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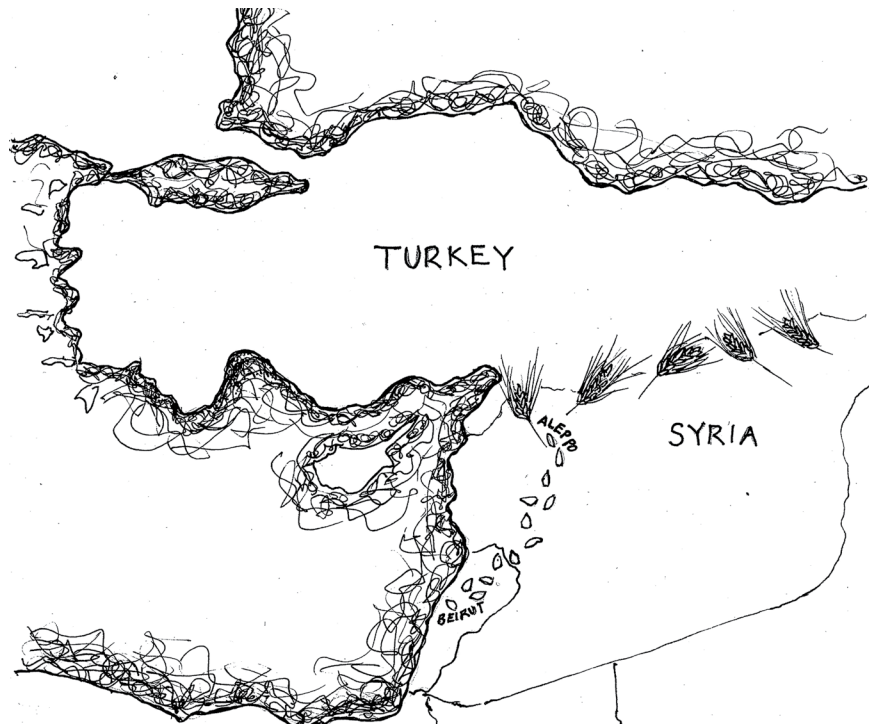
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# Einkorn, Syria, and the Future of Grain

Allison Carafa

Russian agronomist Nikolai Vavilov distinguished centers of origin, identifying where specific crops were first domesticated. Potatoes, pumpkin and cacao were first cultivated in Vavilov's South American Center, for example; buckwheat, cherry, and sugar cane in the Chinese Center; durum wheat, asparagus and flax in the Mediterranean Center. Also known as centers of diversity, scientists have found the greatest variation of genes in both domesticated and wild crops in these locations.

Vavilov determined einkorn's center of origin is on the border of Turkey and Syria- one of the most important locations on our planet for the study of ancient - and future - varieties of grain. But the war in Syria is causing massive damage to these regions, affecting not only our study of how and why these grains were domesticated, but also destroying the unique genetic variety we need to create drought resistant strains that will survive on our warming planet.

The International Center for Agricultural Research in the Dry Areas (ICARDA) is an international organization once located in Aleppo, Syria that researches and develops crop strains for drought prone regions. (Since its inception in 1977, the center has developed more than

900 improved cereal and legume varieties.) The center was located in Syria because of the area's extraordinary diversity of cultivated and wild cereals. In the spring of 2014, three years into the Syrian civil war, ICARDA was occupied by Syrian rebel forces. During their occupation, ICARDA was allowed to continue their research in exchange for food since many men in the rebel forces were farmers from the region and understood the importance of, and even had worked with, ICARDA.

As the situation in the country became more unstable, they eventually moved the operations to Beirut, leaving behind 950 hectares of land and seed. Once there, Syria, through ICARDA, became the first country to ask for a withdrawal

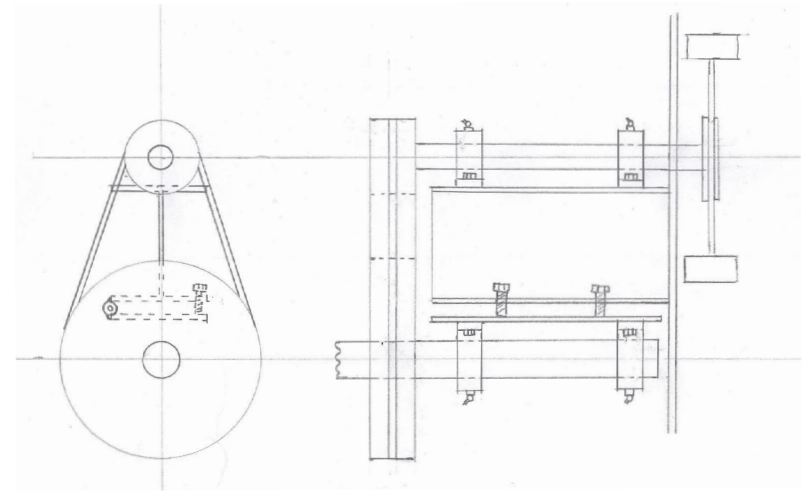
of seeds like wheat, barley, and legumes, from the Global Seed Vault, located on the Norwegian island of Svalbard. Created in 2008, the Global Seed Vault houses almost 900,000 seed samples of at risk plants from around the world, seeking to preserve the genetic material for future use. Once the seeds are stored there, withdrawal is seen as a last resort. ICARDA is in the process of regrowing their research fields and hope to resupply the Vault as soon as they can.

Why is it important to have access to these ancient strains in their original habitat? In order to develop varieties that can survive extreme weather conditions caused by climate change, we need the vast genetic resources that are found in wild crops and farmers fields where these grains have thrived for thousands of years. Within this genetic diversity, we can continue to find important traits that affect yield, quality, and disease and drought resistance.

Although einkorn is becoming trendy due to its ‘untouched’ ancient pedigree, its real allure is what it can tell us about how and why our grains have changed over time, and the value of maintaining landraces. Landraces are genetically diverse, locally adapted, and always evolving, maintained by farmers in their fields (rather than researchers or plant breeders). Farmers select seeds from plants that have desirable traits, like disease resistance, sturdy stalks, or

exceptional flavor. Rather than selecting for one particular trait and thus narrowing the genetic pool, they plant closely related lines together in the field. It’s a kind of farmers’ insurance - if drought, storms, or disease plague the field, some plants will be more resistant than others, and farmers won’t lose the entire crop.

Since einkorn largely fell out of production and missed our industrialized food era, this is how the varieties we have today developed. These genetically heterogeneous and ever evolving strains remind us of the importance of diversity in agriculture, which, as in Syria, can be lost in the blink of an eye.



Nigel Tudor’s design can be adapted to operate off of a tractor’s PTO (power take-off system), shown here.

# Einnovations

Katherine Rapin

Five years ago, when Amish farmer Henry Beiler wanted to start growing einkorn, he couldn’t find a seed supplier. The grain is trickier to grow than modern wheats, produces lower average yields per acre, and, despite its resurgence in the health food community<sup>1</sup>, demand is still relatively low – which means few US farmers are growing it, and even fewer are selling seed.

It was Elizabeth Dyck, farmer, researcher and founder of Organic Growers Research and Information-Sharing Network (OGRIN), who supplied Beiler his first einkorn seeds. She sourced three varieties from the USDA's National Small Grains Collection, a genebank that maintains and distributes a wide variety of seeds worldwide. The varieties were gathered in various places in Europe like Austria, and Bosnia and Herzegovina.

Beiler planted those precious seeds on a small patch of his dairy farm in Watsonstown, PA. By planting just one pound of seed, he harvested about 160 pounds. Over the last several seasons, he's expanded his field to 8.5 acres, integrated the grain into his rotation of hay and feed corn, and now sells the whole grain, milled flour and seed commercially.

Before Beiler grew out these varieties, increased his stock and started selling, it was impossible for farmers in the Northeast to get more than a couple grams of einkorn seeds, says Dyck. Last year, he sold seed to farmers in Maine, Ohio, New York and Washington – enough to grow about 50 acres total, he suspects.

Still, farmers have made slow progress scaling up. "Einkorn is an artisan crop," says Dyck. "It's touchy – you have to learn how to grow it."

Einkorn is especially tall and has a relatively weak stalk, which means it has a propensity to 'lodge,' or fall over in heavy wind or rain fall. (Most modern wheats were dwarfed through breeding in the late 1960s.) Once the stalks are lying flat on the ground, the grain is more susceptible to mold and disease and extremely difficult to harvest.

But einkorn has a superpower, too: given the right conditions, it can employ its extraordinary ability to tiller.

If seeds are sown with adequate spacing and soils have the proper levels of nutrients, namely nitrogen, grasses will produce multiple lateral stems, known as tillers, per seed. As Dyck describes it: "They can send out feelers and say, 'Oh, pretty good – I'll send out a few more shoots!'"

While modern wheats send up 6-8 tillers per seed, einkorn can produce 15-25. And each of those tillers produce seed heads, which means farmers get an exceptionally high yield from each seed they plant. Beiler, an einkorn pro by now, sows 45 pounds of seed and harvests about 2,000 pounds of grain per acre.

And thanks to the innovation of another grain pioneer here in Pennsylvania, einkorn, along with spelt and emmer, has become more cost-effective to process. These three grains are hulled, meaning their tender kernels are

encased in a sturdy husk that requires a machine to remove. (The hulls of 'free-threshing' grains, like bread wheat and naked barley, break free from the grain when harvested with a combine.)

Large-scale dehullers are prohibitively expensive – prices start around \$20,000. And since demand for spelt, emmer and einkorn is relatively low, there are only a few large scale dehullers in our region (one is operated by our friends at Small Valley Milling).

Nigel Tudor, farmer and miller at Weatherbury Farms in Avella, PA, recently designed a more affordable dehuller. With 16 years of metalworking and machining experience, plus a grant from Sustainable Agriculture Research & Education (SARE), he developed a machine that costs about \$13,000 to build. It's a scaled-down version of a German model and it works like this: a sliding gate regulates the rate at which the grain drops from the hopper into the hulling chamber where two tiny hammers spin the grain around a woven wire screen with precisely sized openings. As the abrasion peels off the

hull and the naked grains fall through, an aspirator sucks up the hulls. Though Tudor uses the dehuller primarily for spelt, farmers can use different sized screen to process smaller grains like emmer and einkorn as well.

Elizabeth Dyck is helping Tudor distribute the plans for the machine, which is now being built all over the world. It's a key resource for her new project – 'developing and sharing farmer-generated training and equipment solutions for producing and processing value-added grains,' also funded by a SARE grant. Her goal is to help farmers grow financially and agriculturally sustainable businesses, she says. "This new dehulling system could make crops like emmer and einkorn more profitable."

1. Maybe you've come across the brand Jovial – their einkorn cookies, pastas, crackers, and whole berries are pretty easy to find in health food stores or Whole Foods. From afar, the packaging looks American, which led me to believe there were plenty of einkorn farmers across the country. But this line of 100% einkorn products is made with grain grown 100% in Italy.



# Made Possible in Part by a Unibrowed Greek Man

Sam DeGennaro

When I started working on my recipe for this month's grain share, I had no intention of making bread that anyone would enjoy eating.

I assumed it would at least be edible, and that the novelty of its origins would tickle the fancy of all our dedicated grain nerd subscribers out there. When I set out to develop my interpretation of a 14,000 year old recipe, I didn't expect to enjoy eating it.

Last Summer, Archaeologist Amaia Arranz-Otaegui unearthed what has now been accepted as the oldest piece of bread known to man. The dig site in Jordan is believed to be one of many temporary settlements of a nomadic hunter-gatherer group known as

Natufians. Considering their itinerant lifestyle, this group's dedication to working with wild grains as a labor-intensive source of food has historians rethinking how and why early civilizations constructed permanent settlements and began stewarding early forms of agriculture. Prior to Arranz-Otaegui's discovery, it was accepted that the birth of modern bread came after societies had learned to cultivate grains on a larger, more structured scale and developed systems for milling. Now, the narrative has shifted to show an ancient group of temporarily settled people who foraged for grains, ground them, and baked them, that could have eventually put down permanent roots specifically to make baking bread (among other culinary ventures) an easier task.

In the spirit of all this, I set out to create a rustic and historically accurate flatbread, at least somewhat true to the Natufians. Analysis of the ancient bread revealed two main ingredients - einkorn and starchy tubers native to Jordan. Because of einkorn's finicky structure, the ground tuber would have been added to give the dough more elasticity. To find this bizarre ingredient, I did the only thing someone in my fortunate position could do - consult with my local Alex Bois. We decided the only starchy tuber from that region that lends ample stretchiness is salep, a common ingredient in a traditional, thick Turkish tea-like drink (and the star ingredient in

a very hip ice cream place in Brooklyn, apparently).

The flower from which the tuber is harvested, the mascula orchid, is woefully overpicked in its native Turkey and Jordan. So much so, that it is illegal to harvest them unless from a sanctioned farm. Greece, on the other hand, leads me to believe that they're swimming in these suckers. In fact, the only place I was able to obtain a reliable source of mascula root for salep was from a delightful, unibrowed Greek man on Etsy.

As it turns out, our baker ancestors were onto something. The nuttiness of the einkorn, the sweetness of trace amounts of wild oats and the slight bitterness of the salep balance each other in a way that foraged bread has no business doing. In my research, it was unclear to me whether or not the Natufians had used salt or not, so I threw some in. Any dedication to historical accuracy in this instance is trumped by my desire to eat good bread. So, with starchy tubers from some stranger on the internet and einkorn from our own mill, I humbly present to you Lost Bread's take on the oldest bread you'll ever eat.



## NATUFIAN(ISH) FLATBREAD

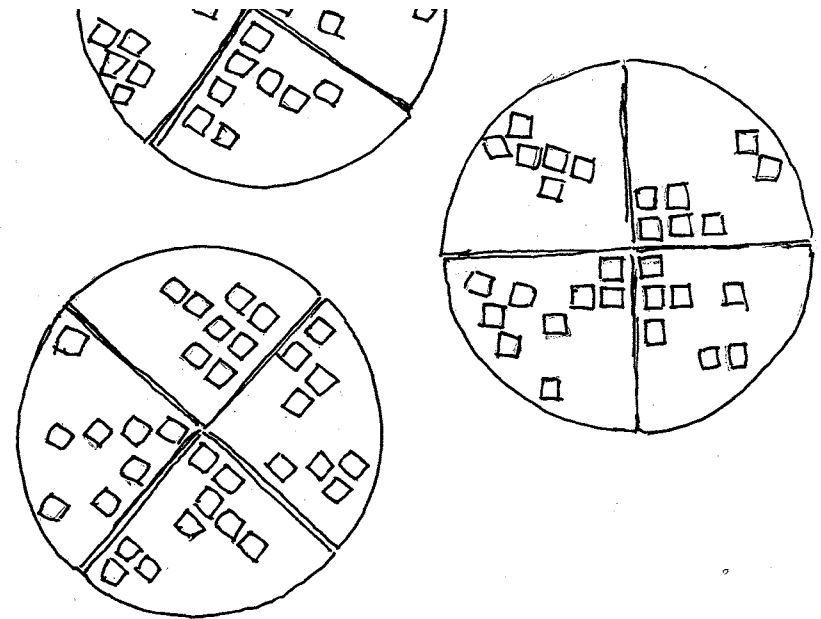
Yield: 5-6

### You'll Need:

450 g Course milled einkorn flour	5 g Salep powder
75 g Course milled oat flour	10 g Salt
315 g H2O	Special equipment: Pizza stone

Whisk salep powder into water (it won't dissolve completely, but should cloud the water up a bit). Add in einkorn flour, oat flour, and salt. Mix by hand until all dry spots are eliminated. Knead gently 2-3 minutes, or until a small amount of elasticity has formed (it will gain more strength and stretch as it sits, don't worry!). Let sit 1 hour at room temp. Preheat oven to highest setting, with a

pizza stone inside. Divide into 150 g pieces. On a bed of einkorn flour, roll or press the dough out into 6 inch circles. Top with a small amount of oil and Maldon salt, and transfer to pizza stone. Bake 8 - 10 minutes.



## EINKORN WAFFLES

Dave Cruz

Makes 4 waffles (180 g each)

### You'll Need:

243 g Einkorn flour	26 g Sugar
290 g Water	2 g Vanilla extract
90 g Egg whites, whipped	4 g Salt
60 g Brown butter	0.5 g Red yeast

Combine flour, water, yeast, sugar, vanilla, and salt; mix until thoroughly hydrated and leave at room temperature to ferment overnight.

Brown butter, cool to just above body temperature (~110F/43.3C); fold into fermented batter and mix well. Whip egg

whites to stiff peaks; fold into batter in thirds to give levity.

Cook each waffle 5 - 7 minutes on a preheated waffle iron, set to medium-high, until GBD. Serve, consume, repeat.

**BONUS: BUTTERED RUM SYRUP**

Dave Cruz

No need to get too tied up on the measurements here - just remember the proportions: 3 parts Syrup, 2 parts Rum, 1 part Butter (and a pinch of salt)!

**You'll Need:**

150 g Maple Syrup

75 g Rum

37 g Butter

0.75 g Salt

Get a pan screaming hot; remove from heat source/kill flame and pour rum into pan - it should not ignite; allow to naturally reduce until it slows, then add heat to further reduce until it no longer emits alcohol.

Add Maple Syrup and at medium heat just bring the syrup to a percolating simmer (just a few bubbles, HOT).

Add butter last and immediately kill heat, add a pinch of salt if desired; stir in until completely dissolved and serve immediately with pancakes, waffles, and/or ice cream.

**EINKORN SPAETZLE**

Patrick Shafer

Serves 3

**You'll Need:**

130 g Einkorn flour

10 g Salt

40 g Milk

2 Eggs

White Vinegar

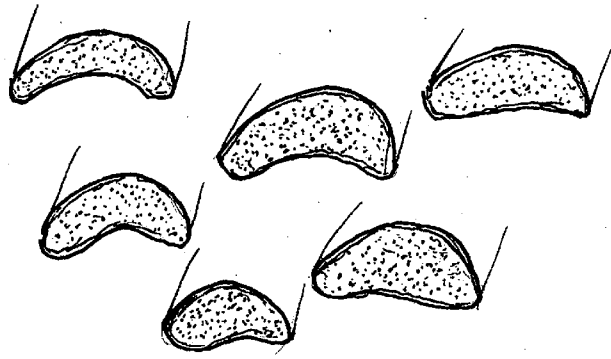
Add flour to a large bowl and form a well in the middle. Sprinkle salt evenly in the bottom of the well. In a separate bowl, whisk eggs and milk. Pour egg mixture into the flour well and stir well with a fork until evenly incorporated.

Bring a large pot of water, plus one small glug of vinegar, to a boil. Set a colander with large holes above the boiling water and add 4oz of batter into the colander. Press batter through the holes with a rubber spatula or wooden spoon. Cook for 1-2 minutes or until all spaetzle is floating and has firmed up. Remove from water and drain. Repeat process until all batter has been used.

**Serving recommendations:**

Have your spaetzle with a thick beef goulash, bright chicken paprikash, or in a hearty vegetable soup. Or, if you're reading this in 18th century poverty-stricken Central Europe, have it with caramelized onions and some stinky cheese.





## RHUBARB CAKE

Deb Bentzel

When cooked, rhubarb's acidic notes melt into a silky tart jamminess we cannot resist. In the same plant family as buckwheat, parts of the rhubarb plant have been used from everything from pies to curing gastrointestinal ailments. Here, we pair it with tender einkorn flour, vanilla and warm spices. Nice with a cup of tea on a rainy spring day, this cake would also not suffer from being paired with scoop of buttermilk ice cream, or softly whipped cream. When choosing rhubarb for this type of baked good, try to find deep red stalks for a shocking pink result.

*Makes two 6" cakes*

### You'll Need:

185 g Einkorn flour	300 g Rhubarb, sliced into 1/2" pieces
140 g Butter, cubed and at room temperature	40 g Butter, small dice (for rhubarb/pan prep)
170 g Vanilla sugar	20 g Vanilla sugar (for rhubarb/pan prep)
112 g Eggs (approx 2 large)	2 g Salt (a small pinch)
73 g Yogurt, plain, whole milk	3 g Fruit pectin (optional)
8 g Salt	
3 g Baking powder	
2 g Cardamom or nutmeg (or combo)	

Preheat oven to 350 F. Butter or grease with pan spray either two 6" round cake pans, or one 9" cake pan. Line pan(s) with parchment paper, and grease the paper as well.

In a medium sized bowl, toss sliced rhubarb with 20 g vanilla sugar and pinch of salt, and pectin, if using. Set aside.

In a large bowl, stir or gently whisk together the einkorn flour, baking powder, spices, and salt.

Using a stand mixer with a paddle attachment or hand mixer, cream the 140 g butter and 170 vanilla sugar together on medium speed until mixture is light and fluffy. Add eggs into mixer on low speed, one at a time, until incorporated. Be sure to scrape down paddle and bowl to thoroughly mix. Mix in yogurt on low-medium speed. Turn speed to low and mix in dry ingredients. Scrape down bowl after ingredients just come together, then mix on low / low-medium speed until batter looks smooth.

Divide rhubarb mixture into two pans (or one, if using larger cake pan). Dot with 40 g small dice butter. Evenly divide cake batter using a scale between two pans (or transfer to larger cake pan). Smooth with a spatula to even out the batter. Tap cake pan(s) a few times on work surface.

Bake at 350 degrees 25-30 minutes for 6" round cake pans, or 35-45 minutes for larger pan.

Remove from oven and place on cooling rack. After 10 minutes invert onto another cooling rack, serving dish or other plate of your choice. Allow to cool to room temperature before serving.

Cake will hold nicely at room temperature up to two days, after which it can be stored in the refrigerator.

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