DISCLAIMER: Many factors contribute to water quality from rainwater harvesting systems, Prestige Timbers, Inc. and any distributors of the Royal Wallaba Wooden Roof and Sidewall Shingles do not hold themselves out as water quality experts. The following compilation of studies is intended as a guide and general information. Contact your local water treatment expert for recommended rainwater harvesting systems.

The conservation of potable water supplies is of increasing importance throughout the world. Rainwater harvesting offers an important source of potable water without reliance on external water reserves. The following informatic compiles data on the safe use of rainwater harvested from Hardwood shingle systems.

Rainwater Harvesting Suggestions on Wallaba Hardwood Surface

- Wallaba contains natural tannins which aid in its fire, mold, and rot resistance. Immediately after installation and a primary rinse off rainwater runoff is within guideline levels of sediment, nitrogen, and heavy metals.
- A seasoning period of 4-6 months after installation to avoid colored water or undesirable taste is highly recommended.
- Use of an NSF/ANSI 42 Standard filter is highly recommended. Preferably use of an NSF/ANSI 53 or NSF/ANSI 58 Standard filter for any Rainwater Harvesting system.
- Local conditions and rainwater quality contribute heavily to the pollutants present in water collected through rainwater harvesting. Site assessments and tests should be considered prior to use of harvested water.

Concerns of Rainwater Harvesting

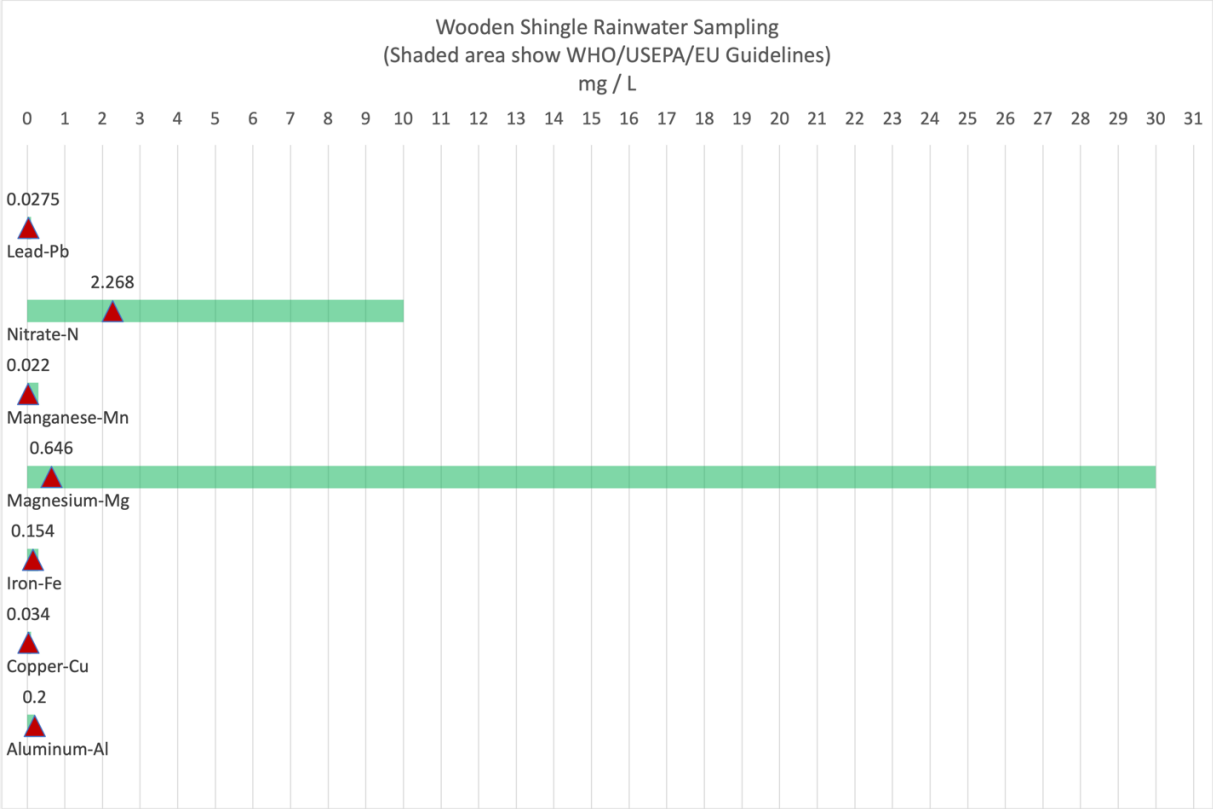
All roofing material contribute dissolved and particulate matter to roof runoff water due to product weathering and chemical and physical reactions occurring between the rainwater and the roofing materials (Förster 1999; Despins et al. 2009; Zobrist et al. 2000).

Results of Wooden shingles in Rainwater Harvesting

Studies have confirmed that nitrate, sulfate, lead, iron copper and other heavy metal levels from rainwater collected from wooden shingle roofs were all below the European Directive, United States Environmental Protection Agency, and World Health Organization guideline levels, see table 1 (Lee et al. 2012). Due to the natural wood tannins a seasoning period of between 4-6 months allows significant

reduction of tannins present in rainwater collected. Additionally, Evidence supports the continued use of first flush and filtration to improve water quality in all rainwater harvesting systems. (Id.).

Table 1.



Local environmental factors contribute heavily to overall water quality no matter the roofing material used (Yaziz et al. 1989; Lee et al. 2010; Despins et al. 2009; Huston et al. 2009). Proper evaluation of rainwater quality is therefore recommended in all harvesting systems, particularly in metropolitan zones (Mendez et al. 2011). While studies indicate that Wallaba Shingles are suitable for rainwater harvesting system use, proper consideration for the local conditions and the totality of the harvesting system must be made.

Treatments and other considerations

While roofing material alone may be safe, Water contamination is not limited to the roofing material. Important consideration must be given to the treatment process to produce water of suitable quality for potable and nonpotable uses. Potential treatment includes both pre-storage and post-storage tanks.

Pre-storage treatment options include First flush Diversion and filters installed before the storage tanks of the rainwater harvesting system.

First Flush Diversion involves the roof surface being flushed (rinsed) periodically and after prolonged dry conditions where the runoff bypasses the storage tank. It is widely accepted that first flush diversion can significantly improve the quality of collected rainwater (Abdulla & Al-Shareef 2009; Kus et al. 2010; Despins et al. 2009; Abbasi and Abbasi 2011; Mendez et al. 2011; Meera and Ahammed 2006). Diverting the first flush can retard the buildup of particulates and sediments within storage tanks, prevent odor and aesthetic problems (e.g. coloration, visible organic matter) and improve overall water quality (Lee et al. 2010; Abbasi and Abbasi 2011). It is also highly recommended as a method for decreasing the concentrations of pesticides and other organic compounds that enter the storage tank (Zhu et al. 2004). It is recommended that a depth of 0.5 to 2mm be used on the roofing surface (Abbasi and Abbasi 2011).

Debris screens and filters can be used between the roof surface and the storage tank to prevent particulate matter (and contaminants adsorbed in particulate matter) from entering the tank (Abbasi and Abbasi 2011). Most debris filters include a coarse filter to exclude leaves, pine needles and other large debris, as well as a fine screen to exclude smaller particulates. Regardless of filter style (self-cleaning, basket-shaped, etc.), the following characteristics are recommended to maximize the effectiveness of debris screens when employed by a rainwater harvesting system:

• Filter should be easy to clean or largely self-cleaning,

• Filter should not clog easily and clogging should be easy to detect and rectify, and

• Filter should not provide an entrance for additional contamination (e.g. corrodible materials, openings large enough to allow animals to access the system. etc.).

Finally, Post-storage treatment can consist of in-line sediment filters on pumps, slow sand filtration, clariflocculation and/or disinfection. Particle filtration (sediment filters, sand filtration, other types of filters), have been shown to remove particulates and heavy metals and improve turbidity (Despins et al. 2009). As a result, we recommend filters which meet the NSF/ANSI 42, 53 or 58 standards. Additional treatment options include adding flocculent to storage tanks as well as disinfection systems. These methods should be reviewed with your rainwater harvesting system expert and water treatment expert for evaluation of applicability.

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