

Preface

We live in a land of abundance and plenty. Examples of this substantial bounty can be found in various locales, but perhaps no other place highlights our good fortune quite like the sprawling American supermarket. With dozens of aisles, stacked floor to ceiling, loaded with fresh fruits and vegetables, breads and beans, processed and packaged foods, herbs and spices from faraway lands, household products, anything and everything that we may hope to purchase and enjoy, the supermarket has it all. If we approach the grocery store with the eyes of a consumer, we are thrilled by its diversity of offerings. In fact, many consumers have come to expect this abundance, demand it, and are quick to complain to the store's management if the selection available isn't as diverse and lavish as expected.

If we view the market with the eyes of a producer—whether farmer, homesteader, community activist, crafter or artist—we see these aisles of grocery-laden shelves in a very different light. We see the hours of labor spent cultivating, harvesting and processing the crops. We see the daily struggles of the farmer, battling the elements to ensure a fruitful season. We see the processor, crafting raw ingredients into viable commercial products. We see, and are acutely aware of, the sheer amount of resources that are spent, exploited and far too often wasted in a desperate attempt to keep these shelves filled with a myriad of choices, in what too often appears to be an overly aggressive assault on our senses. As if, perhaps, by loading these shelves with dozens of options, countless brands of packages stacked up in neatly organized rows, the store itself is trying to convince us of our wealth. How could we possibly feel insecure or unsure of our standing in the world when we have 24 different brands of breakfast cereal to choose from? But the producer knows better.

Through the eyes of the producer, we see that what appears to be 24 distinct selections to choose from is merely an illusion. Although the choices may have unique packaging with different colors, slogans and mascots, the producer knows that a majority of these products are

just varying ratios of corn and sugar. And in most of these cases, the sugar is likely just high-fructose corn syrup.

While the illusion of choice may appeal to the wide-eyed, eager consumer, those of us with a production-centered state of mind find ourselves quickly disenchanted by this overreaching, almost ridiculous, façade. Farmers, homesteaders, community activists, crafters and artists alike are driven by a philosophy of creation, a true do-it-yourself mindset. We will not, we cannot, just sit back contently and allow others to produce the world's goods for still others to consume, because a system based on unlimited consumption, with limited production, simply cannot sustain itself. And certainly not with the quality that we so desire. When as individuals, or cooperative communities, we commit to a focus on production, creating for ourselves what we can with the resources available to us, this is when we begin to restore balance to a system that has become stretched so thin it can hardly be expected to support us for much longer.

The realities of self-reliance, to any degree, can certainly seem overwhelming, even to the most energetic and inspired among us, but as with any other endeavor worth pursuing, the realization of our goals is well worth the stress, sacrifices and hard work required to reach them. And like any other journey toward self-improvement, the path forward begins with the first step. None of us will see our dreams manifest overnight but only through a continual process of small steps forward, coupled with self-evaluation and continual redirection, always steering ourselves toward our desired destination. Over time, even our destination may change, but each small step forward brings us that much closer to where we wish to be.

My personal journey toward finding a balance between my perceived need to consume and my ability to produce began many years ago. As a practicing herbalist, I was already keenly aware of my consumer-based dependency on goods produced outside of the family homestead. In an attempt to rectify what I saw as an unsustainable imbalance, I committed myself to shifting this perceived need into action. Why purchase what I could create? If I am unable to produce what I believe that I need, do I, in fact, really need it? Or is there an alternative?

To improve upon a system, we must first evaluate its flaws. This doesn't mean that we shouldn't recognize its strengths as well, but this

latter task is generally a far quicker and more comfortable one. Identifying our flaws, be they personal, professional or societal, requires honesty and reflection, and this often leads to realizations that are difficult to embrace. But embrace them we must, if we ever hope to shed this skin of consumerism to emerge as independent, truly sustainable producers.

When faced with these difficult, personally existential questions, I was surprised to find answers in the least likely of all places: the grocery store. I suppose that what I discovered there was not so much direct answers to my questions but the impetus for the train of thoughts that led me to where I now find myself.

As a proponent of local food and a catalyst for positive change, I had long endeavored to scale down and simplify my family's personal food system, growing our own whenever possible and purchasing directly from local producers to supplement our needs. Studying local food systems, I realized that the foundation required by these systems in order to meet the true needs of a community is built upon grains and legumes. These staple crops provide the caloric requirements, and therefore the energy, that a society needs in order to properly function.

The community where I live in central Michigan is fortunate enough to be home to a number of artisan bakers, all skillful and dedicated to their craft. Many of these bakers offer unique breads made from ancient grains such as emmer and einkorn wheats. Some of these artisans source their grains locally, dedicated to the finest flavors that can be achieved only through the freshest ingredients, choosing to mill their own flours for each freshly baked batch of breads.

It was with these artisan bakers in mind, and their devotion to producing the highest quality offerings by milling raw ingredients into viable commercial products with their own hands, that I found myself deep in personal reflection, staring out at the abundance of cooking oils available for purchase at my local supermarket. Just as bread itself has an ancient history, with the first flatbreads being produced many thousands of years ago and leavened breads, those made light and fluffy with yeast, becoming common around 300 BCE, vegetable oils have been a part of human cuisine since antiquity. If producing my own staple crops, such as grains and beans as well as fruits and vegetables, was essential in my quest to avoid needless consumption and

gain greater independence, then by that same logic, wouldn't home-scale production of seed and nut oils be a justifiable venture?

Nearly a decade has passed since the fateful day when I decided to try my hand at artisan oil production, and the task has proven both profitable and rewarding. We've now extracted oil from the seeds and nuts of more than a dozen plant species at Small House Farm, and we've enjoyed these oils in our kitchen and used them in our herbal apothecary as the base of numerous topical wellness products. Our small-batch, expeller pressed oils have been sold commercially through numerous cooperative groceries and health food stores, as well as via our online platforms, and have even earned national awards for their quality.

It's my objective that this book will serve as an instructional guide to not only equip you with the knowledge required to successfully press your own seed and nut oils, perhaps even growing your own oil-seed crops, but to also help you undertake, or continue along, the often challenging journey away from mindless consumption and toward mindful production.

Before we continue, I must revisit my opening analogy, which portrayed the supermarket as a symbol of abundance and plenty. While this certainly holds true, we must acknowledge that this extravagance is a luxury not equally available to all that may wish to partake. Many factors affect this unfortunate situation, including those of socioeconomic inequality, and the fact remains that, indeed, some neighborhoods are devoid of anything resembling a grocery store at all.

Perhaps this somber reality further illustrates my point that whenever possible, with whatever resources available, it is vital that each of us, each individual, family and community, reevaluates our perceived needs, takes stock of our abilities, and pushes forward in every reasonable way to grow our own, produce rather than consume, and to once again regain control of the basic components of life. The quality of our livelihood rests in our own hands; let us use our hands to produce a better world.

SECTION I

Oil Extraction: A Brief History



Olive oil press at Assisi (1676).



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PLANT-BASED OILS, extracted from seeds, nuts and occasionally fruits, have been a fundamental part of the human diet since as early as 6000 BCE. Archeologists have uncovered evidence of olive oil production in ruins discovered in northern Israel that are believed to be around 8,000 years old, while in North America, archeologists from Indiana University have found evidence of hickory nut oil extraction in the remnants of an ancient kitchen presumed to be over 4,000 years old. Residue believed to be oil extracted from brassica seeds has been identified inside shells discovered within an eighth- to tenth-

century church of a Coptic monastery in Egypt, and historic records indicate that brassica oilseed crops had been cultivated as early as 2000 BCE. These oils were vital to the health and well-being of their producers. The dietary fats found in seed and nut oils play a fundamental role in the body, assisting with the proper absorption of vitamins as well as being essential to brain and nerve function.

Aside from the culinary applications, these oils were also used as fuel, most often in lamps, which were the principal source of lighting in ancient times. Before the advent and widespread utilization of kerosene, animal fat and plant-based oils were the predominant choices for lamp fuel. These lamps were much preferred over candles for lighting, due to the extended period of time that such lamps could be burned. One of the most well-known stories involving the use of oil lamps is, of course, that of Hanukkah, known as the Festival of Lights, a Jewish celebration commemorating the rededication of the Second Temple in Jerusalem; and indeed, both the Old and New Testaments of the Bible record multiple instances of the use of olive oil as fuel as well as food.

As a quick point of clarification, relevant and worth mention before we can continue, throughout this book, when referring to oil, I am never referring to mineral oils, crude oil, petroleum or any of its refined, petrochemical components. The obvious focus of this volume is plant-based seed and nut oils, their production and various uses.

These oils were certainly important to ancient religions, as can be evidenced by numerous traditional ceremonies, many of which are still observed today. The ritual act of anointing with oil even carried into secular life, as an honor bestowed upon monarchs and government officials and in some cultures even considered a mark of hospitality offered to houseguests. This is not to imply that topical application of oils was limited to significant moments of celebration or spiritual observation. In fact, various oils, often scented with herbs or flowers, were employed as a treatment for those fallen ill or even to simply mask unpleasant odors.

In the 8,000 years since the first olive was squeezed to release its flavorful, golden essence, the use of oils in food, medicine and for religious ceremony hasn't undergone many notable changes. In kitchens around the world oils are still employed as a medium for cooking as well as to improve the flavor of various dishes. They are frequently utilized as the base of commercially manufactured, as well as household, preparations of topical wellness and beauty products, including soaps, lotions and medicinal balms. And while not as common as the practice once may have been, modern religious ceremonies still make use of oils in many of their rituals. Various oils have proven useful for industrial applications as well, as insulators, lubricants and, of course, as a source of fuel. While oil lamps are certainly not as widely used as they once were, numerous vegetable oils are converted into biofuels, which are then utilized to fuel vehicles, to generate energy for utilities such as heat and electricity, and also for cooking.

While the uses for seed and nut oils have remained somewhat consistent over time, the methods of production have evolved dramatically since the first olives were pressed along the Mediterranean Sea so many years ago. It's likely that the earliest technique to extract oil was what is known simply as the wet extraction method. For this procedure, the seeds or nuts are first hulled, then heated and crushed. Next, the ground seeds are boiled in enough water to suspend the crushed seed material until the oils are coaxed free and float to the surface. The

oils would then be carefully skimmed from the water and heated again, this time in a smaller container, to evaporate any additional moisture. This simple technique requires little equipment, but is quite time consuming and results in relatively low yields.

Another traditional approach to oil extraction, utilized by cultures around the world, although with modifications in mechanics and design, is that of the manual press. This method makes use of pressure for extraction, essentially squeezing the oils free from the seeds, nuts and fruits. Variations of this technique are what we will focus on throughout this book for their efficiency and ease of application for the small-scale producer.

Historians have determined that around 2000 BCE, on the Indian subcontinent, sesame seeds were commonly pressed for their oils using a stone or granite mortar and pestle. Larger versions of this device were constructed, and young bulls were employed to turn the pestle within the mortar, thus crushing the seeds, their oils running out of a small hole at the base of the mortar to be collected.

These machines are known as *ghanis*, and modern, motor-powered models are still widely available, although they remain most commonly used throughout India.

A variation of this technology, still relying upon the principle of applying direct pressure to the oilseed, is commonly known as an expeller press. These machines are composed of a rotating turn-screw, housed within a horizontal cylinder, that gradually increases the pressure on the seed or nut when turned. These machines can be manually operated or motorized, and this category of oil press is the type that we will discuss in most depth in later chapters, it being readily accessible, easy to operate and efficient, while providing the highest yields in comparison with other mechanized oil presses.

A traditional ghani-style press used for pressing peanut oil in India.

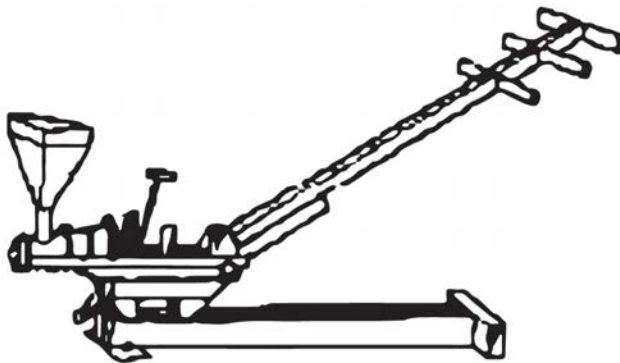


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Alternatively, devices such as a ram press can be used for processing soft seeds such as sesame or sunflower. This machine operates with a piston that is manually forced via a lever into a horizontal chamber, crushing the seeds that have fallen into the chamber from a hopper above. While quite efficient with softer seeds, this type of machines is unable to successfully press hard seeds and can easily be damaged by the attempt.

Another piece of equipment, likely already familiar to the homesteader and farmer, is the cage press. This piece of equipment is a vertical press and is most commonly employed to crush and squeeze the juice from apples, grapes, pears and similar fruits. These machines can be manually operated or motorized, are simple to use and provide good yields. The most notable drawback to this style of oil press is that it operates on a batch system. Only a certain amount of seed can be pressed at a time, and the machine must be cleaned out between each batch to maintain quality and efficient yields, unlike the expeller or ram style presses, which offer continuous operation.

Regardless of the style of extraction equipment used, the oils produced by the methods listed above are considered unrefined, and in cases where pressing occurs at temperatures less than 122°F (50°C), these oils would also be considered cold-pressed. Before we go any further, let's delve into the differences between, as well as the pros and cons of, refined versus unrefined oils, mechanical extraction versus solvent extraction and why cold-pressed oils are considered superior by



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A ram-style oil press.

health-conscious consumers. We should also discuss the processes of bleaching, deodorizing and hydrogenating that many commercial oils go through, if only to emphasize the necessity for small-scale, environmentally conscious and mindful producers.

The extraction techniques previously discussed are considered mechanical extraction methods; that is, the process of extraction relies upon manual or motorized impact, utilizing pressure to remove the oil from the chosen seed, nut or fruit. The resulting oils are considered unrefined, having endured no further processing. Allowed to rest, any particles that remain in the oil will settle, and the final product can then be decanted or lightly filtered before bottling. These unrefined oils have the most pronounced flavor and color and are considered to be of the highest quality. These oils are typically the most nutritious, but, due to the natural resins and minute particles within are best when used unheated and have a shorter storage life than refined oils. These products can then be more thoroughly strained and filtered to remove additional small particles and improve their shelf life. Gently heating the oil first will make filtering more successful. After this additional processing, the oil would then be referred to as “naturally refined,” and



The light color of refined pumpkin seed oil compared to the deep red color of the unrefined oil.

these products tend to have a higher smoke point, making them a better choice for high-heat cooking applications.

Conversely, a great majority of commercial oils are chemically refined. This is a multistep process intended to “purify” the oil by removing any impurities, creating a product with an almost indefinite shelf life. The first step is the degumming process, in which oil is heated and then mixed with either a calculated amount of water or phosphoric acid, depending on the type of oil being refined. The resins present within the oils are thus separated and then removed from the oil, which moves along to the second step in the process: neutralization. This second step, introduction of an alkali, neutralizes free fatty acids and removes the acidity from the oil.

From this point, the oil enters the bleaching process. Here the product is heated to a temperature of 248°–266°F (120°–130°C), and bleaching clay is introduced to remove the color pigments from the oil until it reaches the desired quality oil color for the product. The chemicals are then filtered from the product once this color is reached. The next step is the deodorization process, to remove any odors from the oil. To achieve this, the oil is heated to 392°F (200°C) in a pressurized vacuum as steam is forced through the oil to evaporate any odor-causing substances. After this step some oils, such as sunflower, rapeseed and corn oil, are exposed to the process of dewaxing. This final step is to ensure that the oils remain clean and do not become cloudy when exposed to colder temperatures. To accomplish this, the oils are first heated to 131°F (55°C) and then quickly cooled to 50°–59°F (10°–15°C). Any solids that form during this cooling process are filtered out, and the resulting oil is a clear, odorless liquid.

In addition to the long and arduous refinement procedure, most large-scale commercial oils are processed via chemical extraction, as opposed to the mechanical techniques previously described. This solvent extraction technique most commonly involves the use of petroleum-derived hexane. The oilseed is first crushed or flaked, then blended with the solvent chemical. After the prescribed extraction time, the plant material is removed and the solvent is evaporated from the oil by heating the mixture to a temperature of 300°F (149°C). The resulting oil is then refined as described above. This inexpensive and high-yielding technique has become the most popular and widely used

method of oil extraction, particularly in the manufacture of commodity crop oils such as corn, soybean and cottonseed.

An additional process that some commercial oils are exposed to is known as hydrogenation. This is a common practice with oils extracted from soy, sunflower, cottonseed and olive, among others, through which the oil is blended with a catalyst (typically finely ground nickel) and heated in a large-capacity cylindrical pressure reactor to 248°–370°F (120°–188°C). The mixture is continuously stirred while hydrogen gas is pumped through the liquid, creating a chemical reaction. The final, semi-solid, modified product is considered a hydrogenated or partially hydrogenated oil. This technique is meant to improve the flavor, stability and storage qualities of the oil, but these products are typically considered to be nutritionally inferior and are generally avoided by health-conscious consumers who believe the artificially manufactured trans fats found in these products can adversely affect heart health.

Among the various treatments, chemical and otherwise, that oils are subjected to throughout the refinement process, it's the frequent exposure to high temperatures that may potentially be the most destructive aspect for the oils' nutritional values. While manual extraction methods could never produce the extreme heat that's involved in the refinement process, it is possible for the motorized equipment to reach temperatures above the 122°F (50°C) threshold that defines whether or not an oil can be labeled as cold pressed. Oils that, during production, maintain a temperature below this defining threshold will retain maximum flavor, aroma and nutrients and are considered to be of the highest quality. Expeller presses, which squeeze the seeds through a cylindrical cavity with a turnscrew, or ghanis, the motorized mortar and pestle style machines, although not heated, can reach temperatures of up to 140°–210°F (60°–99°C) due to the intense friction and pressure needed to extract the oil. While cold pressing seeds or nuts may produce the highest-quality oils, the yields are measurably less than what can be achieved by utilizing an expeller-style press. In any case, both of these oil products, cold pressed or expeller, are superior in flavor and nutritional value when compared to their solvent-extracted and chemically refined counterparts.