因改造食品相關檢測技術開發，並藉由持續參與國際性研討會及研習增進並維繫相關資訊感度。

一、 持續進行加強國際交流以維持聯繫管道

本次研習實驗室「信賴性評價單元實驗室」為日本基因改造食品研究技術相當具權威實驗室，實驗室長橘田博士更為日方基因改造作物資訊傳遞與技術開發相當重要的代表，不僅屢次代表日方參與美國、歐盟等國際性基因改造作物相關議題會議，也很重視該實驗室國際性交流，因此每年不定期接待各國研究人員於該實驗室下進行短期或長期研習，進行國際性資訊傳遞與技術交流以維繫良好國際關係。因此，藉由持續派員研習交流，不僅可增進日方與我方情誼外，亦可藉由橘

田博士實驗室學習基因改造作物相關研習技術與資訊，並可更新及掌握相關議題最新發展及國際性動向，以拓展我國人脈並增進我國研究技術與資訊與國際接軌。

二、　持續培養與精進基因改造食品技術

隨著基因改造作物的發展與上市，相關規範及檢驗技術的研發與建立一直以來為本署重大業務之一，且近年來基因改造作物技術發展日趨成熟與新穎，持續獲取新興基因改造作物的資訊及發展相關檢測技術更為本署研究發展方向。為了與基因改造技術與時俱進，除了藉由參與國內多場基因改造作物交流會議外，參與國際間的交流研習與互動更是不可或缺的機會。藉由基改相關研究人員參與國際性研習交流，獲取更多基因改造作物管理資訊及相關技術，以便規劃並建立我國基因改造檢驗技術發展方向，以因應未來快速發展的新穎基因改造作物的產生與上市等情形。

三、　持續增進人員培訓避免技術知識流失

我國基因改造食品相關規範與相關基改檢驗技術發展至今已逾 10 年，隨著時代的演進近年來基改相關法規及檢驗技術日趨成熟，而 10 多年時間的堆疊成就相關專業知識與領域的培育及養成。然而面對未來更多新興基因改造技術的快速發展，在可能面臨到對現行法

規與技術的衝擊與挑戰狀況下，持續培訓既有專業知識人員不僅可快速掌握相關資訊，避免人才流失導致知識斷層以即時因應相關技術發展方向。

本次研習筆者也體會到日方對於各專業領域的尊重與研究態度，如蚊爪先生工作的橫濱植物防疫所，為了協助職務上檢疫檢驗分析，不時至不同實驗單位進行研習及技術學習，此次蚊爪先生因職務上的基因改造作物檢驗分析，故與筆者共同於橋田博士的實驗室進行研習進修。

最後，筆者此次能有機會赴日研習並學習日方研究技術、獲取資訊以及維繫國際情誼，要感謝衛生福利部及本署各級長官的支持，也謝謝研究檢驗組長官同仁以及食品生物科同仁協助給予協助和提供相關資訊聯繫。最後感謝國立研究農業・食品產業技術総合研究機構食品研究部門橋田和美博士、高畠令王奈博士、鍵屋ゆかり小姐、倉嶋たけ代小姐、大西真理小姐以及實驗室所有成員在研習期間的諸多照顧與傳授相關專業知識與技術，以及感謝蚊爪竜一先生於研習期間一起努力學習及照顧。

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附件一、食品研究部門(原食品總合研究所)英文簡介

http://www.naro.affrc.go.jp/publicity_report/publication/files/nfri_outline-e2014.pdf


NARO

National Agriculture and Food Research Organization (NARO)

NFRI

National Food Research Institute

NFRI

Roles and responsibilities

In order to promote a healthy and rich diet for consumers and to address the country's food supply issues, the National Food Research Institute (NFRI) carries out innovative research. Specifically, NFRI aims to:

1. Develop technology that maximizes the value of food and agricultural products.
2. Develop technology that provides a wide variety of safe food.
3. Offer accurate information about food products based on scientific evidence.

NFRI is the only research organization under the auspices of the Ministry of Agriculture, Forestry, and Fisheries, which conducts research specifically in the area of food related science and technology. The work of NFRI is extensive and includes the scientific analysis of food and health, the development of technology to ensure the safety of food, and the development of innovative distribution and processing technologies. While implementing the most advanced technology, NFRI makes every effort to work on the most relevant topics affecting the country and to support on-going research projects. NFRI also conducts diverse research in relation to agricultural products, ranging from the distribution and processing stages to the cooking and eating stages of the food chain.

Major research subjects

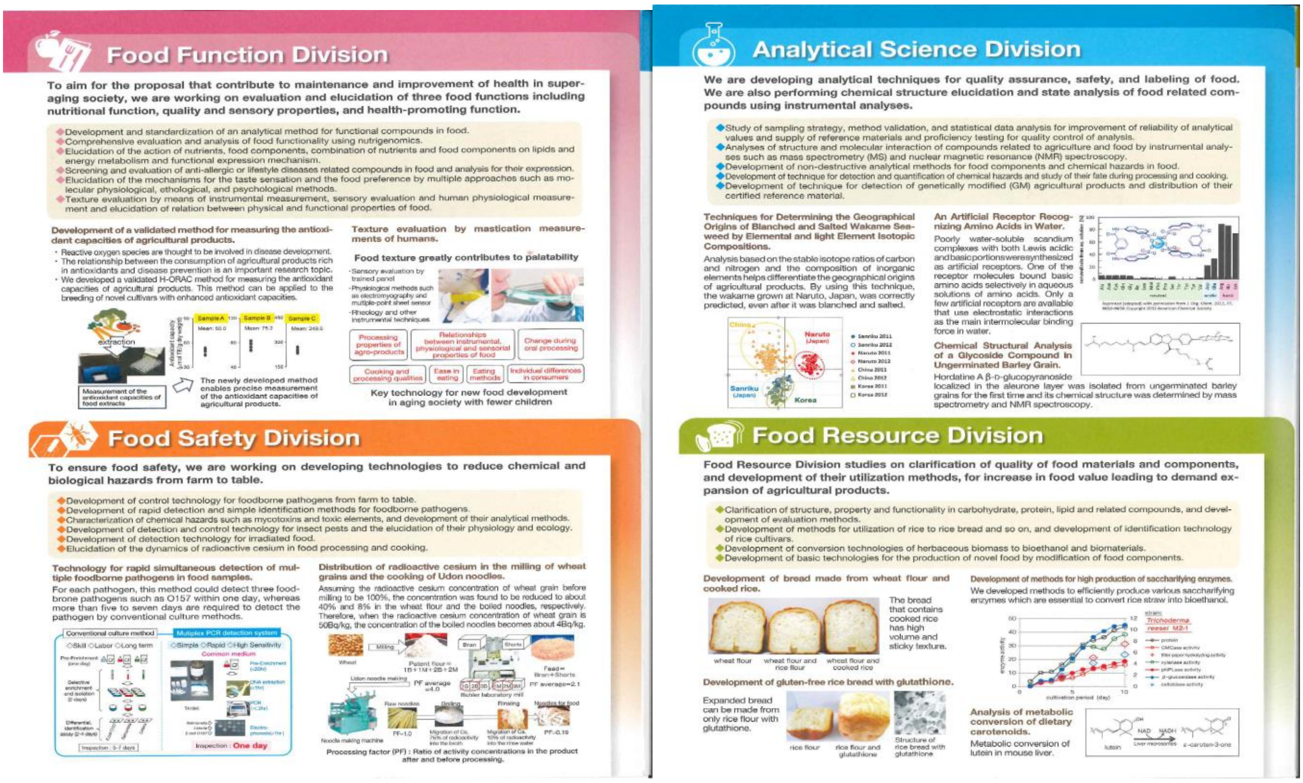
- Studying the three functions of agricultural products and foods: nutritional function, palatability and biological function, and the development of technology for their effective utilization.
- Development of technology to ensure the safety and credibility of agricultural products and foods.
- Development of distribution and processing technologies with an aim to conserve and improve the qualities and functionalities of agricultural products.

In addition to basic research and development of advanced technologies, NFRI carries out research that meets the rapidly changing needs of society.

Through the channels of the food industry as well as the agriculture, forestry, and fisheries industry, the research results obtained at NFRI have contributed to building a technical system to support a healthy and rich diet for consumers, and to secure a safe and stable food supply.

History

- 1934 : Established as the Rice Utilization Research Institute under the Agricultural Bureau of Ministry of Agriculture, Forestry and Fisheries in Tokyo.
- 1944 : Reorganized as the Office of Food Administration Research Institute.
- 1947 : Reorganized as the Food Research Institute.
- 1972 : Reorganized as the National Food Research Institute.
- 1979 : Moved to Tsukuba Science City from Tokyo.
- 2001 : Reorganized as the Independent Administrative Agency, National Food Research Institute.
- 2006 : Merged with the Independent Administrative Agency, National Agriculture and Food Research Organization (NARO).


Food Function Division

To aim for the proposal that contribute to maintenance and improvement of health in super-aging society, we are working on evaluation and elucidation of three food functions including nutritional function, quality and sensory properties, and health-promoting function.

- Development and standardization of an analytical method for functional compounds in food.
- Comprehensive evaluation and analysis of food functionality using nutrigenomics.
- Elucidation of the action of nutrients, food components, combination of nutrients and food components on lipids and energy metabolism and functional expression mechanism.
- Screening and evaluation of anti-allergic or lifestyle diseases related compounds in food and analysis for their expression.
- Elucidation of the mechanisms for the taste sensation and the food preference by multiple approaches such as molecular physiological, ethological, and psychological methods.
- Texture evaluation by means of instrumental measurement, sensory evaluation and human physiological measurement and elucidation of relation between physical and functional properties of food.

Development of a validated method for measuring the antioxidant capacities of agricultural products.

- Reactive oxygen species are thought to be involved in disease development.
- The relationship between the consumption of agricultural products rich in antioxidants and disease prevention is an important research topic.
- We developed a validated H-ORAC method for measuring the antioxidant capacities of agricultural products. This method can be applied to the breeding of novel cultivars with enhanced antioxidant capacities.

Texture evaluation by mastication measurements of humans.

Food Safety Division

To ensure food safety, we are working on developing technologies to reduce chemical and biological hazards from farm to table.

- Development of control technology for foodborne pathogens from farm to table.
- Development of rapid detection and simple identification methods for foodborne pathogens.
- Characterization of chemical hazards such as mycotoxins and toxic elements, and development of their analytical methods.
- Development of detection and control technology for insect pests and the elucidation of their physiology and ecology.
- Development of detection technology for irradiated food.
- Elucidation of the dynamics of radioactive cesium in food processing and cooking.

Technology for rapid simultaneous detection of multiple foodborne pathogens in food samples.

For each pathogen, this method could detect three foodbrone pathogens such as O157 within one day, whereas more than five to seven days are required to detect the pathogen by conventional culture methods.

Distribution of radioactive cesium in the milling of wheat grains and the cooking of Udon noodles.

Assuming the radioactive cesium concentration of wheat grain before milling to be 100%, the concentration was found to be reduced to about 40% and 8% in the wheat flour and the boiled noodles, respectively. Therefore, when the radioactive cesium concentration of wheat grain is 50Bq/kg, the concentration of the boiled noodles becomes about 4Bq/kg.

Analytical Science Division

We are developing analytical techniques for quality assurance, safety, and labeling of food. We are also performing chemical structure elucidation and state analysis of food related compounds using instrumental analyses.

- Study of sampling strategy, method validation, and statistical data analysis for improvement of reliability of analytical values and supply of reference materials and proficiency testing for quality control of analysis.
- Analyses of structure and molecular interaction of compounds related to agriculture and food by instrumental analyses such as mass spectrometry (MS) and nuclear magnetic resonance (NMR) spectroscopy.
- Development of non-destructive analytical methods for food components and chemical hazards in food.
- Development of technique for detection and quantification of chemical hazards and study of their fate during processing and cooking.
- Development of technique for detection of genetically modified (GM) agricultural products and distribution of their certified reference material.

Techniques for Determining the Geographical Origins of Blanched and Salted Wakame Seaweed by Elemental and light Element Isotopic Compositions.

Analysis based on the stable isotope ratios of carbon and nitrogen and the composition of inorganic elements helps differentiate the geographical origins of agricultural products. By using this technique, the wakame grown at Naruto, Japan, was correctly predicted, even after it was blanched and salted.

An Artificial Receptor Recognizing Amino Acids in Water.

Poorly water-soluble scandium complexes with both Lewis acidic and basic portions were synthesized as artificial receptors. One of the receptor molecules bound basic amino acids selectively in aqueous solutions of amino acids. Only a few artificial receptors are available that use electrostatic interactions as the main intermolecular binding force in water.

Chemical Structural Analysis of a Glycoside Compound in Ungerminated Barley Grain.

Hordatine A β-D-glucopyranoside localized in the aleurone layer was isolated from ungerminated barley grains for the first time and its chemical structure was determined by mass spectrometry and NMR spectroscopy.

Food Resource Division

Food Resource Division studies on clarification of quality of food materials and components, and development of their utilization methods, for increase in food value leading to demand expansion of agricultural products.

- Clarification of structure, property and functionality in carbohydrate, protein, lipid and related compounds, and development of evaluation methods.
- Development of methods for utilization of rice to rice bread and so on, and development of identification technology of rice cultivars.
- Development of conversion technologies of herbaceous biomass to bioethanol and biomaterials.
- Development of basic technologies for the production of novel food by modification of food components.

Development of bread made from wheat flour and cooked rice.

The bread that contains cooked rice has high volume and sticky texture.

Development of gluten-free rice bread with glutathione.

Expanded bread can be made from only rice flour with glutathione.

Development of methods for high production of saccharifying enzymes.

We developed methods to efficiently produce various saccharifying enzymes which are essential to convert rice straw into bioethanol.

Analysis of metabolic conversion of dietary carotenoids.

Metabolic conversion of lutein in mouse liver.

Food Engineering Division

Based on a food engineering approach, new food technologies are being studied as unit operations by analyzing the processes, improving the system, and incorporating cutting-edge technologies such as nanotechnology and IT (information technology). Some successful technologies are using our research and have already contributed to your daily life through safe and high quality foods.

Development of advance technologies for distribution and processing and its application.

- Development of a high quality and efficient distribution system by using three dimensional transport simulator (vibrator), etc., and development of packaging technologies for agriculture products and food, and quality control during distribution.
- Development of food technologies such as membrane separation, Aqua-gas® (superheated steam with hot water droplets) heating, and high hydrostatic pressure processing for high quality foods. Process analysis and optimization of food processing/cooking for improved food quality and high functionality. Development and applications of *in vitro* gastric digestion model for foods.
- Development of pasteurization by high electric field AC and radio frequency flash heating. Development of micro-channel emulsification technology for producing mono-disperse emulsions. Development of ultra-fine grinding method of food materials using a jet mill etc. and its application.
- Development of biodiesel fuel production process using Non-Catalytic Superheated Methanol Vapor Bubble Method. Development of advanced conversion processing with by-products from agro and food industry.

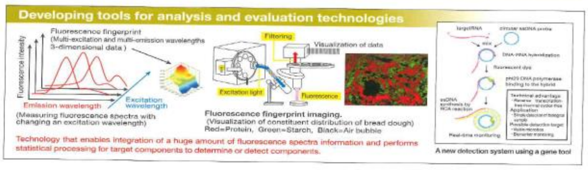
Tools for developing an advanced food distribution system

Tools for developing processing technologies

Development of advance analysis, evaluation and prediction technology for high quality and confidence and information and communication technology.

- Development of the technology of distinction and fixed quantity with fluorescence fingerprinting and imaging applications. Development of quality analysis with detection of weak intensity light signal data.
- Development of an analytical technologies to observe nano-scale structure and function using scanning probe microscope and a new bio-tool to detect targets in biological material.
- Development of a predictive model for microorganism growth and death in food and its database. Development of the evaluation tool of environmental load of food transportation by LCA and its application.
- Development of On-Line Food Traceability System for addition to useful information about agriculture products and foods and technologies to communicate research information to the public.

Developing tools for analysis and evaluation technologies

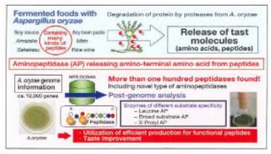


Applied Microbiology Division

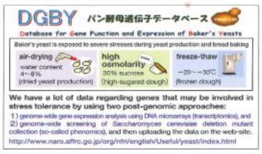
For the improvement of the utilization technology on food-brewing microorganisms and enzymes useful in the food industries, we study elucidation of the physiology of yeasts, natto-forming bacilli, and koji mold (*Aspergillus oryzae*), search for new useful strains and enzymes, and their evaluation and utilization.

- Elucidation of an environmental stress tolerance mechanism for advanced utilization of baker's yeast, and improvement of the yeast for bioethanol production.
- Elucidation of mechanisms for material production and metabolism in *Bacillus subtilis* (natto), analysis and improvement of enzymes for the production of useful oligosaccharides, and advancement of the technology for fermentation by bacteria.
- Development of the utilization technology of food brewing koji mold (*Aspergillus oryzae*) and its enzymes using genomic information.
- Development of the technology for the evaluation and reduction of toxicity of mycotoxin using cells of microorganisms.

Post-genome analysis of koji mold (*Aspergillus oryzae*) peptidase.
The useful enzymes which were not known until now are found one after another using the koji mold genome information. The development and novel utilization of additional superior abilities of koji mold can be expected.



Public presentation of a baker's yeast gene database.
We analyzed genetic information of the baker's yeast and constructed a database to help the study on yeasts. It can be helpful for all the researchers widely from fundamental research to application or development sections such as universities or companies.



Food Biotechnology Division

We are working on basic research to reveal, to utilize, and to improve biological functions for effective utilization of biological and food resources by employing high technologies such as biotechnology.

- Exploration for useful enzymes and substances, improvement for their functions, and development of their industrial uses.
- Unveiling molecular mechanisms that underlie unique biochemical reactions and strict ligand recognition exerted by certain receptor proteins.
- Elucidation and utilization of unknown microbial functions, and development of new microbial breeding technology.
- Development of novel methods to determine and evaluate the structure of biopolymers in solution.
- Elucidation of mechanism on differentiation and metabolic regulation for application on plant breeding.
- Characterization of enzymes useful for the utilization of agricultural waste and food processing waste.

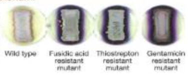
Structure function analysis of β-L-arabinopyranosidase.
A new enzyme named β-L-arabinopyranosidase was discovered. The enzyme is involved in the degradation of exudate gums and is expected to be used for the improvement (modification) of the properties of the gum.

Elucidation of fruit-ripening mechanisms in tomatoes.
Molecular mechanisms for ripening and abscission of tomato fruits are under investigation.

Development of a method for the automated synthesis of oligosaccharides.
We have developed a method for the automated synthesis of oligosaccharides by coupling various kinds of one monosaccharide donors after another. We have synthesized trisaccharide successfully by using this method.

The core-structural disaccharide of human milk oligosaccharide produced in kg-scale by our novel enzymatic method.
We have revealed that bifidobacteria secrete the enzyme to liberate the particular disaccharide that acts as the bifudus factor from human milk oligosaccharides. We have also developed a practical enzymatic method to produce the disaccharide.

Hyperproduction of a blue-pigmented antibiotic by certain drug resistant mutants of a soil bacterium.
We have demonstrated that introduction of certain drug-resistance mutations that alter ribosomal functions is effective for improvement of bacterial capabilities. Our approach opens up new avenues for efficient strain improvement.



Organization

Director General

Department of Planning and General Administration
- General Administration Coordinator
  - Planning and Promotion Section
  - General Administration Section
  - Information and Public Relations Section
  - Cooperation and Coordination Section

Research Coordinator for Radiation Effects on Food

Food Function Division
- Research Leader
- Nutritional Function Laboratory
- Functional Food Factor Laboratory
- Functionality Evaluation Laboratory
- Physiological Evaluation Laboratory
- Sensory and Cognitive Food Science Laboratory
- Food Physics Laboratory

Food Safety Division
- Radiation and Food Science Laboratory
- Chemical Hazard Laboratory
- Food Hygiene Laboratory
- Food Entomology Laboratory

Analytical Science Division
- Food Analysis Laboratory
- Mass Analysis Laboratory
- Molecular Structure and Dynamics Laboratory
- Nondestructive Evaluation Laboratory
- Foodmetrics Laboratory
- GMO Analytical Evaluation Laboratory

Food Resource Division
- Research Leader
- Cereal Science and Utilization Laboratory
- Carbohydrate Laboratory
- Protein Laboratory
- Lipid Laboratory

Food Engineering Division
- Research Leader
- Food Processing Laboratory
- Reaction and Separation Engineering Laboratory
- Instrumentation and Information Engineering Laboratory
- Nanobiotechnology Laboratory
- Distribution Engineering Laboratory
- Food Packaging Laboratory
- Food Piezotechnology Laboratory
- Advanced Food Technology Laboratory

Applied Microbiology Division
- Research Leader
- Yeast Laboratory
- Applied Bacteriology Laboratory
- Applied Mycology Laboratory
- Microorganism Evaluation Laboratory

Food Biotechnology Division
- Enzyme Laboratory
- Biomolecular Engineering Laboratory
- Microbial Function Laboratory
- Biofunctional Regulation Laboratory
- Biofunctional Application Laboratory

Research Program「Food Functions」

Project Manager: Director General
Assistant Project Manager: Director of Food Function Division

- Research Leader of Food Function Division
- Nutritional Function Laboratory
- Functional Food Factor Laboratory
- Functionality Evaluation Laboratory
- Physiological Evaluation Laboratory
- Sensory and Cognitive Food Science Laboratory
- Food Physics Laboratory
- Mass Analysis Laboratory
- Nondestructive Evaluation Laboratory
- Lipid Laboratory
- Food Processing Laboratory
- Distribution Engineering Laboratory
- Advanced Food Technology Laboratory
- Biomolecular Engineering Laboratory
- Head of Planning and Promotions Section
- Head of Information and Public Relations Section
- Head of Cooperation and Coordination Section

■Food Function Research Center (virtual center), Chief : Director of Food Function Division.

Research Program「Food Safety and Food Reliability」

Project Manager: Director General
Assistant Project Manager: Director of Analytical Science Division

- Sensory and Cognitive Food Science Laboratory
- Radiation and Food Science Laboratory
- Chemical Hazard Laboratory
- Food Hygiene Laboratory
- Food Entomology Laboratory
- Food Analysis Laboratory
- Mass Analysis Laboratory
- Molecular Structure and Dynamics Laboratory
- Nondestructive Evaluation Laboratory
- Foodmetrics Laboratory
- GMO Analytical Evaluation Laboratory
- Research Leader of Food Resources Division
- Cereal Science and Utilization Laboratory
- Research Leader of Food Engineering Division
- Food Processing Laboratory
- Reaction and Separation Engineering Laboratory
- Instrumentation and Information Engineering Laboratory
- Distribution Engineering Laboratory
- Food Piezotechnology Laboratory
- Advanced Food Technology Laboratory
- Microorganism Evaluation Laboratory
- Head of Planning and Promotions Section
- Head of Information and Public Relations Section
- Head of Cooperation and Coordination Section

■Technology Development Center for Food Safety (virtual center), Chief: Director of Food Safety Division
■Food Analysis and Standardization Center (virtual center), Chief : Director of Analytical Science Division

Research Program「Value-Added Products and Processes」

Project Manager: Director General
Assistant Project Manager: Director of Food Engineering Division

- Research Leader of Food Function Division
- Sensory and Cognitive Food Science Laboratory
- Food Physics Laboratory
- Radiation and Food Science Laboratory
- Food Hygiene Laboratory
- Food Analysis Laboratory
- Mass Analysis Laboratory
- Molecular Structure and Dynamics Laboratory
- Nondestructive Evaluation Laboratory
- Research Leader of Food Resources Division
- Cereal Science and Utilization Laboratory
- Carbohydrate Laboratory
- Protein Laboratory
- Lipid Laboratory
- Research Leader of Food Engineering Division
- Food Processing Laboratory
- Reaction and Separation Engineering Laboratory
- Instrumentation and Information Engineering Laboratory
- Nanobiotechnology Laboratory
- Distribution Engineering Laboratory
- Food Packaging Laboratory
- Food Piezotechnology Laboratory
- Advanced Food Technology Laboratory
- Research Leader of Applied Microbiology Division
- Yeast Laboratory
- Applied Bacteriology Laboratory
- Applied Mycology Laboratory
- Enzyme Laboratory
- Biomolecular Engineering Laboratory
- Microbial Function Laboratory
- Biofunctional Regulation Laboratory
- Biofunctional Application Laboratory
- Head of Planning and Promotions Section
- Head of Information and Public Relations Section
- Head of Cooperation and Coordination Section

Note: the colored circles indicate the divisions and departments to which they belong.

Access

Tsukuba Center – NFRI
Tsukuba shuttle bus service, 15 min or TAXI

Tokyo – Tsukuba Center
Tokyo-Akihabara-Tsukuba
Tokyo- Akihabara , JR Line, 5 min
Akihabara-Tsukuba, Tsukuba Express Line, 45-55 min

Tokyo-Tsukuba Center
Highway bus service, 65 min

Airport – Tsukuba Center
Tokyo International Airport (Haneda) -Tsukuba Center
Highway bus service , 120 min

Narita International Airport-Tsukuba Center
Bus service, 100 min

Ibaraki Airport-Tsukuba Center
Bus service, 60 min

Tokyo-Ueno-Ushiku-NFRI
Tokyo-Ueno, JR Line, 15min
Ueno- Ushiku, JR Joban Line, 55 min
Ushiku-NFRI, Bus service, 30 min or TAXI

For more information, please see "Access to NARO" on the following website.
http://www.naro.affrc.go.jp/english/

Collaborators with NFRI

Overseas Organization and Universities

- University of Dhaka (the People's Republic of Bangladesh)
- China Agricultural University (the People's Republic of China)
- Institute of Agro-Food Science & Technology, Chinese Academy of Agricultural Sciences (the People's Republic of China)
- Central Food Technological Research Institute (the Republic of India)
- Korea Food Research Institute (the Republic of Korea)
- Kasetsart University (the Kingdom of Thailand)
- National Food Institute (the Kingdom of Thailand)
- Rajamangala University of Technology (the Kingdom of Thailand)
- United States Department of Agriculture (United States of America)
- United Nations University

arranged in alphabetical order of the country

Domestic Organization and Universities

- National Institute of Health and Nutrition
- National Institute of Advanced Industrial Science and Technology
- Food and Agricultural Materials Inspection Center
- Japan Association for Techno-innovation in Agriculture, Forestry and Fisheries
- Ibaraki University
- Ochanomizu University
- Shizuoka University
- Seitoku University
- University of Tsukuba
- The University of Tokyo
- Tokyo University of Agriculture
- Tokyo University of Agriculture and Technology
- Tokyo University of Science
- Tohoku University
- The University of Tokushima

arranged in the order of the Japanese syllabary

National Food Research Institute (NFRI),
National Agriculture and Food Research Organization (NARO)
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TEL : +81-29-838-7971 FAX : +81-29-838-7996 E-mail : www-nfri@naro.affrc.go.jp
URL : http://www.naro.affrc.go.jp/org/nfri/english/

2014.12

附件二、農林水產省植物防疫所英日文簡介

http://www.maff.go.jp/pps/j/guidance/pamphlet/pdf/2016_p_all.pdf

植物防疫所は病害虫の被害から日本の農業と緑を守っています。

Plant Protection Stations protect Japan's agriculture and forests from harmful plant pests and diseases.

植物の病害虫が新たな地域に侵入すると、思いもよらぬ大きな被害を与えることがあります。ヨーロッパで猛威を振るい植物検疫開始のきっかけとなったブドウネアブラムシ、北米大陸への移民の原因となったといわれるアイルランドのジャガイモ疫病、日本からアメリカに渡り大害虫となったマメコガネなどその例は数え切れないほどで、一度侵入した病害虫の根絶が難しいことも歴史が物語っています。

日本は四方を海に囲まれているため病害虫が自ら侵入してくることは多くはありませんが、明治以後リンゴワタムシ、ヤノネカイガラムシなどの病害虫が海外からの貨物に紛れて侵入し、日本の農作物に大きな被害をもたらしたため、大正３(1914)年に植物検疫が開始されました。

国際貿易が活発になり、コンテナーによる海上物流や航空輸送網、低温での流通管理技術の発達により日本に輸入される植物類の種類や数量は大幅に増加し、それに伴って病害虫が侵入する危険性は、従来にも増して大きくなっています。

植物防疫所は、日本の植物に被害をもたらす海外からの病害虫の侵入を防ぐため、全国の港や空港で輸入検疫を行っているほか、特殊な病害虫の国内でのまん延を防ぐための国内検疫、諸外国の要求に応じた輸出検疫などの業務を行い、日本の農業と緑を守るために力を注いでいます。

When plant pests and diseases (hereinafter "pests") are introduced into a virgin area, they often cause unimaginably disastrous losses to crops and other agricultural resources. Examples of such introductions are innumerable. They include grape phylloxera in Europe, which caused such serious damage to grapes over a wide area of Europe that it triggered the beginning of plant quarantine; potato blight in Ireland, which is believed to have sparked emigration to North America; and the Japanese beetle in the United States, which was accidentally introduced from Japan and became a devastating pest. Moreover, history has shown that once a pest is introduced into an area, its eradication is difficult.

Because Japan is surrounded by the sea, few pests invade Japan on their own. However, beginning in the Meiji period, pests including the woolly apple aphid and arrowhead scale were introduced into Japan via cargo from overseas. As such pests seriously threatened agricultural production in Japan, plant quarantine began in 1914.

Today, international trade is becoming increasingly active, and container-based marine distribution systems and air-transport networks as well as technologies for cold-temperature transport are becoming more developed. This development has enabled more varieties and quantities of crops to be imported into Japan, creating greater risk that pests may be introduced into Japan.

Plant Protection Stations function to protect Japan's agriculture and plants. We prevent the introduction of overseas pests that may damage Japanese crops by conducting import quarantine at seaports and airports throughout Japan. We also implement domestic quarantine to prevent the spread of specially designated pests within Japan as well as export quarantine in response to requests from other countries.

侵入を警戒する主な病害虫

Major pests requiring precautions

Mediterranean fruit fly

Fire blight

Codling moth

Tobacco blue mold

植物検疫は日本全国において病害虫の侵入・まん延を防いでいます。

Plant quarantine prevents the introduction and spread of pests in all areas of Japan.

植物防疫所では、植物の病害虫が海外から侵入することを防ぐための「輸入検疫」、諸外国の要求に対応する「輸出検疫」、そして国内の病害虫対策を講ずる「国内検疫」と国の内外に向けて検疫を行っています。これらの検疫を実施するために、植物防疫所には専門的な資格を有する植物防疫官が配置されています。

Plant Protection Stations implement quarantine procedures that target both domestic and overseas products. Such quarantine procedures include import quarantine to prevent the introduction of overseas plant pests, export quarantine in response to requests from other countries, and domestic quarantine to control pests in Japan. Quarantine officials possessing expert qualifications are assigned to Plant Protection Stations to implement these quarantine procedures.

[植物検疫の仕組み Plant quarantine system]

■植物検疫は植物防疫法や国際植物防疫条約に基づいて、厳格に行われています。
Plant quarantine is strictly implemented in accordance with the Plant Quarantine Law and the International Plant Protection Convention.

4

輸入検疫

海外からの病害虫の侵入を防ぐために

Protecting Japan from overseas pests

Import quarantine

海外からの病害虫の侵入を防ぐために輸入検疫を行っています。

Plant Protection Stations implement import quarantine to keep overseas pests out of Japan.

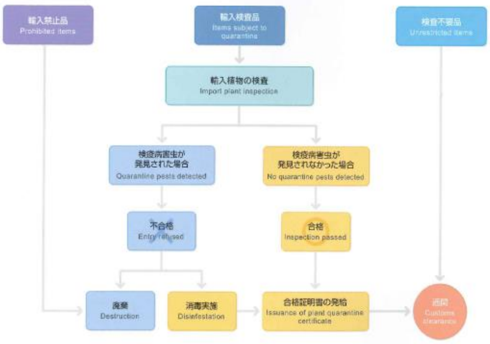
植物の病害虫が海外から輸入される植物に付着して日本に侵入することを防ぐため、輸入検疫が行われています。量や商用・個人用を問わず、貨物、携帯品、郵便物で輸入されるすべての植物が対象となります。

病害虫が付着する危険性のある植物とその病害虫の発生国により規制の内容を定め、病害虫の侵入を防止しています。植物は「輸入禁止品」「輸入検査品」「検査不要品」の３つに区分けされます。

Import quarantine is conducted to prevent plant pests from being introduced into Japan with plants and plant products imported from overseas. All imported plants, whether they are cargo, hand baggage, or mailed, are subject to quarantine regardless of their quantity or purpose (i.e., commercial or private use).

To prevent the introduction of pests, we establish rules depending on the combination of host plants and countries in which the pests are present. Plants and plant products are classified into three types: prohibited items, items subject to quarantine, and unrestricted items.

[輸入検疫の流れ Import quarantine procedure]



6

[植物の区分け Plant classification]

●輸入禁止品

万一侵入した場合、大きな被害が予測され、かつ輸入時には的確な検査が困難な病害虫がいます。このような病害虫が発生している国(地域)からの、その病害虫の付着するおそれのある植物は輸入が禁止されています。また、生きている病害虫や土なども輸入禁止品です。

●輸入検査品

輸入禁止品に該当しない植物で、苗木・観賞用植物・切花・球根・種子・果実・野菜・こく類・豆類・木材・香辛料原料・漢方薬原料などは輸入時の検査が必要です。

●検査不要品

植物であっても木工品や製茶など高度に加工され、病害虫の付着するおそれのないものは、輸入時の検査は不要です。

Prohibited items

There are pests that could cause serious damage if they were to introduce into Japan and are difficult to detect by import inspection at entry points. Thus, importation of plants that may have such pests on them from countries (regions) in which the pests are found is prohibited. Also, live pests, soil, etc., are prohibited items.

Items subject to quarantine

Plants and plant products that are not prohibited items and that are seedlings, ornamental plants, cut flowers, bulbs, seeds, fruits, vegetables, grains, beans, wood, spice crops, ingredients for Chinese medicines, etc., must be inspected when they are imported.

Unrestricted items

Plant products that have undergone a high degree of processing (such as wood products and processed tea) and also pose no threat of pest presence do not require inspection when they are imported.

[日本が侵入を警戒している代表的な病害虫の発生地域 Examples of regions that Japan watches for pest introduction]

■ 発生地域 Regions in which pests are present ■ 未発生地域 Regions in which pests have not been recorded

※多くの果物類が輸入禁止です。 Many types of fruit are prohibited items.

7

全国各地で水際作戦が展開されています。

A waterfront strategy for the entire country

輸入検疫は植物が輸入された場所で、通関に先立って行われます。
輸入される全ての植物について、必要量をサンプル抽出して実際に目で見て検査を行います。

Import quarantine is conducted prior to customs clearance at the place of entry.
From all plants to be imported, a particular quantity is sampled for visual inspection.

●海港における貨物の検疫

こく類、青果物、木材などは大型専用船で、青果物、切花、球根、種子などはコンテナー船で輸入され、その港で検査を行います。

Cargo inspection at seaports

Grains, fruits and vegetables, and wood, etc., are imported by bulk-cargo ships, while fruits and vegetables, cut flowers, bulbs, and seeds, etc., are imported by container ships. All cargoes are inspected at the seaport of entry.

▲海港でのかぼちゃの輸入検査
Import inspection of pumpkins at a seaport

●空港における貨物の検疫

切花、球根、青果物などは航空貨物で輸入されます。また、本格輸入に先立つサンプル輸入として多種多様な小口貨物などもあり、到着した空港で検査を行います。

Cargo inspection at airports

Cut flowers, bulbs, fruits and vegetables, and other items are imported by air cargo. All items are inspected at the airport of entry, and in some cases a large variety of small-lot shipments are imported as samples ahead of full-scale importation.

▲空港でのパプリカの輸入検査
Import inspection of red peppers at an airport

●携帯品の検疫

入国する旅行客が携行して持ち込む植物は、到着後、税関検査場内にある「植物検疫カウンター」で、税関検査に先立って検査を行います。

Inspection of hand baggage

Plants and plant products that are brought in by passengers entering Japan are inspected prior to customs clearance at plant quarantine counters located in the customs area.

▲旅客携帯品の輸入検査
Import inspection of a passenger's hand baggage

●郵便物の検疫

植物が含まれた郵便物は日本郵便株式会社の職員の立会いの下に事業所において検査を行った後、配達されます。

Inspection of postal items

Postal items that contain plants and plant products are delivered after they have been inspected at the post office in the presence of an employee of Japan Post Co., Ltd.

▲海外から到着した郵便物の検査
Inspection of postal items from abroad

●種苗の検疫　Quarantine of seeds and seedlings

種子や苗木などは、さらに精密な検査を行います。

種子などは、輸入時の検査では発見できない病気に感染している可能性があります。この場合、サンプルを持ち帰り検定室でブロッター検査などの精密検査を行います。
球根、果樹の苗木・穂木、いも類などウイルス病による大きな被害が警戒される植物については、他の植物から隔離された国のほ場などで一定期間実際に栽培する隔離検疫により精密な検査を行います。

Seeds and seedlings undergo an even more thorough inspection.

Seeds can be infected with diseases that cannot be detected during import inspections. Consequently, when seeds and other such items are being imported, samples are taken to a laboratory, where they are subjected to blotter tests and other thorough inspections.
For bulbs, fruit tree seedlings and scions, plants of the potato family, and other plants for which there are concerns about major damage caused by viral diseases, thorough inspections are conducted through post-entry quarantine that involves actually cultivating plants for a certain period of time at national farms that are isolated from other crops.

▲輸入種子の精密検査
Thorough inspection of imported seeds

▲隔離検疫による苗木の精密検査
Thorough inspection through post-entry quarantine

●海外検疫　Pre-shipment quarantine in countries of origin

輸入禁止品でも条件付きで解禁されているものがあります。

輸入禁止品であっても、相手国側において、発生している病害虫を完全に殺虫殺菌できる技術が確立し、その消毒措置が適正確実に行われる体制が整った場合には、農林水産大臣が一定の条件を付して輸入を解禁する制度があります。
輸入解禁を求める国と日本の政府間で、殺虫殺菌処理や病害虫の発生状況などに関する科学的なデータのやりとりがなされ、専門家による現地確認調査などを経て輸入が解禁されます。解禁された植物については、植物防疫官が輸出国に派遣され、輸出国政府が行う消毒や輸出検査など定められた条件が実際に守られているかを確認する海外検疫が行われます。

There are cases where even prohibited items can be imported with conditions.

The Minister of Agriculture, Forestry and Fisheries may allow the import of prohibited items with certain conditions if the country of origin has technologies for disinfesting the items and a framework for using these technologies properly and reliably.
Import bans are lifted after the government of a country making a request to lift a ban and Japan exchange scientific data on disinfestation measures and pest conditions, and experts conduct an onsite survey. A pre-shipment quarantine in the originating country is then conducted for plants for which the ban has been lifted. This involves dispatching quarantine officials to the exporting country to confirm that the government of that country is actually abiding by the set conditions (disinfestation, export inspections, etc.).

◀条件付きで日本に輸出される植物
Plants for conditional export to Japan

[輸入解禁手続きの流れ　Procedure for lifting import bans]

▲試験・調査データの作成
Preparation of testing and inspection data

▲輸出検査の現地確認
Local confirmation of export inspection

輸出検疫

日本の農作物を輸出するために

For export of Japanese agricultural products

Export quarantine

輸出相手国の要求に応じた検疫を行っています。

Implementing quarantine in response to requests from Japan's trading partners

日本から輸出される植物に輸出相手国が指定する病害虫の付着がないか、相手国の要求に即した消毒が実施されているかについて検査します。

Inspections are conducted to confirm that pests specified by Japan's export partners are not on plants exported from Japan and that sterilization is being implemented in accordance with demands by Japan's export partners.

●輸出時の検疫

植物防疫所は、日本の農産物を円滑に輸出するため、
①諸外国の植物検疫の規制情報の収集と情報提供、
②産地や市場などの集荷地での検査の実施、
③相手国が規制する病害虫に関する防除･選果指導
などの取組を行っています。

Quarantine when exporting

In order to facilitate smooth exports of Japanese agricultural products, Plant Protection Stations provide necessary services, such as: (1) collection and sharing of information on plant quarantine requirements of foreign countries; (2) on-site export inspection at consolidation areas, such as production areas and markets; and (3) technical training and lectures on pest control, frut sorting, etc., for pests regulated by importing countries.


▲輸出時のナガイモの検査
Export inspection of Chinese yams

●栽培中の検疫

種子や苗木などは栽培中に病害虫が発生していないことを証明するよう要求される場合が多く、例えばEU向けの盆栽などは輸出に先立ち2年間の栽培中の検査が求められています。

Quarantine during cultivation

In many cases, importing countries have requested Japan to certify that no pest infestation occurred during cultivation of seeds and seedlings.

For example, the EU has requested that bonsai for export to the EU should be inspected during cultivation for two years prior to export.


▲栽培中の盆栽の検査
Inspection of bonsai during cultivation

[輸出検疫の流れ　Export quarantine procedure]

国内で病害虫のまん延を防止するために

To prevent the spread of pests in Japan

Domestic quarantine

国内で病害虫のまん延を防ぐために、さまざまな対策を行っています。

Plant Protection Stations employ a variety of measures to prevent the spread of pests within Japan.

国内でもジャガイモ及び主要な果樹苗木の検査や、病害虫の発生地から未発生地への苗木類の移動を規制するなどして、病害虫のまん延を防いでいます。

Plant Protection Stations employ various measures to prevent the spread of pests within Japan, including conducting inspections of seed potatoes and major fruit-tree seedlings and regulating the movement of seedlings from regions with pest outbreaks to those without pests.

●国内の種苗検疫　Quarantine of domestic seeds and seedlings

病害虫の寄生していない種苗を供給するための検査を行っています。

健全な種苗を供給するために国が指定した種苗は、植物防疫官が毎年栽培中の適期に病害虫の検査を行い、この検査に合格しないと種苗として移動することができません。現在、ジャガイモが検査対象の種苗として指定されており、植物防疫官が輪腐病、ウイルス病などの病害虫を対象とした検査を行っています。

また、かんきつ類、りんご、ぶどう、なし、もも、おうとう及びすももの繁殖用穂木を採取する樹(母樹)を対象にウイルス病などの検査を行っています。

Conducting inspections to secure a supply of pest-free seeds and seedlings

In order to secure a supply of pest-free seeds and seedlings, plant quarantine officials inspect nationally-designated seeds and seedlings for pests during their growth. Seeds and seedlings that do not pass this inspection cannot be supplied to end users. Currently, seed potatoes are designated as seeds/seedlings requiring inspection, and quarantine officials inspect them for ring rot, viral diseases, and other pests.

Moreover, quarantine officials conduct inspections of trees (mother trees) from which scions are taken for propagation to determine the existence of viral diseases, etc. Inspected plants include citrus, apple, grape, pear, peach, cherry, and plum.


▲種馬鈴しょ(ジャガイモ)のほ場検査
Field inspection of seed potatoes


▲線虫の検出検査
Inspection for nematodes

●病害虫の根絶防除などの取組　Pest eradication programs

国内の一部に発生した病害虫から、日本の農業を守っています。

南西諸島(沖縄･奄美･トカラ)、小笠原諸島には国内の他の地域に発生していないアリモドキゾウムシ、アフリカマイマイなどの重要な病害虫が発生しています。植物防疫所は、これらの病害虫及びその寄主植物を未発生地域へ移動することを禁止するとともに、病害虫の根絶防除に取り組んでいます。

また、新しい病害虫が侵入した場合、早期に発見し、直ちに防除を行うことが重要です。このため、植物防疫所では全国の主要な海空港や通関手続きを行う日本郵便株式会社の事業所に誘引剤を入れたトラップを設置したり、都道府県の病害虫防除所などと連絡を密にして、常に侵入警戒調査を実施し、侵入病害虫の早期発見や緊急防除に努めています。

Protecting Japan's agriculture from regional pest outbreaks

In the Nansei Islands (Okinawa Islands, Amami Islands, and Tokara Islands) and the Ogasawara Islands, there are serious plant pests such as the sweet potato weevil and the giant African snail that are not present in other parts of Japan. As Plant Protection Stations strive to eradicate these pests, we also work to prevent the movement of these pests as well as the movement of their host plants from areas where they are present to other areas.

When new pests are introduced into an area, it is vitally important to detect them and to take immediate steps to eradicate them at an early stage. Consequently, Plant Protection Stations have installed lure-bait traps at major seaports and airports of entry and Japan Post offices that conduct customs clearance procedures. We also work closely with prefectural pest control stations to conduct continuous monitoring surveys to detect new pests at an early stage, and engage in emergency eradication.


▲侵入警戒トラップ
Monitoring trap


▲アフリカマイマイ
Giant African snail


▲アリモドキゾウムシ
Sweet potato weevil


▲ミカンキジラミ
Asian citrus psyllid

[移動が規制されている植物･病害虫とその地域　Plants/pests whose movement is regulated and their regions]

持ち出せないもの Items that cannot be taken out	病害虫の発生地域 Regions where pest exist	持ち込めない地域 Regions where items cannot be brought in
植物:ミカン科植物の一部の生植物(種子及び果実を除く)(ミカン･ポンカン･タンカン･シークヮーサーなどのかんきつ類、ゲッキツ･サルカケミカン･ワンピなど) Plants: Some seedlings of the Rutaceae family (citruses, Orange Jessamine, *Toddalia asiatica*, wampee, etc., including mandarin oranges, shaddock, *Citrus tankan* Hayata, and *Citrus depressa* Hayata) 病害虫:カンキツグリーニング病菌、ミカンキジラミ Pests: Citrus greening disease bacteria, Asian citrus psyllid	沖縄県全地域 All of Okinawa Prefecture	沖縄県を除く国内全地域 All domestic regions except Okinawa Prefecture
	徳之島、沖永良部島及び与論島 Tokunoshima Island, Okinoerabu Island and Yoron Island	徳之島、沖永良部島及び与論島を除く国内全地域 All domestic regions except Tokunoshima Island, Okinoerabu Island and Yoron Island
植物:さつまいも、ヨウサイ、あさがお、ぐんばいひるがおなどの生茎葉及び地下部 Plants: Unprocessed stems and leaves as well as underground parts of sweet potato, water spinach, morning glory, beach morning glory, etc. 病害虫:アリモドキゾウムシ、イモゾウムシ、サツマイモノメイガ、アフリカマイマイ Pests: Sweet potato weevil, West Indian sweet potato weevil, sweet potato stem borer, and giant African snail	沖縄県全地域*、奄美群島、トカラ列島及び小笠原諸島 All of Okinawa Prefecture, Amami Islands, Tokara Islands and Ogasawara Islands	沖縄県全地域*、奄美群島、トカラ列島及び小笠原諸島を除く国内全地域 All domestic regions except Okinawa Prefecture, Amami Islands, Tokara Islands and Ogasawara Islands

*久米島等では、平成25年にアリモドキゾウムシが根絶されました。　*Sweet potato weevil was eradicated from Kumejima Islands in 2013.

高い同定診断技術が検査を支えています。

Sophisticated identification and diagnostic technologies support inspections.

病害虫は世界中に非常に多くの種類が存在しています。

検査で発見された病害虫の種類を正確に見分けること(同定)は、植物検疫にとって極めて重要な業務です。

検査現場で識別ができない病害虫は、全国ネットワークによって迅速かつ的確に同定され、それに基づき適正な検疫措置が講じられています。

また、検査などで発見された国内外の病害虫の標本を保管管理したり、植物防疫官が病害虫を同定するための資料を作成し、これらを利用した研修を行い、同定技術の向上を図っています。

An extremely broad range of pests exists in the world.

Therefore, the work of accurately classifying (identifying) the types of pests that are detected in inspections is a vital part of plant quarantine.

When it is difficult to identify pests at inspection sites, the network of Plant Protection Stations is used to quickly and accurately identify the pests, and then appropriate quarantine measures are implemented based on this identification information.

Plant Protection Stations store specimens of both domestic and overseas pests that are collected in inspections. We also prepare materials for pest identification used by quarantine officials, conduct training using these materials, and work to improve identification skills.

▲害虫の同定
Pest identification

輸入検疫で発見された
日本未報告の病害
「テンサイさび病」
学名: *Uromyces betae*

Beet rust, a significant plant disease previously unreported in Japan, which was detected through import quarantine
Scientific name: *Uromyces betae*

輸入検疫で発見された
日本未発生のカメムシ
学名: *Stenozygum coloratum*

A stinkbug that is not present in Japan, which was detected through import quarantine
Scientific name: *Stenozygum coloratum*

▲同定資料
Identification materials

高度な植物検疫のために

For highly advanced plant quarantine

高度な植物検疫を行うための調査研究を続けています。

Continuing research for highly advanced plant quarantine

植物検疫の高度化のためには、絶えず最新の情報を収集しながら、検査技術や分析技術、消毒技術などの開発、向上を図り、検疫の現場に活かすことが重要です。植物防疫所では専門の施設・体制を整備し、日々調査研究に取り組んでいます。また、植物防疫官の技術向上のために体系的な研修を実施しています。

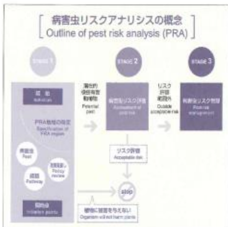
For highly advanced plant quarantine, it is important to constantly collect the latest information, to develop and improve technologies for inspection, analysis and treatment, and to apply such information and technologies to actual quarantine activity. In addition to establishing specialized facilities and systems, Plant Protection Stations are engaged in day-to-day research. Also, we conduct systematic training to improve the quality of plant quarantine officials.

●病害虫リスクアナリシス

非常に多種多様に存在する病害虫について、日本での発生の有無、日本への侵入の可能性、日本でのまん延の可能性や農作物などへの被害の大きさなど、病害虫のリスクを評価し、そのリスクに応じた検疫方法の決定に関しての調査研究を行っています。

Pest risk analysis

Plant Protection Stations assess the risks posed by a wide variety of pests, e.g., the absence or presence of targeted pests in Japan, the possibility of pests being introduced into Japan, the possibility of pests spreading in Japan, the degree of damage to crops, etc.; they also conduct research that aids in determining quarantine methods that are appropriate for the degree of risk.



●害虫に関する調査研究

世界各地に発生している害虫の情報を収集・解析するとともに、生態や被害が不明な害虫については、発生国から導入して各種調査を行うことによって、検査技術の開発などを行っています。

Research on pests

Plant Protection Stations conduct research on plant pests by gathering and analyzing information on the origins of pests from around the world, and develop pest inspection techniques for pests with unknown biologies and impacts on plants by bringing them from their countries of origin and conducting various studies on them.

▲害虫の人工飼育
Artificial breeding

●植物病原体に関する調査研究

日本未発生の植物病原体の疫学、生態、防除方法などの情報を海外から収集するとともに、これらの病原体を導入して、形態、生理生化学的性質、血清学的性質及び分子生物学的性質を調査し、検査方法及び同定方法の研究開発を行っています。

Research on phytopathogens

Plant Protection Stations collect information from overseas on epidemiology, biology, prevention methods, etc., for plant diseases that have not yet occurred in Japan. We also bring in their pathogens and investigate their morphology, biochemical properties, serological properties, and molecular biological properties, and carry out research and development on inspection and identification methods.

◀ウイルスの電子顕微鏡観察
Observation using electron microscopy

●消毒技術の開発

植物検疫では病害虫が発見された植物を的確かつ安全に消毒することが重要です。このため、化学的・物理的方法による消毒技術の開発を行っています。

Development of disinfestation technologies

Precise and safe disinfestation of plants that are infested with pests is an important part of plant quarantine. For this reason, Plant Protection Stations develop treatment technologies that use chemical and physical disinfestation methods.

▲ガスクロマトグラフィーによる分析
Analysis using gas chromatography

●検疫データの整備

輸出入植物の種類や生産国(地域)、検査で発見された病害虫の種類などの植物検疫の実績データは、植物検疫の現場において効率的な検疫を行うため、また輸出入者など関係者にとっても重要です。植物検疫統計データは、年次報告のほか、週ごとの速報値がホームページで公開され誰でも利用することが可能です。

Maintaining quarantine data

Recorded plant quarantine data, such as inspected plants and their countries (regions) of origin or intercepted pests, are essential for Plant Protection Stations to conduct on-site quarantine effectively, and they are also important resources for importers, exporters, and other concerned persons. The statistical data on plant quarantine are contained in publications such as annual reports and weekly quick estimations, and are released on our website where anyone can make use of them.

▲ホームページで公開しているデータのメニュー画面検索結果
Data menu screen of search results made available on the Internet

■植物防疫官研修　Training of quarantine officials

さまざまな専門分野の研修を行っています。

Training is being provided in a variety of specialized fields.

研修センターでは植物検疫業務に必要な植物学、応用動物昆虫学、植物病理学、農薬学、消毒技術、植物防疫行政、貿易などの広範な知識や技術習得、海外への対応のための語学などのカリキュラムが年間を通じて組まれ、的確な業務が行えるよう研修を行っています。

Through the Training Center's curriculum, quarantine officials acquire a broad range of skills and knowledge necessary for the work of plant quarantine throughout the year. These fields include botany, applied zoology and entomology, plant pathology, agricultural chemicals, sterilization techniques, plant quarantine administration, and trade practices. Plant Protection Stations also participate in language training so that we can work with overseas personnel. In this way, quarantine officials are learning the skills needed to conduct their duties properly.

▲害虫識別法の実習
Practical study of pest identification methods

専門知識を活かした業務にも積極的に協力しています。

Actively cooperating in operations that utilize specialized knowledge

植物防疫所では、より正確で迅速な検査を実施するため、病害虫の識別能力の向上に努めており、これらの技術により、「特定外来生物による生態系等に係る被害の防止に関する法律」に基づき規制されている外来生物の判別に協力しています。

また、植物防疫所では遺伝子診断などの新しい病害虫判別技術の導入にも努めています。この遺伝子診断技術により、「遺伝子組換え生物等の使用等の規制による生物の多様性の確保に関する法律(カルタヘナ法)」に基づく未承認遺伝子組換え農作物の混入について検査を実施しています。

▲遺伝子組換え生物体の分析
Analysis of genetically modified organisms

Plant Protection Stations continue to enhance technologies to identify quarantine pests for accurate and speedy inspections. Using such technologies, the Stations also cooperate in identifying alien species regulated by the Invasive Alien Species Act.

The Stations also continue to introduce new pest identification technologies such as genetic diagnosis. Using genetic diagnosis, the Stations inspect unapproved genetically modified crops based on the Act on the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms (the Cartagena Protocol domestic law).

●外来生物の輸入に関するお問い合わせ先
For inquiries concerning import of alien species, please contact:
環境省自然環境局野生生物課外来生物対策室
Office for Alien Species Management, Wildlife Division, Nature Conservation Bureau, Ministry of the Environment
TEL: 03-3581-3351(代表/main)　FAX: 03-3581-7090

外来生物法ホームページ
Invasive Alien Species Act website
http://www.env.go.jp/nature/intro/

●カルタヘナ法に基づく未承認遺伝子組換え農産物の検査に関するお問い合わせ先
For inquiries concerning inspections for unauthorized genetically modified crops based on the Cartagena law, please contact:
農林水産省消費・安全局農産安全管理課
Plant Products Safety Division; Food Safety and Consumer Affairs, Ministry of Agriculture, Forestry and Fisheries
TEL: 03-3502-8111(代表/main)　FAX: 03-3580-8592

カルタヘナ法関連情報ホームページ
Website with information on the Cartagena Law
http://www.maff.go.jp/j/syouan/nouan/carta/

手続きの簡素化や利便性の向上にも取り組んでいます。

Working to simplify procedures and improve convenience

電子申請

植物防疫所では、各種申請・届出を利用者が自宅や事務所からオンラインで提出することができるよう、電子申請システムを導入しています。各種申請・届出は、全国どこの植物防疫所へも提出できるようにする必要があるため、全国の植物防疫所をつなぐオンラインネットワークを整備して対応しています。

特に、輸出入植物の検査申請を処理するシステム(植物検疫関連手続)は、インターネットからも利用できるシステムで、植物を輸出入する場合に必要な手続(申請書・届出の提出と証明書・通知書の受取)を行うことができます(注)。

また、輸入植物(貨物)検査の申請は、1回の入力、送信で関連する省庁のすべての手続を行うシングルウィンドウにも対応しており、税関への輸入申告手続と連携するなど、輸入手続全体の効率化・迅速化を図っています。日本における輸入植物(貨物)の総検査申請数のうち、約96%が電子申請で処理されています。

(注)輸出検査の証明書はオンラインで受け取ることができません。植物防疫所から書面でお渡しします。

Electronic applications

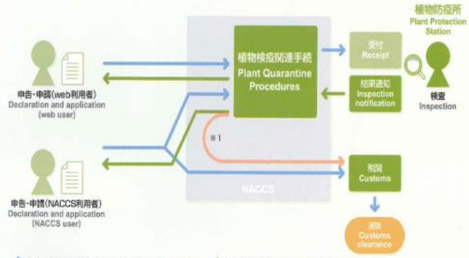
Plant Protection Stations are establishing an electronic application system that will allow users to submit applications and notifications online from their homes or offices. Because it is important to make it possible to submit applications and notifications to any Plant Protection Station in Japan, all Plant Protection Stations are linked by an online network.

Plant Protection Stations use a system, which is also available on the Internet, for processing applications for the inspection of imported and exported plants (plant quarantine procedures) that is capable of handling the procedures necessary when importing and exporting such plants (e.g., submission of application forms and notifications,receipt of certificates and notifications) (See Note).

In addition, for import plant (cargo) inspection applications, the system provides a single window for performing all procedures required by the related authorities with one input and transmission, and import notification procedures for customs are coordinated, with the aim of simplifying and accelerating all import procedures. Electronic applications are used to handle approximately 96% of all applications for import plant (cargo) inspections in Japan.

Note: Phytosanitary certificates cannot be received online. Paper copies are handed over in person at Plant Protection Stations.

電子申請による輸出入植物検査手続の流れ
Flowchart of import and export plant inspection procedures using electronic applications



※1 NACCS(輸出入・港湾関連情報処理システム)への結果通知(→)は通関申告とのリンクが設定された輸入植物等検査申請の場合
*1 Notification of results sent via NACCS (Nippon Automated Cargo and Port Consolidated System) (→) in the case of an application for inspection of import plants, etc. in which a link has been established to the customs clearance report.

海空港を中心とした全国ネットワーク

Nationwide network of seaports and airports

那覇植物防疫事務所 Naha Plant Protection Station

那覇	Naha
那覇空港	Naha Airport
嘉手納	Kadena
平良	Hirara
石垣	Ishigaki

門司植物防疫所 Moji Plant Protection Station

門司	Moji
下関	Shimonoseki
福岡	Fukuoka
福岡空港	Fukuoka Airport
伊万里	Imari
長崎	Nagasaki
鹿児島	Kagoshima
八代	Yatsushiro
大分	Oita
細島	Hososhima
志布志	Shibushi
鹿児島空港	Kagoshima Airport
名瀬	Naze

神戸植物防疫所 Kobe Plant Protection Station

神戸	Kobe
伊川谷圃場	Ikawadani farm
姫路	Himeji
大阪	Osaka
舞鶴	Maizuru
和歌山	Wakayama
関西空港	Kansai Airport
広島	Hiroshima
広島空港	Hiroshima Airport
境港	Sakaiminato
浜田	Hamada
水島	Mizushima
尾道	Onomichi
岩国	Iwakuni
坂出	Sakaide
小松島	Komatsushima
松山	Matsuyama
高知	Kochi

■本　所(5)　Head Office
■支　所(16)　Sub-station
■出張所(45)　Branch
■駐　在(6)　Plant Inspectors' Office

横浜植物防疫所 Yokohama Plant Protection Station

横浜	Yokohama
つくば圃場	Tsukuba farm
川崎	Kawasaki
札幌	Sapporo
新千歳空港	Shinchitose Airport
釧路	Kushiro
小樽	Otaru
室蘭苫小牧	Muroran-Tomakomai
函館	Hakodate
塩釜	Shiogama
仙台空港	Sendai Airport
弘前	Hirosaki
八戸	Hachinohe
宮古	Miyako
石巻	Ishinomaki
小名浜	Onahama
成田	Narita
東京	Tokyo
鹿島	Kashima
千葉	Chiba
羽田空港	Haneda Airport
新潟	Niigata
秋田	Akita
酒田	Sakata
直江津	Naoetsu

国土交通省 小笠原総合事務所
Ogasawara General Office
Ministry of Land, Infrastructure, Transport and Tourism

名古屋植物防疫所 Nagoya Plant Protection Station

名古屋	Nagoya
衣浦	Kinuura
四日市	Yokkaichi
中部空港	Chubu Airport
伏木富山	Fushiki-Toyama
金沢	Kanazawa
小松飛行場	Komatsu Airport
敦賀	Tsuruga
清水	Shimizu
豊橋	Toyohashi

※掲載の地図は、植物防疫所、支所、出張所及び駐在の位置関係を模式的に表した地図であり、島嶼などは正確に表現されていません。
Note: The map shown here is a rough schematic representation of the locations of the Plant Protection Stations, Sub-stations, Branches and Plant Inspectors' Offices, and is not an accurate depiction of the islands of Japan.

横浜植物防疫所
Yokohama Plant Protection Station

〒231-0003 横浜市中区北仲通5-57
5-57 Kitanaka-dori, Naka-ku, Yokohama 231-0003
TEL: 045-211-7152～5 FAX: 045-211-0611

名古屋植物防疫所
Nagoya Plant Protection Station

〒455-0032 名古屋市港区入船2-3-12
2-3-12 Irifune, Minato-ku, Nagoya 455-0032
TEL: 052-651-0111～4, 0132, FAX: 052-651-0115
052-659-1357

神戸植物防疫所
Kobe Plant Protection Station

〒650-0042 神戸市中央区波止場町1-1
1-1 Hatoba-cho, Chuo-ku, Kobe 650-0042
TEL: 078-331-2806, 2386, 2376, 2384 FAX: 078-391-1757
078-389-5320

門司植物防疫所
Moji Plant Protection Station

〒801-0841 北九州市門司区西海岸1-3-10
1-3-10 Nishikaigan, Moji-ku, Kitakyushu 801-0841
TEL: 093-321-1404, 2601, 2809 FAX: 093-332-5189

那覇植物防疫事務所
Naha Plant Protection Station

〒900-0001 那覇市港町2-11-1
2-11-1 Minatomachi, Naha 900-0001
TEL: 098-868-0715, 2850, 1679 FAX: 098-861-5500

本パンフレットは平成27年4月現在の情報を基に作成されています。
最新の情報については、最寄りの植物防疫所、または植物防疫所ホームページ（http://www.maff.go.jp/pps/）でご確認ください。

This pamphlet was prepared based on information current as of April 2014.
For the latest information, please contact your nearest Plant Protection Station or visit the Plant Protection Station website (http://www.maff.go.jp/pps/).

2015