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CONTENTS

Abstract. Background: Tree pits are urban green infrastructures in paved areas. But tree roots and flares, especially of larger trees, may come into conflict with pavement, resulting in tree health decline and repair costs. This study aimed to (1) establish allometric relationships between diameter at breast height (DBH) and trunk flare diameter (TFD) of common urban tree species, and (2) identify factors affecting the presence and magnitude of protruding roots and flares. Methods: The terms "protruding roots" and "protruding flares" were strictly defined as roots and flares reaching or exceeding the border between the open soil and the adjacent paving material. The study surveyed 1,100 trees of 14 species planted in tree pits in Chai Wan, Hong Kong. Results: DBH was a significant predictor of TFD but was less significant when trees with protruding roots or flares were considered separately. In most logistic models, DBH was significantly and positively related to the odds ratio of the occurrence of protruding roots and flares. Overall, a centimetre increase in DBH brought 1.049 to 1.114 times higher likelihood of protruding roots and flares. Multiple regression suggested that for every square-metre increase in the open soil area in tree pits, the maximum length of protruding roots and flares increased by 0.154 to 0.172 m. This relationship could be attributed to the underlying association between DBH and open soil area. Species-specific regression results were tabulated to allow more accurate estimation of protruding roots and flares. Conclusion: For urban planners and pavement engineers, the approach recommended in this study could be adopted to optimise urban greening and pavement design.

Keywords. Pavement Damage; Protruding Roots; Tree Care; Tree Pit; Trunk Flare; Urban Green Infrastructure.

Abstract. Background: Chain saws are a primary piece of equipment in arboriculture. Sharpening of chain saw chains is important to the chain saw's continued efficient cutting power. Analyses of chain saw sharpening procedures can influence efficiency and sustainability in arboriculture. Previous research has examined mechanical aspects and variability of chain saw chains; however, a knowledge gap exists regarding sharpening methods relating to operational efficiency. Methods: Chain saw chains retired from operational service were submitted by 132 arboriculture crews from 47 companies across a 6-month period. The research team reviewed 640 chain saw chains to determine whether the functionable lives of the chain saw chains had been exhausted. If the functionable life was not exhausted, the remaining functional life of the chain was documented. To analyze the accounting cost and economic cost of sharpening versus purchasing new chain saw chains, an economic model was created with variables from chain saw chain manufacturers and geospatial data. Results: Of the submitted chain saw chains, 77% ($n = 493$) were retired before their functional life was exhausted. The mean number of additional times that the chains could have been sharpened was 4.54 more times ($\sigma = 2.22$). Per the economic model, accounting costs of purchasing new chains were 3.64 to 4.96 times more expensive than sharpening chains in-house. The economic cost of purchasing a new chain was generally 1.83 to 3.74 times more expensive than sharpening chains in-house. Conclusion: This study demonstrates that the functional service life of chain saw chains are frequently not exhausted and that purchasing chains has higher accounting and economic costs than sharpening chains in-house.

Keywords. Arboriculture; Business Decisions; Cutter Teeth; Sharpening Techniques; Urban Forestry Management.

Abstract. Utility vegetation managers need tools to predict tree-related risks and knowledge of the necessary management prescriptions to reduce the risk of windthrow damage to utilities' electrical infrastructure. This review focuses on key studies involving the likelihood of failure of trees, beginning with a description and discussion of failure in trees, followed by an examination of methodologies that have been used to assess tree failure, before concluding with a review of factors which have been found to influence tree failure. Ultimately, a better understanding of the likelihood of failure of individual trees and the relationships governing tree failure and vegetation-related outages may allow for significant advances in the risk management of utility infrastructure.

Keywords. Likelihood of Failure; Urban Forestry; Utility Forestry; Utility Tree Risk Assessment; Utility Vegetation Management.