שאלון מנהלי אוספי הטבע בעבור מיפוי והכרת הצרכים במדינת ישראל בתחום אוספי הטבע הלאומיים

מונתה ועדה מטעם האקדמיה הלאומית הישראלית למדעים אשר תפקידה לבחון את מצב השימור, הטיפוח והמחקר באוספי הטבע הלאומיים.

השאלון להלן מופנה אליך כאל מנהל אוסף טבע אשר יכול לעזור לנו להכיר טוב יותר את הצרכים הללו. מילוי השאלון הינו אחד הכלים החשובים שלנו לזהות מהו הצורך, ונודה לך אם תוכל לסייע לנו בנידון.

השאלון נכתב בלשון זכר מטעמי נוחות בלבד, אך מופנה למנהל ולמנהלת ללא כל אבחנה באותה מידה. את השאלונים המלאים נבקש להחזיר למוסד, לכתובת דרכה קבלתם את השאלון

1. שם המנהל: __ד"ר עינב מייזליש גתי__; מספר טלפון: _03-9683896_; Email: einavm@agri.gov.il_
2. תחום האוסף: __בנק הגנים –משאבים גנטיים צמחיים אוסף זרעים_
3. שם המוסד האקדמי: __מנהל המחקר החקלאי מכון וולקני

אבקשך להכין מסמך תמציתי **באנגלית** (לא יותר מחמישה עמודים) המתאר את האוסף עליו אתה מופקד אנא התייחס לנקודות שלהלן:

1. תיאור מצאי הפריטים באוסף.
2. תיאור תהליכי איסוף פריטים נוספים לאוסף.
3. טכניקות שימור הפריטים (ניתן ורצוי לצרף תמונות).
4. כוח האדם הטכני העומד לרשות האוסף והרכבו של כוח האדם
5. קטלוג ומאגרי המידע הזמינים לחוקרים על האוסף
6. התשתיות הפיסיות העומדות לרשות האוסף.
7. קהילת החוקרים העושים שימוש באוסף, הן מהמוסד שלכם, הן ממוסדות אחרים בארץ ומחו"ל.
8. מדיניות השימוש למשתמשים חיצוניים (דרך הבקשה, זמינות המוצגים, עלויות וכדומה).
9. שיתופי פעולה של האוסף עם אוספים דומים מחו"ל.
10. ארגונים בין-לאומיים בהם חבר האוסף.
11. דוגמאות למחקרים מצטיינים אשר עשו שימוש באוסף- נא לציין מאמרים אשר פורסמו בעיתונות מדעית מובילה ב- 5 השנים האחרונות.
12. אנא הוסף כרצונך על הצרכים ועל נושאים נוספים שהיית מעוניין בהם בהקשר מצב השימור, הטיפוח והמחקר באוספי הטבע הלאומיים.

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תודה רבה על עזרתך הרבה

<u>חברי הוועדה לבחינת מצב השימור, הטיפוח והמחקר באוספי הטבע הלאומיים</u>

פרופ' רות ארנון – יו"ר
פרופ' צבי בן-אברהם – חבר
פרופ' דני וייס – חבר

פרופ ׳ אילן חת – חבר
פרופ ׳שולמית מיכאלי – חבר
מר גדי לוין– מרכז

The Israel Plant Gene Bank (IGB) of the Agricultural Research Organization is the national center tasked to preserve the diversity and genetic resources of the local and regional vegetation. The long-term aim of the IGB is to conserve *ex situ* seeds of wild species, crop cultivars and landraces collected from their natural habitats throughout Israel. The wealth and diversity of plant life in Israel is threatened due to habitat loss caused by intensive urbanization and infrastructure construction, and the rapid transition to modern agriculture based on elite lines with extremely limited genetic diversity. The IGB, located on the campus of the Agricultural Research Organization in Rishon Lezion, serves as a physical repository for plant genetic diversity. IGB facilities allow the collection and long-term conservation of seeds, making them available for current and future research and breeding programs. The IGB is one of the fundamental and critical national operations to conserve the genetic biodiversity of the Israeli flora.

The IGB seed collection

The IGB currently houses more than 30,000 different seed accessions and supplies samples for research, cultivation and ecological conservation.

The collection contains:

- Wild flora of Israel
- Crop landraces of Israel
- Seed depository of researchers
- The national cannabis collection

Wild flora of Israel: Seeds from wild flora are collected from natural populations to ensure genetically diverse samplings. Each species is collected from different populations across geographic, soil and climatic gradients to preserve unique traits. Of the approximately 2600 different wild flora species in Israel, the IGB collection holds XX species in XX accessions.

The conservation mission of the IGB focuses, among others, on the collection of two main groups of plant species with a high conservation priority:

1) Crop wild relatives (CWR) - Defined by the European Crop Wild Relative Diversity Assessment and Conservation Forum as wild species closely related to food

and fodder crops, and by extension, forestry species, ornamental and industrial crops, and other species of socio-economic importance (such as medicinal and aromatic plants), and to which the wild relatives may contribute genetic material. The IGB holds XX% of the 314 different CWR of Israel.

The value of CWR has long been recognized: they are of major importance to agriculture and forestry, both of which have benefited for millennia from CWR genes that confer, for example, pest and disease resistance, drought tolerance, and other advantageous traits currently needed in agriculture around the world. Cultivars of modern crops are genetically uniform, reinforcing the need for wild relatives with the appropriate genetic diversity to develop new resistant and better adapted cultivars. The demand for new cultivars remains high and will continue to be met by obtaining novel genes from wild relatives.

2) The endangered, near threatened and very rare (ENtR) plant species of Israel's flora are listed in the "Israel Red Data Book of Flora at Risk". As part of the INPA (Israel Nature and Parks Authority) program to protect and conserve ENtR species, IGB has expanded its role in their conservation from serving as a depository for *ex-situ* seed conservation. The IGB is now actively involved in whole-plant conservation and the reintroduction of ENtR species back into nature, as well as in propagation efforts. In the past ten years, 1289 accessions belonging to 68% of the species on the Red List were collected and are included in the IGB core collection of endangered and rare species. The germination unit of the IGB has developed 198 new protocols and propagated 87 different ENtR species, producing over 10,000 seeds per propagated sample.

Crop landraces of Israel

Landraces are dynamic populations that evolve over generations from natural and human selection for adaptation to local environments, producing stable yields, and containing extensive genetic diversity and buffering capacity. Over the 20th century, landraces in Israel and all over the world were replaced by a very small number of "modern" varieties bred and grown in high-input industrial farming systems for uniformity, high yield, and suitability for food mass-production. Local landraces that

evolved considerable genetic diversity for adaptability and resilience, as well as high nutrient content and rich and varied flavors, are in danger of extinction.

The IGB holds a unique collection of local landraces that have been collected since the beginning of the 20th century. These were deposited in the IGB, as well as gene banks worldwide, and are now exported back to Israel and provide Israeli and international researchers with access to important pools of traits and genes for better research and breeding in the face of climate change and growing food demand.

Seed depository of researches. Conscious that genetic resources are valuable to current and future generations, we allow **researchers in Israel** to deposit their seed collections at the IGB free of charge and offer different conservation options. This service started in 2016 and already has resulted in a duplicate of XX accessions belonging to XX different research programs and academic institutions, including a duplicate of the cereal inventory of the Tel-Aviv University.

The **cannabis collection** is the newest collection at the IGB. Over the past three years, Israel has begun a program for cannabis medicalization. The program involves the Ministry of Health and the Ministry of Agriculture. Breeding new varieties to meet the demands of medicalization requires genetically diverse varieties that are now available from the IGB for research and breeding of medical cannabis in Israel.

IGB international cooperation

The IGB cooperates with other gene banks around the world and with the Crop Trust. The IGB is a partner of the Millennium Seed Bank (MSB) at Kew Gardens (KG) in the United Kingdom. Within this partnership, the MSB serves as a backup for the IGB inventory, so 10% of each IGB accession is deposited regularly in the MSB. The IGB collects species of interest to the MSB and is part of research projects conducted by the KG team. Every year, the MSB supports the participation of one IGB member in a gene bank management training workshop at the KG.

The IGB cooperates with the Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) Gene Bank, the Slovakian Gene Bank and the Czech Republic Gene Bank on cannabis projects. As part of these cooperative arrangements, the IGB

phenotypically, genetically and biochemically characterizes the cannabis collections of the gene banks and shares knowledge. The IGB also cooperates with the Russian VIR Gene Bank on extinct Israeli landraces, exchanging germplasms and knowledge. The IGB is also member of the European Cooperative Program for Plant Genetic Resources (ECPGR) and the European Search Catalogue for Plant Genetic Resources (EURISCO).

In Israel, the IGB seed inventory is used by several academic institutions for different research objectives: Volcani Center, Hebrew University of Jerusalem, Bar-Ilan University, Ariel University, Tel-Aviv University, Haifa University, and Ben-Gurion University. Botanical gardens, museums, schools and community gardens also frequently use the IGB inventory.

The collection can be searched and ordered from online catalog. Users must sign the Material Transfer Agreement (MTA) of the IGB (available in the website).

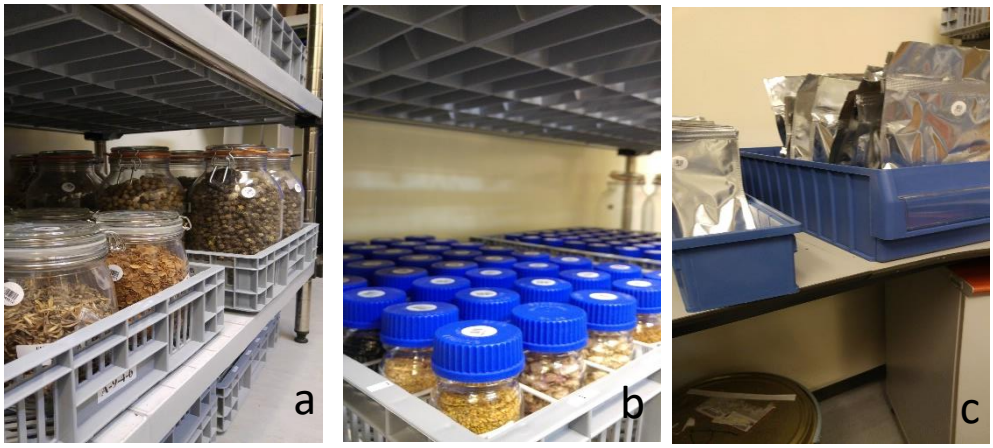
Seed collection and conservation at the IGB

The collection of additional species and populations to include the entire flora of Israel, according to prioritization lists, is a focus of the IGB. The list is evaluated annually, based on the existing inventory and the projects carried out. The IGB database management system was expanded to include a new GPS-based field system. The new system acquires information from the IGB inventory, the distribution map of the target species and the location of the collector botanists. Collectors can locate the species approved for collection on the map and discern the likelihood of finding it according to its predicted distribution.

Old landraces are imported from gene banks around the world holding collections from Israel, mainly the VIR in Russia and the USDA centers in the United States. In addition, the IGB receives seed samples of traditional varieties cultivated in villages throughout Israel. Propagation of these accessions is carried out at the Volcani Center by other research institutes, according to interest and availability.

The IGB uses state-of-the-art technology for seed conservation, including cryopreservation. Each seed sample is cleaned and dried to a 15% moisture content in

special temperature- and humidity-controlled rooms. Each sample is sealed according to its content [wild plant seeds in transparent bottles; landraces, cannabis and researcher collections in aluminum bags; (Picture 1)] and deposited in the IGB vault, underground freezers at -20ºC (Picture 2). The humidity level and temperatures in all conservation facilities at the IGB are monitored and supported by backup systems (Picture 3). System failures are immediately reported by SMS to ensure immediate attention.



Picture 1: Wild plant seeds are packed in transparent bottles (a, b), landraces, cannabis and researches deposit in aluminum bags (c).

Picture 2:

Freezers at -20ºC store the IGB inventory in an underground, secured vault.

Picture 3:

The humidity level, temperatures, and electricity in all IGB facilities are monitored, controlled and have backup systems.

The IGB team consists of research technicians, students, and volunteers. The technicians are PhD, MSc and BSc employees of the Volcani Center, while the students are MSc candidates conducting their research using the IGB inventory under the supervision of the IGB head and IGB researcher. The volunteers include young adults completing their National Service, retirees, and young adults with mental and physical disabilities. In addition, the IGB employs an IT programmer specialist to manage its database and catalog.

The IGB database and catalog system is a multi-purpose database to manage the wild, landrace, modern crops and cannabis accessions. The system administers all IGB units including its seed inventory, cleaning and packing processes, germination examination, data acquisitions from different depositors, and the collection work itself. The system uses PHP and the database is MySQL-based. The online catalog and ordering system has different search and filtering options in both English and Hebrew and is available for users worldwide. The information in the database on each accession includes information on the species, geographical collection area (includes the specific waypoint), soil, and additional botanical and ecological information. Research conducted on germplasm from the IGB inventory is listed and available through the database.