Proposal for Israeli Presidia for:

Traditional Breads from Ancient Wheats

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Israel's breads are as diverse as our multi-cultural peoples, reflecting a colorful tapestry spanning ancient biblical foodways to traditional Mideastern, and today encompassing Sephardic Mediterranean, Eastern European and Ethiopian flavors.

Jerusalem flatbreads in the Machane Yehuda Shuk

Shared by all is the centrality of bread in our food traditions, and a shared heritage of wild and ancient wheats native to the land of Israel - that reach back to the very first wheats that nourished ancient civilization. However today, at least 85% of Israel, Palestine and Jordan's wheat is imported from US megafarms. Our delicious ancient wheats are threatened with extinction. A Presidia to promote Israel's Traditional Breads from Ancient Wheats is a strategy for genetic conservation of indigenous wheats; that will benefit Israel's multi-cultural community of traditional bakers and traditional wheat farmers - who are as threatened as the wheats they steward. Israel's traditional wheat farmers are primarily in Galilee villages such as Sachnin and the Negev Bedouin farmers.


Pita baked in a village near Jerusalem
See: growseed.org/chubez.html

Yiftach, an artisan Israeli baker, forms sour dough whole grain loaves


flatbread baking on the oven walls of Machene Yehuda's Bucharian Bakery

In the traditional farming systems where Israel's landrace wheats evolved, women contributed most of the work, selected seed for planting, process grains, and baked the bread. Yet the gender-specific role and knowledge of women home bakers is almost invisible in the modern food system. .[i] Our project is celebrating and empowering traditional women farmer-bakers, and our indigenous knowledge of baking.

A generation ago, the Arab village in Sachnin, in the pastoral Galilee hills of northern Israel, produced its own wheat using indigenous, drought-hardy varieties. Each morning, the fragrance of fresh bread emanated from almost every home. Today a mere three percent are farmers. Over three-quarters of Sachnin families buy mass-produced white pita bread shipped in from industrial bakeries. Who grows the wheat? It is shipped from the US. Sachnin's loss of local food production and loss of livelihoods echoes throughout the Israeli food system. Rural communities that were self-sufficient a generation ago have lost their livelihoods due to cheap imported, lower quality wheat that replaces our indigenous varieties with richer flavor.

Modern wheat, the most widely cultivated plant on earth, is bred for yield in high-input fields with agrochemical protection. Modern wheat is half the height of heritage wheats, dwarfed to not collapse under unnatural amounts of synthetic fertilizer that increase grain size. But it is an empty harvest. Economies of scale enable industrial wheat to be produced cheaply, but with hidden costs. Taste is not a criteria. Nutrition is forgotten. Heritage wheats' rich flavor and nutritional value are the very qualities bred out of modern wheats, selected for high yield and uniformity.

Modern wheat is bred for uniformity and yield.
85% of Israel, Palestine and wheat today is imported from US mega-farms.

Landrace wheats have been selected by generations of traditional farmers for robust hardiness in rainfed fields and for delicious flavor.

Israel's ancient wheats were not only selected by generations of traditional farmers for plump full seed that clung firmly to the stalk, but were selected for **delicious flavor**. They are rich in full taste with a depth of complex flavors that makes modern bread, even modern artisan baked bread, insipid by comparison. Why? Israel's native wheats are the **oldest strain of wheat to be domesticated**, and are infused with traits from ***wild emmer***.

wild emmer wheat

Wild emmer wheat, (T. dicoccoides), called '**Em Ha'Hitah' ~ Mother Wheat** in Hebrew, the mother of all cultivated modern wheats, is indigenous to Israel. Every Israeli school child knows 'mother wheat'. It grows on the wind-swept hills of the Galilee to the mountains crowning Jerusalem, and up to the plateau of the Golan Heights and Houran plains.[iiiii]

Over millenia of domestication, wheat has slowly lost wild emmer's capacity to accumulate protein, micronutrients, zinc and iron in its grain. [iv] The survival mechanism of accumulating nutrients in the grain enables wild emmer to germinate in uncultivated soil. Wild emmer's complex nutrients in its grain translates directly into extrodinarily rich flavor. From ancient days to today, wild emmer surrounds Israel's indigenous wheat field edges, quietly provides a dynamic geneflow of flavor-rich traits. .[v]

Cultivated emmer (T. dicoccum) was the wheat eaten by biblical Israel, and was the main variety eaten during the period of the Pharohs. Joseph traveled to Egypt for emmer, where it was used for the Egyptian beer and sophisticated breads. The original matzah was made with emmer. Cultivated emmer is known in Jewish folklore recipes to be the best food for pregnant mother, infants and elders due to it easily digestible, high nutritional content rich in micro-nutrients and protein. The main crop for the first 5,000 years of ancient agriculture, emmer spread south to Ancient Egypt and north into Old Europe, where it can still be found in mountain regions, such as Tuscany, Italy, known as '*farro*'. Emmer was significant in Israel until the end of the Iron Age ~ 500 BCE.

The landrace durum wheats that evolved in the southern Fertile Crescent, and Israel, encompasses many, many unique local varieties that can be characterized into meta-populations of: slender, translucent seeded Nursit-types, large seeded, large spiked Jalajuli-types, short, fat spiked Houran-types (also called Hitti or Etti) from the Horan plains[1]. Landraces were selected for stable yield and for flavor. Landraces and modern wheats have been compared for yield, protein and micro-nutrients, and flavor by researchers in Israel. The high grain protein of the landraces can be inversely correlated with its lower yield. Modern breeding of wheat tends to produce higher yields with uniform characteristics, but their baking quality and flavor may not equal the best landraces.[vi] The delicious durum wheat landraces that nourished ancient civilizations are disappearing from the southern Fertile Crescent due to replacement by modern uniform cultivars bred for yield alone, and the critical reduction in wheat cultivation due to inundating imports from the US.[vii]

[1] Kostrinsky, J. (1948): Production of grain crops. Sifryath Hassadeh, Tel Aviv (Hebr.)

See Appendix C. for a: **'Brief History of Wheat in the Land of Israel'**

Ancient Israeli Wheats from Masada

Jaljuli, delicious almost-extinct ancient Israeli wheat

Abundant remains of wheat were found in the 1970s by Prof. Yigal Yadin, translator of the Dead Sea Scrolls, at Masada overlooking the Dead Sea. The grains were stored 2,000 years ago in earthen jars when Masada was the royal palace of King Herod. It is rare to be able to identify archeobotanic material to the level of a specific variety. The shape of the carbonized wheat spine that holds the kernels on and the kernels themselves were identified by archeo-botanist M. Kislev as *Jaluli* and *Hourani*. The fragile remains of *Hourani* and *Jaluli* lay for decades on a dusty shelf, almost forgotten.

Eli Rogosa, organic farmer, artisan baker and director of Israel's **Heritage Seed Conservancy** (growseed.org/isc.html), succeeded in finding living seed of almost extinct *Hourani* and *Jaljuli* wheats by searching in genebanks world-wide, and in the fields of

traditional farmers in remote villages. Seeds were collected by *Nikolai Vavilov*, a reknowned plant explorer who combed the Fertile Crescent in 1926. Vavilov reported[2],

'The Hourani landrace deserves great attention because of its exceptional quality, yield and fine appearing grain. It is distinguished by early maturity, drought resistance and resistance to lodging. As has been shown in our experiment that Hourani's trait-complex is dominant in hybridization with our ordinary Russian wheats.'

Jaljuli wheat has an equally impressive history. The name 'Jaljul' evolved from an ancient Hebrew place-name 'galgul' meaning 'circle of stones'. Galgul (or gilgal) ancient sacred circles are described in the Torah. Joshua and the 12 tribes placed twelve stones in a galgul circle (Josh. 4-5). The ancient Israeli prophets prayed in a galgul (2 Kings 2:1-2). A stone circle galgul is the holy place where Prophet Samuel annointed Saul's kingship (1 Samuel ch. 7 and 11). A village in Israel called '*Jaljulya* is near ruins of a 'stone circle'. *Hourani* and *Jaljuli* grown today in Arab villages are prized for their wonderful flavor.

ISC is coordinating a project that brings together traditional farmers, artisan bakers, especially women home bakers, and the Israel Genebank <igb.agri.gov.il>, the Biodiversity and Environmental Research Center of Palestine <berc.ps> and the Jordan Genebank, to conserve the remaining southern Fertile Crescent landrace wheats before they are lost to the world. A seminar on ' **Restoring Landrace Wheats'** is planned for Oct. 25, 2007. This network will partner with the proposed Presidia, and can include 'parched spring wheat'. A detailed workplan will be submitted on request.

[2] Vavilov, Nikolai. Scientific Basis for Wheat Breeding. Vol. 13 Chronica Botanica, Waltham, MA 1950

APPENDIX

A. Biblical Diet

ארץ חטה ושעורה וגפן ותאנה ורמון ארץ זית שמן ודבש (דברים ח 8)

"“a land of wheat, barley, grapevines, olive oil, fig-tree, pomegranates and date-honey”

Deut 8:8

As the biblical quote reflects, wheat was the primary food of ancient Israel, and to this day is at the heart of a traditional meal. The daily fare of ancient Israel consisted of over one half wheat, supplemented with legumes, such as lentils and chickpeas, olives and olive oil, almonds, figs, dates, pomegranate, wild vegetables (ie: mallow, nettle, mustards, purslane), healing herbs, as well as cultivated garlic, onions, lettuce, beets, chards, native cucumber and melon, with weekly goats cheese or yogurt, fish, egg and wine. Meat was eaten at most four times a year during festivals, and then only by the wealthy. Meals were generally vegetarian, relying on the combination of bread from whole grains, legumes and dairy for protein.

B. Biblical Parched Spring Wheat

Parched Spring wheat was eaten by Ruth in the fields of Boaz

"If you bring a grain offering of the first fruits to the Lord, offer the crushes heads of the spring aviv grain roasted in the fire" Leviticus 2:14

"The day after the Passover, the very day they ate of the produce of the Land, the unleavened bread and the parched grain" Joshua 5:11

~When she glean with the harvesters, Boaz offered her parched grain., Ruth ate parched wheat in the field with Boaz. She ate all she wanted and had sopme left over." Ruth 2:14

Jesse sent young David to food supplies to his brothers fighting the Phislistines, he brought parched grain and bread."1 Samuel 17:17, 25:18;

Parched green wheat is a traditional Israeli way to enjoy early spring wheat. Almost ripe green wheat in the milk stage is lightly roasted for a chewy, slightly sweet product with a savory, taste. Parched grain mentioned frequently in the Bible.

Due to the tight hull encasing emmer wheat, ancient Israelis devised various methods to remove the hull, that include use of a mortar and pestle or by roasting green wheat, then rubbing off the burnt hulls.

The biblical Book of Ruth recounts how roasted green wheat was eaten during the barley harvest. In I and II Samuel, roasted wheat is combined with other dried foods (beans, raisins) that are easily carried. Roasting ripe grains converts the starch into a sweet dextin. Like harvesting sweet corn for roasting, there is a best time to harvest wheat for parching. The stage is when the green grains can be separated from their spike by rubbing between the hands. If it is immature, the grain will collapse. If it is too mature, the grains become hard and doughy. The time for harvest is when the milky endosperm can be squeezed out from a grain.

Before the Roman conquest in 70 CE, green spring wheat was brought to the Temple in Jerusalem, and parched as an offering. The people were required to parch the first fruits of wheat before they ate any. The Talmud explains the methods for parching spring green wheat: '

'They reaped the spring wheat, put it into baskets and brought it to the Temple in Jerusalem. Then they parched the green wheat with fire in order to fufill the precept that it should be parched with fire. The Sages explain that fresh and tender grains were beaten with reeds so the grain was not crushed. Then they put it into a long pot perforated with holes so that the fire would take hold of all of the grains. They then spread out the parched grains in the Temple Couryard so that the wind would blow over it to cool and dry it. Then they put it into a special gristmill that carefully separated off the husks without damaging the tender grain. They removed a tenth of an ephah . What was left over was redeemed and might be aten by anyone. Rabbi Akiva declared that it was liable to the dough offering and to tithes for the poor and hungry.'

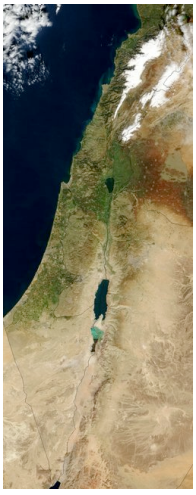
Talmud Menahot page 66a

After threshing, roasted wheat can be enjoyed fresh or bagged for use later. Parched wheat is cooked like rice, traditionally enjoyed for stuffing squash, eggplant, grape leaves or boiling in soups.

Bedouin farmer munching green spring wheat

C. Brief History of Wheat in the Land of Israel

Wheats whisper the journeys of peoples who carried them, the trading and conquests that are kneaded into our breads. Israel's great range of climates and soil types in a small area has given rise to a vast biodiversity of flora and fauna. From the emergence of agriculture from 12,000 years ago, native wild emmer evolved into cultivated emmer with fatter seed. Emmer was gradually selected into looser hulled, threshable durum, the main crop of tradition agriculture in our region.



The land of Israel is a narrow corridor bordered on one side by the Mediterranean and the other side by scorching desert. This corridor, connecting the ancient civilizations of Egypt and Mesopotamia, was for thousands of years a battleground for warring empires and tribes, each bearing wheat varieties from all directions into the land of Israel. During the ~1500 year period from when Joshua and 12 tribes conquered Canaan in 1400 BCE, to the conquest of the nation of Israel by Rome in 70 of the Common Era, Israel developed a sophisticated community food system that promoted 'food equity' on a scale unheard of in the ancient world, through laws of tithing and gleaning for the poor, and 'shmittah' cycles that absolved land debts. The Talmud records an intensive organic inputs of

manures, blood and ashes from Temple sacrifices, crop rotations with three and seven year fallows, and use of fermented manure (compost) resulting high yields. Wheat was transported throughout the region by commerce internally and with neighboring nations, resulting in intensive mixing of regional wheat genepools. After the Roman conquest, by the third century the Byzantine-based Roman Empire controlled the land of Israel until desert Muslim tribes invaded in the mid-7th century. After Crusader invasions 1100-1250, the Mameluk regime destroyed all seaports to prevent future invasions, **indirectly preventing wheat movement**. From that period ten centuries ago, the wheat cultivated in the land of Israel evolved in highly localized micro-climates. The land was sparsely inhabited by small hostile clan-tribes, each living in a territory of defined natural boundaries. Each clan-tribe was at constant war with the others. There was no known interaction between these hostile tribes other than warfare Each depended on the products of their own district, that were cultivated for centuries on the same soils with no outside introductions. This gave rise to **numerous landrace populations with a foundation of rich genetic variability,** specific to localized micro-climates, with early origins spanning northern Africa to ancient Mesopotamia. [viii] From the Crusader period, the region suffered great impoverishment. Trade ceased. The genetically diverse landraces had centuries to stablize traits into localized populations, selected by farmers for locally preferred characteristics, such as shape, color or flavor.

In early 1900s bread wheat varieties were introduced with the wave of British and European Jews who preferred yeasted breads. The favored drought-hardy aestivum variety was **Florence** (White Naples x Fife) **x Aurore** (Ladoga x Jacinth - released 1920 by Vilmorin) introduced via Tunis.[ix] Durum production declined, although the black awned large seeded Zenati Bouteille from Algeria was of some importance. Durum production in

modern Israeli agriculture basically disappeared by the mid-sixties. Israeli markets preferred the T. aestivim varieties most from CIMMYT and crossed with Florence Aurore.[x] In Arab non-irrigated farms, durum was the main wheat for many years more; until bread wheat varieties took over in the seventies. Inbar and Ariel are favorites.[xi]

Almost all Israeli wheat for human consumption, at least 85%, is imported from the US. Flour is milled from mixtures of locally produced and imported lots according to quality testing. Recently some wheat is imported from Germany and East-European countries.

Israeli wheat breeders have not emphasized breeding for quality, as measured by composition of storage proteins. The result is low correlation between wet gluten and protein content. It is highly recommended by the author to initiate breeding efforts for locally-adapted wheats with higher quality for the increasing niche markets of artisan bread.

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[i] Women – preservers and managers of agrobiodiversity. FAO. 1999 <fao.org/FOCUS/E/Women/Biodiv-e.htm>

[ii] Domestication and *in situ* conservation of cereal wild progenitors in the Near East. rdeshir B. Damania. Genetic Resources Unit, ICARDA, PO Box 5466, Aleppo, Syria.

[iii] Anikster, Y. and I. Noy-Meir 1991. The wild-wheat field laboratory at Ammiad. Israel J. Bot. 40: 351-362.

[iv] Gene Regulating Senescence Improves Grain Protein, Zinc, and Iron Content in Wheat

Cristobal Uauy,[1*] Assaf Distelfeld,[2*] Tzion Fahima,[2] Ann Blechl,[3] Jorge Dubcovsky[1]

Science 24 November 2006:_Vol. 314. no. 5803, pp. 1298 - 1301

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2 The Institute of Evolution, University of Haifa, Mt. Carmel, Haifa 31905, Israel.

3 United States Department of Agriculture, Agricultural Research Service, Western Regional Research Center, 800 Buchanan St., Albany, CA 94710, US

[v] Wild and domesticated emmer wheat populations, gene flow and emmer domestication. Luo MC, Yang ZL, You FM, Kawahara T, Waines JG, Dvorak J PS, UC Davis CA, 95616,

[vi] Blum, A. Grain Quality of Landrace Wheat as compared with Modern Cultivars, Plant Breeding 99, p. 226-233, c. 1987

[vii] Phenotypic diversity of durum wheat (Triticum durum Desf.) from Jordan. Rawashdeh, Nasab; Haddad, Nasri1; Al-Ajlouni, Mohamad; Turk, Munir. Genetic Resources and Crop Evolution, Volume 54, Number 1, February 2007 , pp. 129-138(10). Publisher: Springer

[viii] Aaronson, A. Agricultural Explorations of Palestine. USDA Bulletin 1910 No.180

[ix] Arnon I., Raviv M. (1980): From fellah to farmer. In: Problems of Regional Development. Settlement Study Centre, Rehovoth.

[x] Wheat in Israel: history and present status. Sem Y. Atsmon, Ashkelon, retired wheat breeder Hazera, 2007 - Modern wheat lines from CIMMYT-Volcani were released in 1960: Meirav but succumbed to stripe rust within 10 years. Hazera releases include: Cee'on, from II 8474A/F4 Colombia (1967-1978); Mivhor, from II 8156/F4 Mexico (1969-1977) and Hai, from II 18889/F4 Mexico (1971-1976). Yafith (1972-1976) from II 20985/F2 Colombia. In 1986 Dariel, selected from F4 in CH 38212. Hazera-crosses between CIMMYT-lines produced varieties Shafir (1977), Atir (1987), Negev and Galil (1999). The most recent ones are Zahir, Ram and Shoham. The Weizmann Institute program, now part of Agridera, used breeding materials from CIMMYT crossed with Egyptian, Brazilian and even Hazera varieties that include Deganith (1984) but not grown anymore, later releases: Nirith, Gedera, Yuval and Rotem.

[xi]