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TOPOCLIMATIC CONDITIONS AS FACTORS, INFLUENCING ON THE OLIVE GROWING IN THE MUNICIPALITY OF PIRAN

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ABSTRACT

The author analyses and evaluates the influence of the selected physical geographic factors on olive growing in the Municipality of Piran. The spatial distribution of olive groves in the area in relation to the chosen relief factors (elevation, slope and aspect) has shown that most of the olive groves are situated at the sites classified as very suitable for them: 98% in the elevation zone up to 250 m a.s.l., almost 40% on slopes with less than 20%, while almost 60% of the groves are situated at southern and south-western aspect sites. The answers given by the questionnaired olive oil producers have furthermore pointed out a certain impact of the olive grove aspect on crop size and frost threat. This, however, is difficult to define, considering that olive growing is influenced by many different factors, such as olive age and variety, as well as agronomic factors, e.g. olive grove cultivation.

Key words: olive growing, Municipality of Piran, GERK, frost, elevation, slope, aspect

CONDIZIONI TOPOCLIMATICHE QUALI FATTORI INFLUENZANTI LA CRESCITA DI OLIVI NEL COMUNE DI PIRANO

SINTESI

Gli autori analizzano e valutano l'influenza di determinati fattori fisico-geografici sulla crescita degli olivi nel comune di Pirano. La distribuzione spaziale delle piantagioni di olivi in relazione ai fattori topoclimatici prescelti (altitudine, inclinazione ed esposizione della superficie) ha evidenziato che gran parte delle piantagioni è situata in siti classificati quali molto idonei: il 98% dei quali in zone fino a 250 m s.l.m., almeno il 40% in zone con inclinazione inferiore al 20%, e quasi il 60% delle piantagioni è situato in siti esposti a sud e sud-ovest. Le risposte al questionario fornite dagli olivicoltori hanno inoltre evidenziato un determinato impatto dell'esposizione delle piantagioni sulla produttività annuale e sul rischio di gelate. Tale impatto è però difficile da definire e quantificare, considerando che la crescita degli olivi viene influenzata da diversi fattori, quali l'età e la varietà dell'olivo, nonché da svariati fattori agronomici.

Parole chiave: crescita olivi, comune di Pirano, GERK, gelata, altitudine, inclinazione, esposizione

INTRODUCTION

The article focuses on olive growing in the Municipality of Piran, comprising the chosen relief (physical geographic) factors. It presupposes that in respect of physical geographic factors, the Municipality as part of Slovene Istria constitutes an area where the olive-growing conditions are favourable. Based on these assumptions, the article has the following two main goals:

- to present the spatial distribution of olive groves as a category of land use in the Municipality of Piran in relation to the selected relief factors;
- to evaluate the impact the olive grove aspect has on crop size and frost threat.

Physical and social geographic factors influencing olive growing

Olive is a Mediterranean tree, thriving especially in the Mediterranean climate regions, known for their warm and dry summers and mild and wet winters (Vesel, 1998). In Slovenia, olive tree regions correspond with the sub-Mediterranean climate. Slovene Istria is the principle olive tree region in Slovenia (98% of all olive groves in Slovenia are found here), followed by the region of Goriška Brda Hills and the Vipava River valley with only 2% (Ogrin, 2004). The total surface of olive groves in Slovenia is estimated at about 1,561 ha (Bandelj Mavsar *et al.*, 2008). Considering Slovenia's geographic position, bearing in mind its latitude (45-46°N), the olive groves here reach their northernmost position, thus being endangered especially by winter frosts (Ogrin, 2004).

We estimate that the following physical geographical factors predominantly control olive growing in Slovenia:

- Temperature: in Slovenia, minimal winter temperatures represent the most obvious limit (Ogrin, 2002), being influenced also by the high air humidity and frost duration. Olives are more vulnerable to frost when the latter lasts longer and the air is more humid.
- Precipitation: Although the olive is considered to be adapted to the rainfall shortage, it can be prone to the lack of water during and after the blossoming (in May and months after), but also while forming its stone (July). A sufficient amount of water is needed also in autumn for cell forming and ripening (Vrhovnik, 2007).
- Wind condition: A gentle breeze is a favourable condition during the blossoming and ripening of the fruits, as it speeds up the pollination. On the other hand, strong dry winds can severely damage the trees situated at more exposed locations (Sancin, 1990).
- Daylight: In Slovenia, this factor does not present a serious limitation to olive growing, since the Slovene littoral and its nearby hinterland cover the areas receiving the highest amount of solar radiation in the country (Gams, 1998).
- Rock (soil) type: A hard, humid, clayey soil is less favourable for the olive tree, as it can suffocate its roots as a result of the lack of oxygen (Sancin, 1990).

The present article focuses on the topoclimatic geographic factors, such as relief elevation, slope and aspect. Since air temperature is controlled by the elevation, the latter is a very important influencing factor on olive tree growing in Slovenia. In the littoral area, air temperatures decrease towards the hinterland. One of the reasons is the Adriatic Sea, being 2°C warmer than the surrounding air on the yearly average (Ogrin, 1995).

The olive growing in Slovenia is also influenced and controlled by the social geographical factors. The most recognizable and important among them are (Bandelj Mavsar *et al.*, 2008):

- plots of land are small; as the estimated average size of an olive grove is less than 0,5 ha, they are less appropriate for more intensive agriculture;
- plots are very fragmented;
- administrative matters regarding land registers are mostly unregulated;
- many of the plot owners reside abroad;
- olive oil is not as interesting market product as wine;
- high costs of setting up olive groves, especially in steep terrain;
- insufficient financial aid for laying out new olive groves.

A geographical overview of the Municipality of Piran

The municipality of Piran, which covers some 45 km^2, is situated in the south-westernmost part of Slovenia. Its population is almost 18.000, with the majority living in the towns (Razvojni program podeželja za območje občin Koper, Izola in Piran, 2006). The municipality is divided into 5 cadastral units: Portorož, Piran, Sečovlje, Raven and Nova vas (3MAP, 2008). Together with the Municipalities of Izola and Koper, it forms the geographic unit named Slovene Istria (Ogrin, 1995).

According to the climatic criteria, the biggest part of the Piran Municipality is situated in the littoral zone (Ogrin, 1995) to the height of 200–250 m. The area is influenced by the Adriatic Sea, which lowers temperature extremes both in the winter and summer periods. Thus, the conditions for olive tree growing are highly suitable, as the winter or early spring frosts usually do not pose a serious threat to them. However, they can be subjected to strong winds (bora, jugo) (Ogrin, 1995).

The leading economic activity in the Municipality is tourism with fishery being the supplementary branch, as well as salt production and agriculture. The area is well known for its Mediterranean vegetable cultures, olives and vine (Razvojni program podeželja za območje občin Koper, Izola in Piran, 2006).

MATERIAL AND METHODS

To achieve the goals stated in the introductory part, we used two main methodological tools. Firstly, we used the GIS (Geographic information system) to assess spatial distribution of olive groves in the Municipality of Piran in relation to the relief-topoclimatic factors: elevation, slope and aspect. Secondly, questionnaires were carried out to examine whether the olive grove aspect has an impact on crop size and frost threat.

The slope basically tells us how steep a defined area is; it is a quotient between height change and distance between two chosen points on the surface. When this quotient is multiplied by 100, we get the slope incline in %. The aspect tells us the direction faced by hill slopes. It has a major impact on how the relief is exposed to the daylight. The aspect is classified according to the cardinal points (N, NE, E, SE, S, SW, W, NW), with each of them containing the degree interval of 45 (by ArcMAP, 2008) *(e.g.*, 0–22.5° and 337.5–360° for north direction, 22.5–67.5° for northeast, 67.5–112.5° for east, 112.5–157.5° for southeast, 157.5–202.5° for south, 202.5–247.5° for southwest, 247.5–292.5° for west, and 292.5–337.5° for northwest).

The groundwork of the map was represented by the following layers:

- Piran municipality vector map, consisting of outline borders, major towns (points) and water resources (obtained by GIAM, 2007);
- Piran municipality Digital elevation model (12,5 m) (obtained by GURS, 2007);
- GERK (The Registry of the husbandries) olive grove stats as a category of land use (obtained by MKGP, 2008).

Each of the relief factors was classified into three quality ranks or positions, theoretically determining the conditions of the olive grove (Tab. 1).

Tab. 1: Quality ranks of the chosen physical geographic factors.
Tab. 1: Kakovostni razredi izbranih naravnogeografskih dejavnikov.

Positions \ Factor	Elevation (m)	Slope (%)	Aspect
Very suitable	0–100	0–20	S, SW
Medium	100–250	20–30	W, SE
Less suitable	above 250	above 30	E, N, NW, NE

The quality positions were stipulated according to the prevailing literature sources. The elevations up to 250 m are usually the highest where the conditions for olive trees are still optimal (Lubi, 2001). In general, we estimate that lower elevations are more favourable for olive trees, although olives can be exposed to temperature inversion at very low elevations (Ogrin, 1995). We also estimate that steeper slope makes the conditions for olive cultivation harder and more expensive (Jančar *et al.*, 2002) in terms of agricultural engineering. The classification of the aspect ranks is based on the solar radiation level table (Gabrovec, 1996), by which the southern and south-western positions are characterized as the most sun-exposed ones, whereas the northern positions are the least. The eastern positions are mostly subjected to the strong and cold winds (bora) and are thus considered less appropriate for olive trees, even if they are south-orientated (Lubi, 2001). The trees on south-eastern positions are exposed to sun rays for most of the day, which is fairly favourable, but can warm the trunk and branches, causing earlier sap circulation before the vegetation starts. This, however, can be fatal in the event of frost. Olive trees located on western and also northern positions are, by contrast, subjected to lower temperatures. The later start of their vegetation period makes the trees more resistant to frost (Lubi, 2001). As a result, a category of south–eastern positions was recognized as the middle quality rank.

Questionnaires

34 olive oil producers in the Municipality of Piran were included in the survey carried out with questionnaires. The idea was that the survey sample should cover different olive grove aspects (positions) as specified above. The respondents' contact addresses were provided by the MKGP. However, the list of olive oil producers in this register is not complete, since only the owners who have voluntarily subscribed to the national husbandry register (GERK) are listed. Regarding this fact, the survey took into account only about one third of the total olive groves surface in the investigated area. Nevertheless, the register provides good information on the aspects, slopes, olive groves age and plant numbers of the particular groves. While making sample list of the olive oil producers regarding the aspect classification of their olive groves, we took into consideration that each aspect category (very, medium and less suitable) has an adequate number of respondents. However, the investigation revealed that the number of respondents as owners of olive groves characterized as "less suitable" in the survey was not adequate. Some respondents from the Municipalities of Izola and Koper were thus included into the survey.

Phone interviews with 34 respondents were made, revealing that a half of the olive oil producers possess olive groves that lie fully in a single aspect category. The other half have their olive groves located in different quality positions (with different aspects). For example, one farmer has an olive grove on the southern (very suitable) as well as on the eastern (less suitable) position. This group (Group 2) is to be discussed separately from

the former (Group 1) and it is to be later put into the following categories of aspect quality or suitability: less, middle and very; less and middle; middle and very; less and very suitable.

The questions, which were of open type, were as follows:

- estimate of the average yearly crop size in kg per tree;
- for the farmers with olive groves on different quality localities (aspects): do they estimate that the yearly crop size differs according to the grove aspect and why, how do they rate the impact the aspect has on the crop size;
- the previous experience with frosts, their degree and damage;
- remarks (about grove cultivation, etc.).

Question type and a great diversity of answers provided almost no chance for a serious quantitative analysis, but some summarized results were nevertheless obtained.

RESULTS

Map of spatial distribution of olive groves in the Municipality of Piran

According to the MKGP (as of November 2007), the Municipality of Piran encompasses approximately 414 ha of olive groves. The majority of them are found in a belt extending in NW-SE direction from Seča to Parecag. Note also the zone above Lucija and south from Strunjan. The eastern part of the Municipality is higher in elevation and includes the olive groves around bigger villages such as Padna, Nova vas, Sveti Peter and Dragonja. Due to the saltpans, it is not surprisingly that practically no olives can be found south of Sečovlje. A similar analysis of the actual agricultural land use in Slovenia (in Bandelj Mavsar *et al.*, 2008) made in 2002 has shown that the Municipality of Piran comprises 324 ha of olive groves. The Municipality of Koper boasts almost twice that number (635), while Izola reaches only a half of it (173 ha).

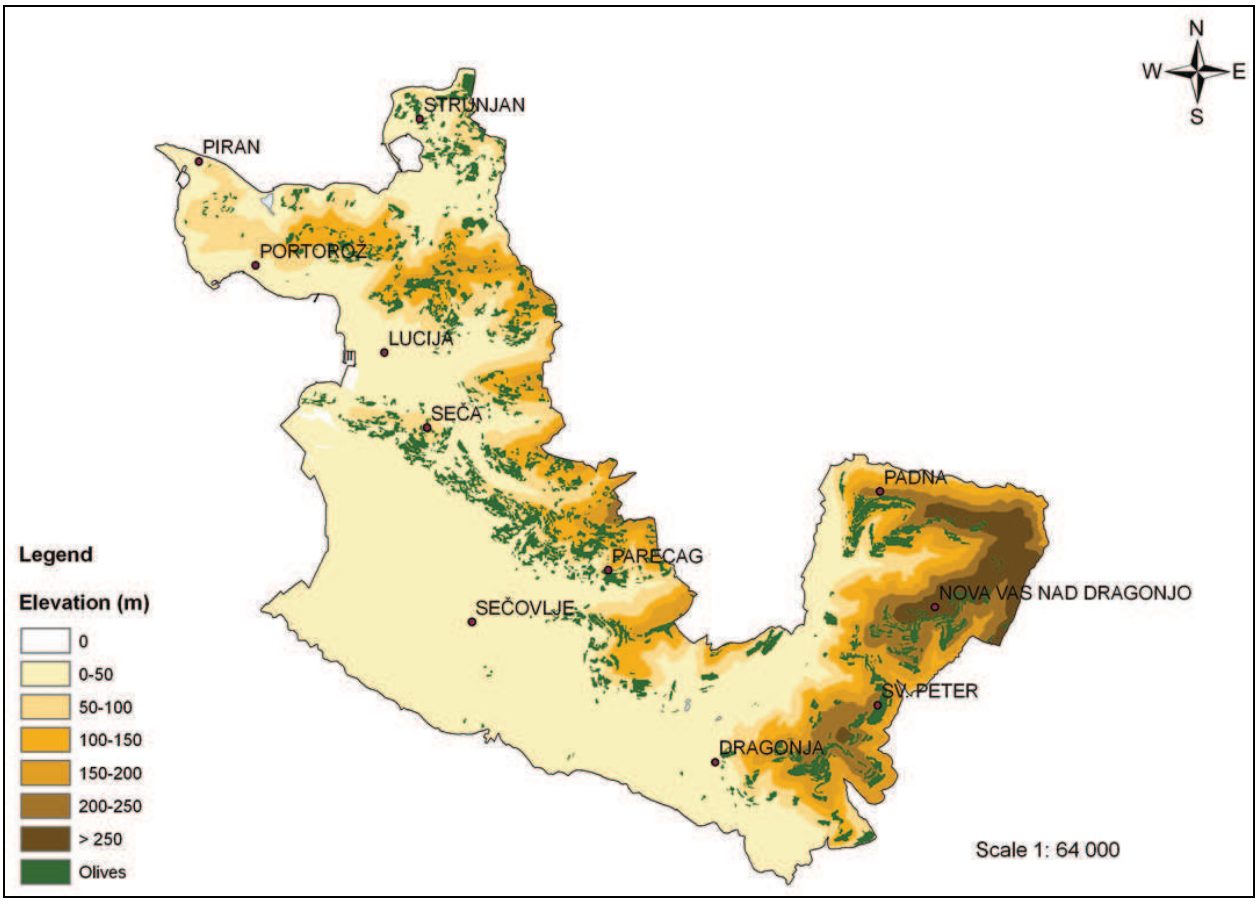

Fig. 1: The municipality of Piran: distribution of olive groves according to elevation (cartography: A. Majer; sources: GIAM, 2007; GURS, 2007; MKGP, 2008).
Sl. 1: Občina Piran: razporeditev oljčnikov po nadmorskih višinah (kartografija: A. Majer; viri: GIAM, 2007; GURS, 2007; MKGP, 2008).

Tab. 2: The Municipality of Piran: distribution of olive groves according to elevation (sources: GIAM, 2007, GURS, 2007, MKGP, 2008).
Tab. 2: Občina Piran: razporeditev oljčnikov po nadmorskih višinah (viri: GIAM, 2007, GURS, 2007, MKGP, 2008).

Elevation (m)	% of surface	% of olive groves
0–100	72.2	52.6
100–250	24.9	45.2
above 250	2.9	2.2

Three quarters of the Municipality of Piran are situated at altitudes between 0–100 meters above sea level and more than a half at the elevations of up to 50 m a. s. l.

Tab. 3: The municipality of Piran: distribution of olive groves according to slope (sources: GIAM, 2007, GURS, 2007, MKGP, 2008).
Tab. 3: Občina Piran: razporeditev oljčnikov po naklonih (viri: GIAM, 2007, GURS, 2007, MKGP, 2008).

Slope (%)	% of surface	% of olive groves
0–20	59.5	39.8
20–30	14.4	31.9
above 30	26.2	28.3

The categories of slopes are more evenly distributed (Tab. 3, Fig. 2). The majority or almost 40% of the groves lie in the up to 20% category (villages of Seča, Dragonja and Strunjan), where the agricultural conditions are considered more favourable or very suitable. The middle zone (20-30% slope) is also well present.

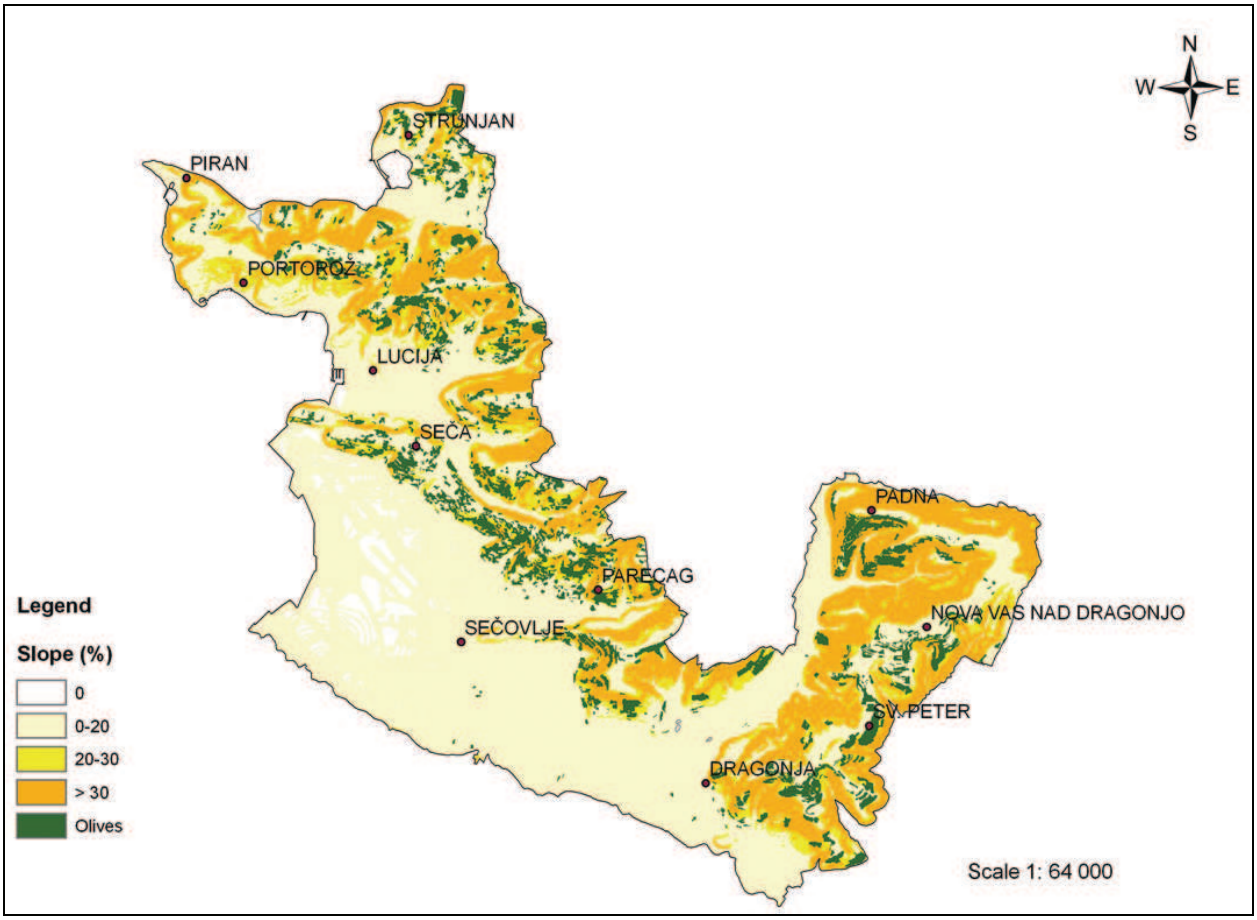

Fig. 2: The municipality of Piran: distribution of olive groves according to slope (cartography: A. Majer; sources: GIAM, 2007; GURS, 2007; MKGP, 2008).
Sl. 2: Občina Piran: razporeditev oljčnikov po naklonih (kartografija: A. Majer; viri: GIAM, 2007; GURS, 2007: MKGP, 2008).

The zone with slopes higher than 30% and considered less suitable for olive trees corresponds to the surface of 28% groves (villages of Parecag and Padna). In the latter category, the conditions for setting up and maintaining olive trees are not only harder but also more expensive in the sense of agricultural engineering.

Tab. 4: The municipality of Piran: distribution of olive groves according to aspect (sources: GIAM, 2007, GURS, 2007, MKGP, 2008).
Tab. 4: Občina Piran: razporeditev oljčnikov po ekspozicijah (viri: GIAM, 2007, GURS, 2007, MKGP, 2008).

Aspect	% of surface	% of ol. groves
S, SW	34.3	58.8
W, SE	22.8	25.8
E, N, NW, NE	42.9	15.4

In the Municipality of Piran, southern and south-western aspect locations (both being classified as very suitable) prevail, jointly comprising one third of the total municipality surface area (Tab. 4, Fig. 3). The majority of olive groves belonging to this category reside in the north-western and central parts of the Municipality. In the grouping sense, though, they are being outnumbered by less suitable locations (43%). The latter are part of the north-western aspect location near the villages of Padna, Nova vas and Sveti Peter.

In contrast, when linking the surface area with the olive grove sites, the prevalent pattern of olives being grown at very suitable localities is again shown. With 34% of the municipality surface area, the zone of the southern and south-western aspect locations is host to almost 60% of olive groves (olive belt between Seča and Parecag, east of Portorož and above Lucija). This is also the case of the Municipality's higher eastern part (Padna, Dragonja and Nova vas). A quarter of the olive tree surface area is situated on the western and south-eastern aspect locations. The northern and eastern aspect locations comprise only one sixth of the olive grove surface area, despite comprising the largest part of the municipality surface.

Questionnaire survey results

The survey results were very diverse and also revealed some methodological shortcomings of our research. First of all, the interdependence between the olive crop size and the olive grove aspect was not shown as an absolute one. Respondents listed different factors possibly influencing the crop size of olive groves and thus revealed to us that we might have overestimated the aspect of the olive grove site as a factor influencing the olive crop size. That is why we believe the relative differences between crop sizes would be more meaningful, although the factors taken into account by respondents are more significant. As noted above, they were split into two groups.

Aspect does have some impact on the olive crop size; however, it is difficult to measure it. The answers from the latter group (Group 2), when the farmers had an easier task of comparing the crop size from different groves, characterised by different aspects, pointed out the olive variety and its age as the most important factors (mentioned 7 or 6 times). The aspect was mentioned 6 times, the cultivation type 5 times. Other factors mentioned were also: soil and "various" (twice) and drought, humidity, human factor, elevation, no answer / I do not know.

The farmers, questioned and put into Group 1, had some difficulties when evaluating the aspect's impact on crop size (7 did not provide an answer), as their experience with different quality aspects had been diminished. However, they again stressed the influence of the olive age (7 farmers mentioning it) and variety (6) on crop size. In general, when the olive tree is older, it gives more crops; but this is also the case with varieties such as Istrska belica or Leccino. Other factors mentioned were: aspect, drought and cultivation type (2) and illness, microclimate, frost, planting distances and soil type (1 answer each). Apart from these factors, it is important to remark that olives are being endangered also by spring drought, although barely noticeable in the respondents' answers. It is definitely a surprising remark, since the olive has always been known as a plant resistant to different external factors, and thus also to droughts. It seems that in the last couple of years the farmers have been advised to irrigate their groves (Vrhovnik, 2007).

Generally speaking, an average olive crop size of a single tree yields around 20–25 kg of fruits, younger trees giving less (5–15 kg) and older more (also more than 70 kg) fruits per tree.

The results also showed the impact exerted by the olive grove aspect locality on frost endangerment. Olive groves located on less suitable (or/and medium) positions are more prone to frost. Frost was experienced by 80% of farmers having their groves on less suitable locations (Group 1) and by 100% of them having their groves on less and medium suitable positions (Group 2). However, this does not mean that the groves situated on theoretically more favourable aspects are not endangered, too. The percentage of farmers (Group 1) experiencing frost was higher in the category of very suitable (38) than on medium suitable aspect locations (25). In Group 2, the second highest percentage of frost occurrence appeared in the aspect category classified as less and very suitable (75), in the other two categories (less, medium, very; medium and very) it was 50. The results do not show, however, that the farmers, like in the previous situation, again stressed the importance of age and

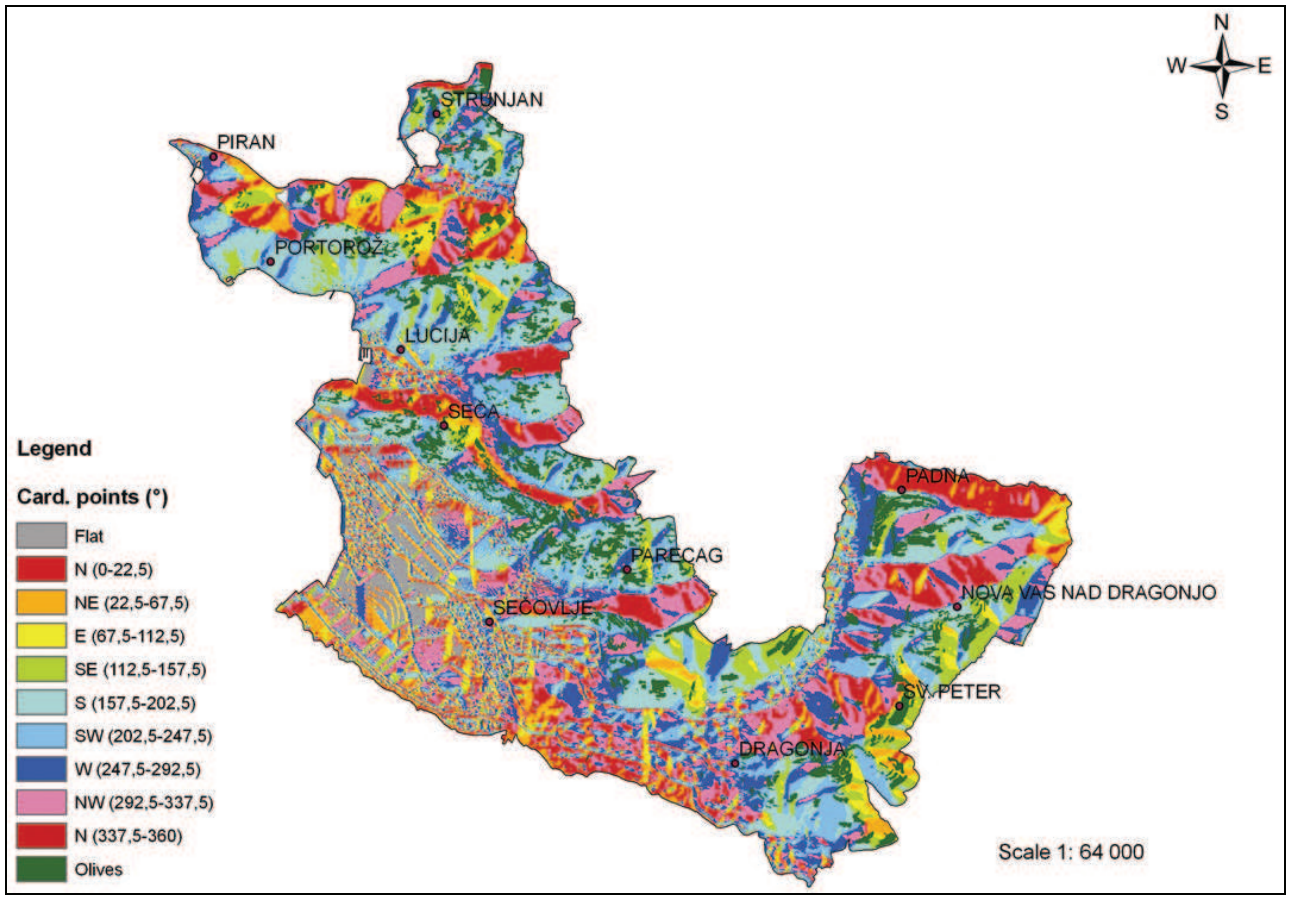

Fig. 3: The municipality of Piran: distribution of olive groves according to aspect (cartography: A. Majer; sources: GIAM, 2007; GURS, 2007; MKGP, 2008).
Sl. 3: Občina Piran: razporeditev oljčnikov po ekspozicijah (kartografija: A. Majer; viri: GIAM, 2007; GURS, 2007; MKGP, 2008).

variety of the olive tree in regard to frost endangerment. Older trees seem to be less prone to it, as well as some varieties such as Istrska belica.

DISCUSSION

It seems that the core answer of our research would reside in the broad category of "various factors". Not only that the factors are various, the important thing is also the time and type of an impact they possess by having an impact on crop size and frost threat. As these factors are both natural (variety, aspect, age) and social/economic (planting distances, plant material, type of cultivation etc.) we must also stress the importance of the human factor. Without suitable education and micro-management, such as cultivation, protection etc., the crop size will be less than satisfying, despite the fact that olive groves hypothetically inhabit the most favourable sites on Earth. A number of such cases were revealed in our survey; the most obvious concerning a farmer, who a season ago had much more crop in a theoretically less favourable east-orientated grove than in the southern one. The reason was bad cultivation, but also the greater impact of drought, which seemed to affect the grove on the southern aspect.

Quite opposite situations also occurred, *i.e.* some groves had managed to survive despite their theoretically less suitable location (an example is the farmer with a 300-year old grove on the western to northern orientation). In this respect, we believe that our aspect classification according to the cardinal points is possibly too accurate and that it should be more simplified. For example, a difference of 5 angle degrees can mean two totally different quality aspects, which is in practice almost unlikely.

From the other point of view, the results of the first part of our research in spatial distribution of olives in the Municipality of Piran certainly indicate prevalence of olive groves situated on very suitable locations. It is, in fact, in the category of aspect, where the differences show the most obvious pattern. The same as we stated the significance of the human factor above, we must at

the end also stress the importance of the physical geographic factors influencing olive growing, with both categories viewed as a whole. We can presuppose that the farmers had obviously known the favourable locations for planting their olive trees, and had obviously taken this well into account.

It would be inappropriate not to mention the opinion of one of the well-known oil producer in Slovenia, actually making the whole point of this topic.

In his opinion, the olive tree fertility is influenced concurrently by several factors. Without a thorough research (bearing in mind the pre-planting soil cultivation, plant material and planting distances, olive varieties, fertilization, tree cutting), it is thus very hard to pinpoint the cause of lesser fertility to only a single factor. He believes that this can also be ascribed to the site aspect, but only in case of big deviations in the crop size when compared to more favourable sites. He also believes that a less suitable aspect can decrease the tree fertility in the seasons with winter marked by both severe frost and bora wind, as well as during the years when harsh conditions such as heat, drought and bora are experienced during the blooming period (causing low effective fructification in plants). Otherwise he does not see significant differences in crop size, which would be the case of aspect location. If claiming the opposite, one should eliminate other factors, which are in his opinion more important, especially the density of planted trees, planting distances and quality planting material that outclass the favourable climate and soil conditions (V. Dujc, *pers. comm.*).

CONCLUSIONS

Physical geographic characteristics of Slovene Istria, including the Piran Municipality, determine the latter as an area with very favourable conditions for olive growing. The spatial distribution of olive groves is in relation to the specific topoclimatic factors: elevation, slope and aspect. To summarize: 98% of olive groves are located in the elevation zone of up to 250 m, almost 40% of them are situated on slopes with less than 20%, and almost 60% on southern and south-western aspect locations. In all three categories, these numbers constitute the majority, so we can conclude that olive groves in the Municipality of Piran can theoretically boast very good and very suitable relief conditions.

In practice, however, the results of our survey in which we tried to evaluate the impact exerted by the grove aspect on crop size and crop threat, has furthermore shown the following premises about the olive growing:

- a vast number of factors influence olive growing;
- these factors can have a simultaneous effect, and if we assess one of them, others have to be also considered (directly), although some can be or must be eliminated;
- even if these factors have a simultaneous effect, the extent of their impact will be related to their duration and time of occurrence (e.g. macro- and microclimate factors).

All this would be also taken into account if we decided to associate the elevation or slope with the crop size, instead of the aspect. For an applicable analysis, one should firstly highlight a single factor while eliminating the others. All this would require much knowledge from the fields of agronomy, aeromechanics and agriculture, which of course exceeds the topic of our research.

Two important factors regarding the crop size and frost threat have been revealed by the research: olive age and variety. Older olives have better fertility and are less prone to frost; the same can be said of some well known varieties, such as Istrska belica. Regarding the frost, no aspect can provide for the plants' 100% protection; on more south orientated slopes its impact can, perhaps, be minimised.

One of the decisive issues that should not be overlooked is the human factor. The same as we can classify *e.g.*, elevation or slope as very or less suitable, we can also classify the olive growers. A good site for olive growing can be quickly ruined by inappropriate cultivation. This can be clearly yet another key conclusion of our research; although our sample of the people surveyed was perhaps too small, it was in our opinion of high quality and professional.

On the other hand, we believe that our presumptions regarding the aspect's impact either on crop size or on frost threat should not be regarded as too naturally deterministic in a sense that nature predominantly influences certain cultural activities. According to our spatial analysis, the majority of olive groves are situated on locations, classified as very suitable. As the trees are planted by farmers, they are obviously aware of the significance of good geographic (not only topoclimatic) locations and take them into account as well. With this we confirm the last statement from the upper paragraph.

In the future, olive growing will face many potential obstacles, several of which have not been highlighted in our analysis (such as pest attacks and, more important, drought in the light of the forecasted climate change). In the author's opinion, the education, knowledge, will and expert support will be the factors that will play the crucial role in facing the future challenges in the field of olive growing in Slovenia.

TOPOKLIMATSKE RAZMERE KOT DEJAVNIK VPLIVA NA OLJKARSTVO V OBČINI PIRAN

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POVZETEK

Na uspevanje oljk vplivajo številni naravni in družbeni dejavniki. Slovenija je s svojo zemljepisno lego ena izmed najsevernejših rastišč, kjer oljke teoretično še lahko uspevajo in so razmere za njihovo izkoriščanje še gospodarne. Med naravne prištevamo temperaturo zraka, padavine, veter, svetlobo, kamninsko zgradbo ter reliefne oz. topoklimatske dejavnike. Med družbene dejavnike, ki so lahko posledica naravnih, pa prištevamo visoke stroške obdelave nasadov na strmih terenih, parcelno razdrobljenost olj čnih nasadov, neznano lastništvo, manjši ekonomski iztržek od prodaje olja v primerjavi z vinom, itd.

V raziskavi smo si zastavili dva cilja. Prvi je bil predstaviti prostorsko porazdelitev olj čnih nasadov (kot kategorije rabe tal) v občini Piran v luči izbranih reliefnih dejavnikov (nadmorske višine, naklona in ekspozicije). Tu smo uporabili metode računalniške izdelave kart z GIS-om. Drugi cilj je bil ovrednotiti vpliv ekspozicije nasadov na količino pridelka oljk ter na ogroženost zaradi pozeb za območje občine Piran. Ta cilj smo skušali doseči z vprašalniki odprtega tipa med oljkarji z nasadi na različnih ekspozicijah. Dostopni so nam bili le podatki (kontaktni ter o nasadih) tistih oljkarjev, ki imajo nasade prijavljene v GERK. Zaradi pomanjkanja oljkarjev z nasadi na manj primernih ekspozicijah smo anketirali tudi nekaj oljkarjev v občinah Izola in Koper.

Rezultati so pokazali, da so olj čni nasadi kot kategorija rabe tal v občini Piran razporejeni na legah, ki so zelo ugodne zanje. Dobra polovica vseh olj čnikov leži na nadmorski višini do 100 m in nekaj manj kot 98% do višine 250 m. 40% olj čnikov bomo našli na naklonih do 20% (teoretično to pomeni manjše stroške pri obdelavi tal). Slabih 60% jih leži na južnih in jugozahodnih ekspozicijah, spet teoretično bolj osončenih legah, zaščitenih pred močnimi vetrovi (burjo). Rezultati ankete so pokazali, da količino letnega pridelka oljk po drevesu zelo težko jasno in nedvoumno pripišemo zgolj ekspoziciji. Vpliv obstaja, vendar ga je težko oceniti. Podobno velja za možnost pojavljanja pozebe kot dejavnika razporeditve olj čnikov. Olj čniki na manj primernih ekspozicijah so se morda izkazali kot bolj dovzetni za možnost pozebe, a njeno pojavljanje tudi na najbolj ugodnih legah ni povsem izključeno. Na osnovi rezultatov prostorske analize olj čnikov v občini Piran lahko sklenemo, da se oljkarji zavedajo, katere lege so ugodnejše za gojenje oljk.

Ključne besede: oljkarstvo, občina Piran, GERK, pozeba, nadmorska višina, naklon, ekspozicija

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