GQ AGRI

Optimal Temperature Guide for Hot Pressing of Oil Crops

Empowering Small Farms, Transforming Rural Economies.

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Introduction

GA Agri is considered a useful reference material in the determination of the best hot pressing temperature to use on different oil bearing crops. Hot pressing temperature is one of the parameters that severely affect the qualities of oil, yield and consequently the market value of the extracted oil. GA Agri presents useful information on how to make a choice of the temperature, taking into account the peculiarities of different crops, targeted oil quality, and productive limitations. Producers who adhere to the recommendations provided herein can get the best out of their hot pressing processes in terms of high quality of the oil and maximum possible yield.

The Importance of Optimal Hot Pressing Temperature

Hot pressing temperature has a direct effect on the viscosity of oil, activity of enzymes, conformation of proteins and volatilization of flavor compounds. A

fine balance needs to be chosen in selecting the right temperature range. The objective it pursues is to obtain maximum oil recovery without affecting sensory qualities that are deemed desirable, nutritional constituents and oxidative resistance. The properly selected temperature profile is a guarantee of an efficient extraction process, a low level of energy use, and the creation of high-quality oil which will satisfy the needs of consumers and the market that is constantly changing.

Temperature Guidelines for Different Crops

Optimal temperatures are not general and differ considerably relying on the nature of the crop. These are oil content, cell wall structure, fatty acids composition and end-product specifications wanted. The optimum temperature ranges of some of the commonly grown oil bearing crops are given below withshort explanations of such choices:

Crop	Recommended Temperature	Details
Peanut	120° C – 130° C	Balances nutty aroma and optimal oil extraction.
Soybean	110° C – 120° C	Reduces beany flavor while maximizing yield.
Palm Fruit	130° C – 140° C	High temperature boosts fat release from dense pulp.
Coconut	60° C – 80° C (low heat press)	High heat destroys aroma; mild pressing preserves coconut fragrance.
Sesame	120° C – 130° C	Releases aromatic oils effectively while avoiding carbonization.

Sunflower	110° C - 120° C	Ideal for balancing nutrient retention and throughput.
Rapeseed	130° C - 140° C	Reduces bitterness, improves oil clarity.
Sunflower	110° C - 120° C	Balances nutrient retention with efficient extraction.
Almond	100° C - 110° C	Keeps flavors mild and nutrients intact.
Walnut	100° C - 110° C	Low heat preserves delicate flavor and prevents oxidation.
Basil Seed	100° C - 110° C	Requires light heat to maintain volatile aromatic compounds.
Rice Bran	100° C - 110° C	Prevents rancidity from lipase; gentle roast stabilizes raw bran.
Pumpkin Seed	100° C - 110° C	Delivers nutty flavor without darkening the oil.
Safflower Seed	110° C - 120° C	Heat loosens tight oil cells and improves pourability.
Black Seed	100° C - 110° C	Gentle heating preserves thymoquinone and aroma.
Macadamia Nut	100° C - 110° C	Light roast brings out creamy flavor and boosts yield.
Brazil Nut	100° C - 110° C	Careful heat preserves selenium content and flavor.
Pine Nut	90° C - 100° C	Needs delicate handling to avoid bitterness and scorched oil.
Castor Seed	110° C - 120° C	Moderate heat helps release ricinoleic acid without degrading toxins.
Flaxseed	90° C - 100° C	Low heat preserves omega-3 fatty acids and

		delicate flavor.
Tung Seed	120° C – 130° C	Higher temperature aids oil extraction from tough seed coat.
Mustard Seed	110° C – 120° C	Reduces pungency while enhancing oil yield and clarity.
Cotton Seed	110° C – 120° C	Heat inactivates gossypol and improves oil quality.
Corn Germ	110° C – 120° C	Heat breaks cellular walls and releases oil.
Olive	Cold press (<50° C)	Traditional cold pressing retains antioxidants and quality.
Avocado	Cold or low press (<60° C)	Higher temperatures degrade fats and aroma; best cold-pressed.
Shea Nut	60° C – 80° C (low hot press)	Mild heat helps butter release while keeping natural scent.

Impact of Temperature on Oil Quality and Yield

Temperature has a very complex and significant influence on the quality of oil and its yield. It affects many important properties of oil composition and sensory properties:

Nutrient Retention

- **Low-Temperature Range (40 C -70 C):** This is the best range to use when heat-labile nutrients like vitamins (E, K), antioxidants, and pigments are not to be destroyed, thus it is best with virgin and extra-virgin oils (e.g., coconut, olive). The overall output is lower.
- **Moderate-Temperature Range (70 C- 130 C):** A general purpose range and applicable to most oilseed crops (peanuts, sesame, rapeseed), is a balance between nutrient retention and higher oil yields.
- **High-Temperature Range (>130 C):** Applied primarily to high-oil-content seeds (palm fruit, cottonseed), where maximum yield is the objective, but where labile nutrients, especially polyunsaturated fatty acids can be destroyed.

Development of Flavor Profile

- **Ideal Temperature Ranges:** Every crop has an ideal temperature range in which flavors will develop best (e.g. nuttier smell in peanut oil, aromatic compounds in sesame oil).
- **Temperature Abuse:** Overheating produces off-flavors (bitterness, burnt notes),

decreases sensory quality and market acceptability.

Oxidative Stability

- **Indirect Effect:** Best pressing temperature reduces thermal decomposition of natural antioxidants that leads to a "more stable" oil with better shelf life.
- **Post-Pressing Stability:** Regardless of the pressing temperature, appropriate post-pressing storage (nitrogen flushing, opaque containers) is important for

oxidative stability.

Yield Optimization

- **Temperature and Oil Recovery:** Higher temperatures result in higher oil recovery because they lower oil viscosity, weaken cell walls and deactivate enzymes.
- **Optimal Temperature Range:** Each crop has an optimal temperature range for highest oil recovery with no quality issues.

Market Value Proposition

- Premium Segment (Low Temperature Oils) Oils with nutrient retention and flavor premium pricing, positioning for health consumers.
- Mainstream Market (Moderate Temperature Oils) Quality traits balanced with yield and cost-efficiency for mass consumption.
- Commodity Segment (High Temperature Oils) High temperature vegetable oils may have high yields but low market appeal for quality traits, as high temperature may cause more nutrient losses and flavor changes.

Practical Implementation Considerations

To get the best temperature control at industries, it is essential to consider some of the operating factors carefully and be flexible enough to accommodate a particular situation:

- **Crop-Specific Calibration is Key:** Calibrate temperature down the crop. Depending on the crop, think about the oil content, cell wall hardness, and characteristics of the oil (flavor, nutritional profile).

- **Equipment Capabilities and Limitations:** Purchase pressing equipment that offers temperature control accuracy. Know the temperature range and temperature accuracy of your equipment. Maintain and calibrate your thermocouples and heating elements.
- **Process Monitoring and In-Process Adjustments:** Monitor the pressing temperature. Implement in-process quality checks such as: Visual observation of the oil clarity and odor, and be prepared to adjust the temperature and/or pressing parameters as necessary to achieve consistent quality.
- **Environmental Conditions:** Temperature and humidity in the processing facility play a role in the heat transfer process and pressing efficiency. You may not be able to influence the ambient conditions outside the press, but it is important to be mindful of them, particularly in a facility without climate control. Attempt to maintain consistent environmental conditions in your processing area in the facility if possible.

- **Production Goals and Trade-offs:** Know your production goals. Are you aiming for the highest possible yield or higher quality oil? There will be trade-offs. Higher temperatures will typically provide higher yield, at the expense of quality. Lower temperatures will enhance quality at the potential expense of yield.

Conclusion

Choosing the best hot pressing temperature can be a challenge as the temperature has a direct impact on oil quality and yield and must be thoroughly weighed against crop characteristics, production goals and equipment capabilities.

By first clearly defining the oilseed crop, the quality attributes of the oil, the production volume goals, and the specific equipment being used, producers can use the temperature ranges provided as a guide. By conducting pressing trials, carefully documenting the oil quality and yield results, making adjustments and repeating the process as needed, producers can determine the temperature point

that works best for their specific equipment and production conditions. This process will also help improve oil quality and yield, giving producers a better competitive edge in the market. Therefore, it is important that producers closely monitor the production process, ensure the temperature band is accurately and consistently maintained on their equipment, and strive to constantly provide high-quality oil products that meet consumer expectations.

About us

GQ Agri specialize in providing a comprehensive range of oil press machine solutions tailored to diverse operational needs. With extensive experience in the oil processing industry, we understand the nuances of selecting the right oil press to maximize your efficiency and product quality.

And even if you are new to the oil pressing business or are not absolutely sure what would be the best pressing temperature to use with the currently gathered crops in your area, you can always inquire with us and we will perform a free technical analysis of the situation and give you our expert opinion.

If you have further questions, require a detailed analysis for the best oil press for your raw material, or need personalized guidance on how to choose oil press machine, please contact us. Our team of experts is ready to assist you with professional advice, reliable equipment, and dedicated after-sales support, including readily available spare parts for your oilseed oil press machine.